

GW - 21

# MONITORING REPORTS

DATE:

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ENVIRONMENTAL BUREAU  
OIL CONSERVATION DIVISION

 **ARCADIS**  
GERAGHTY & MILLER

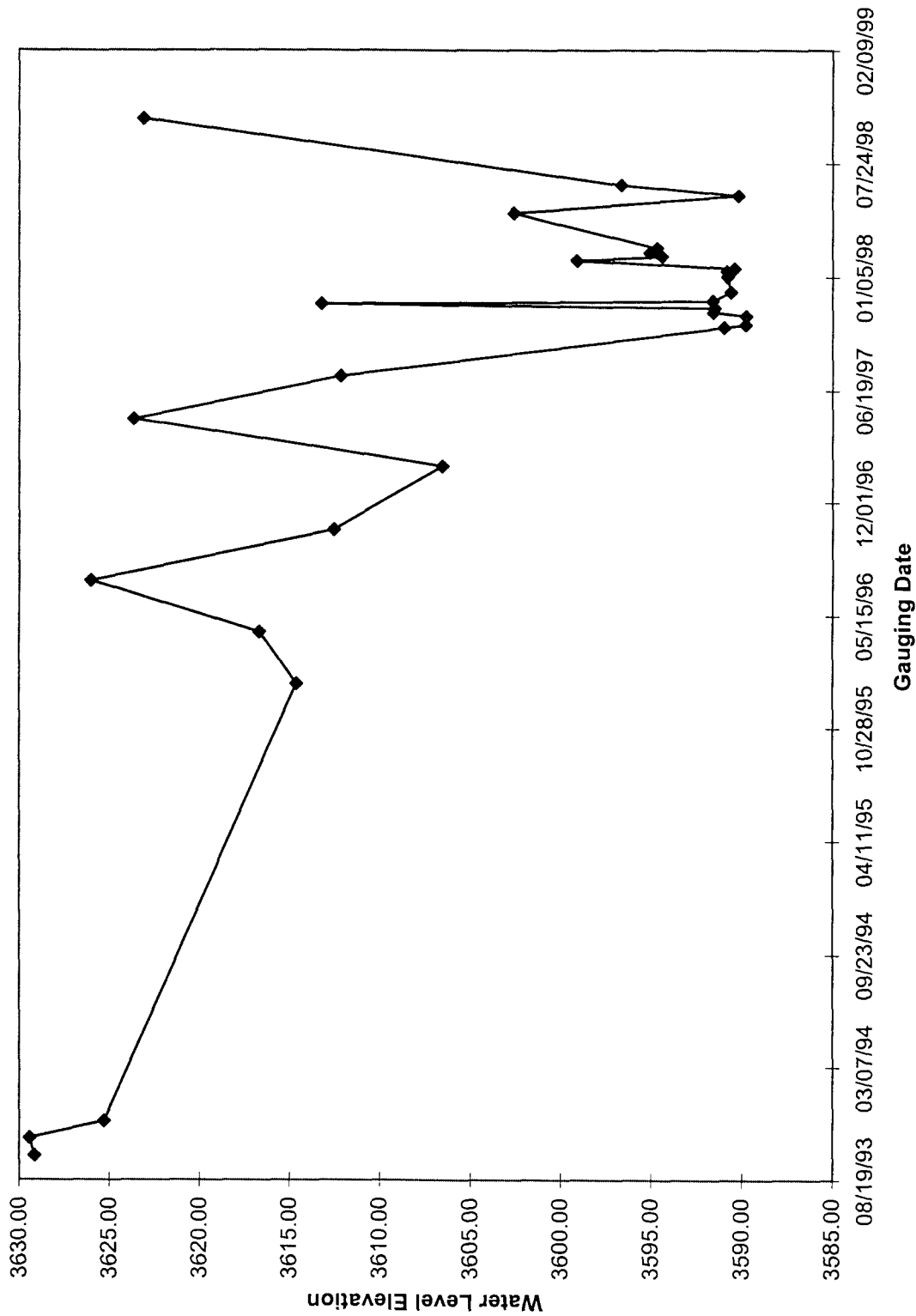
**Annual Groundwater Monitoring  
Report, January - December 1998**

Indian Basin Remediation Project  
Eddy County, New Mexico

P R E P A R E D   F O R

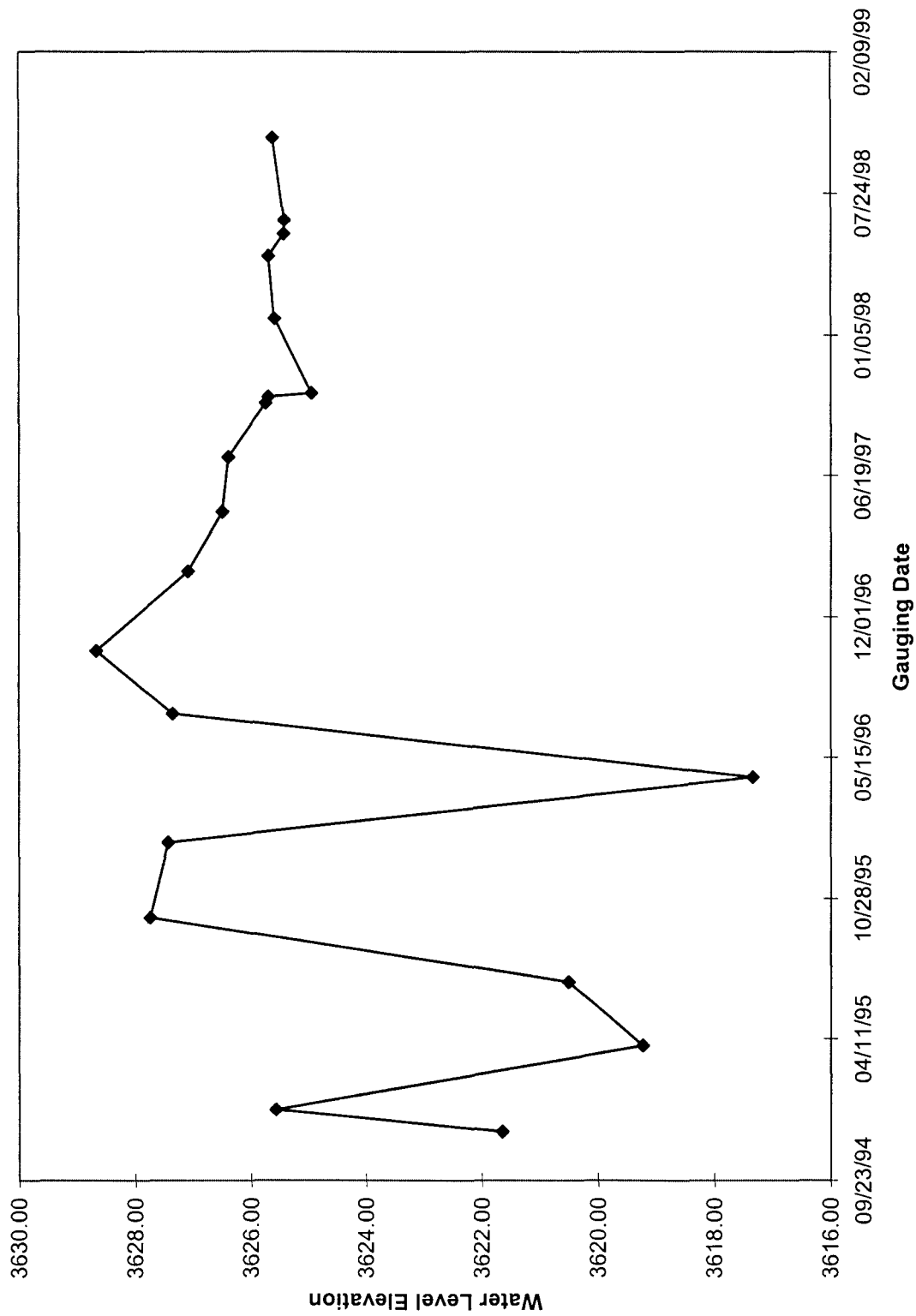
Marathon Oil Company

# MW-72



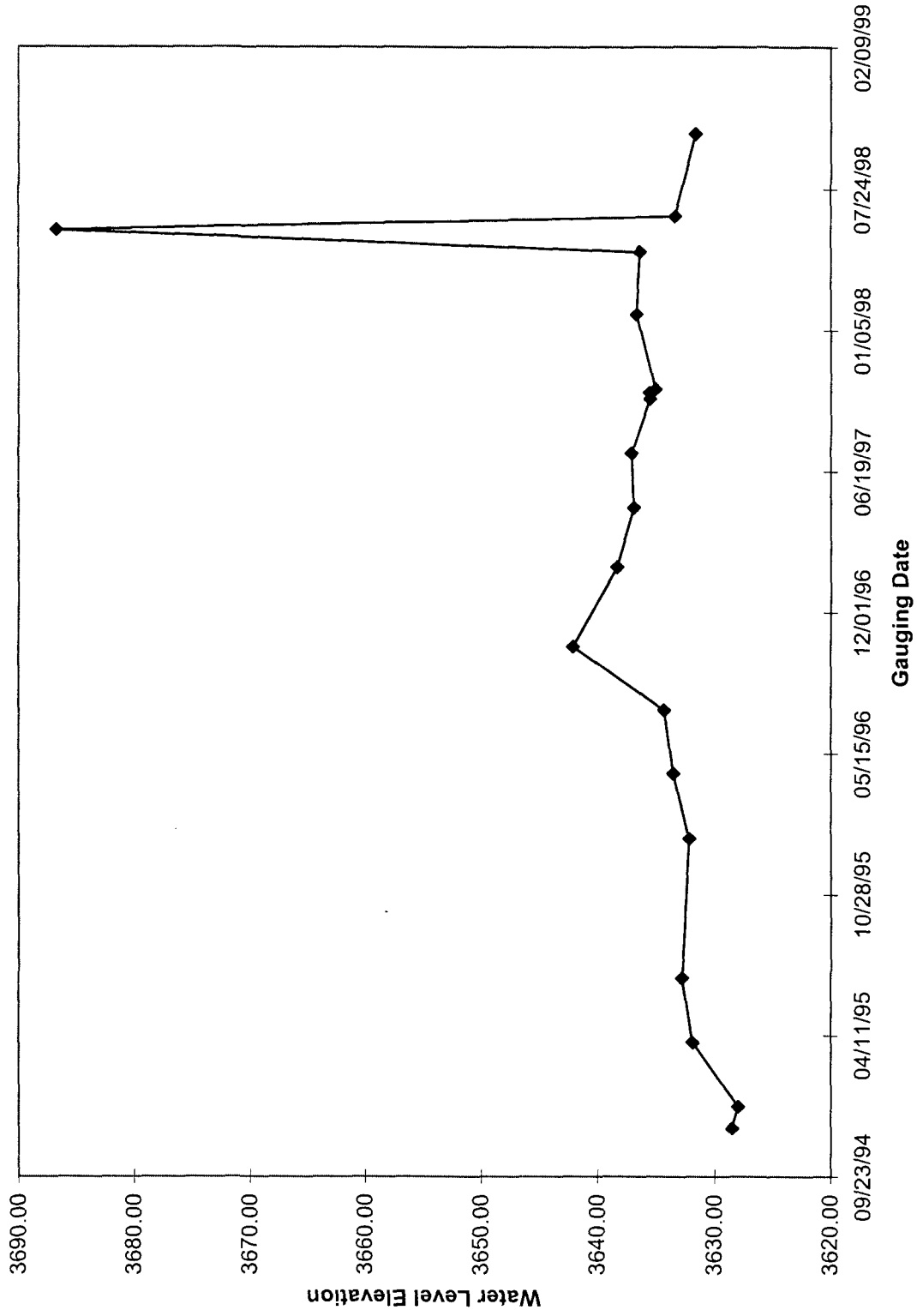
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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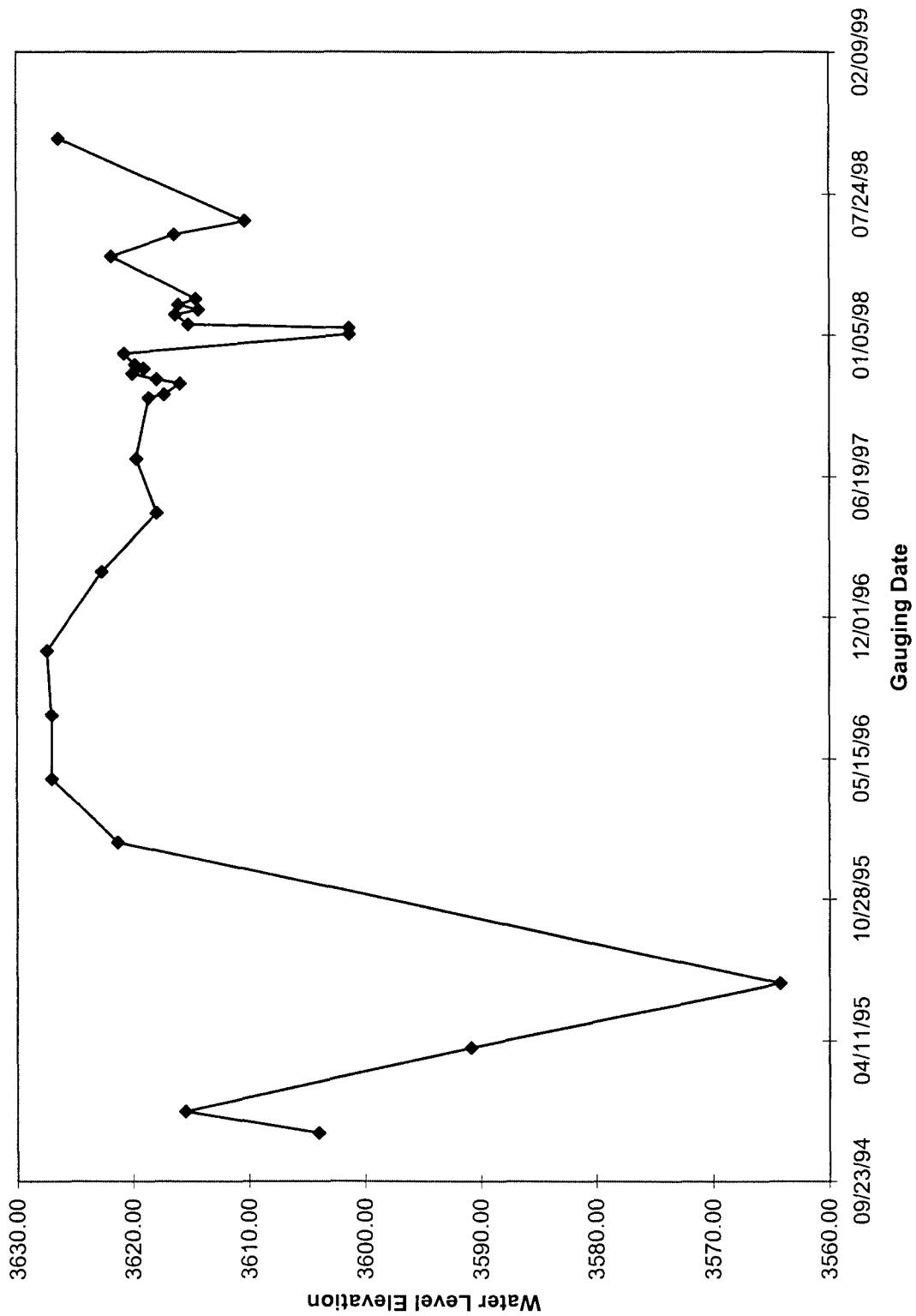
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-74



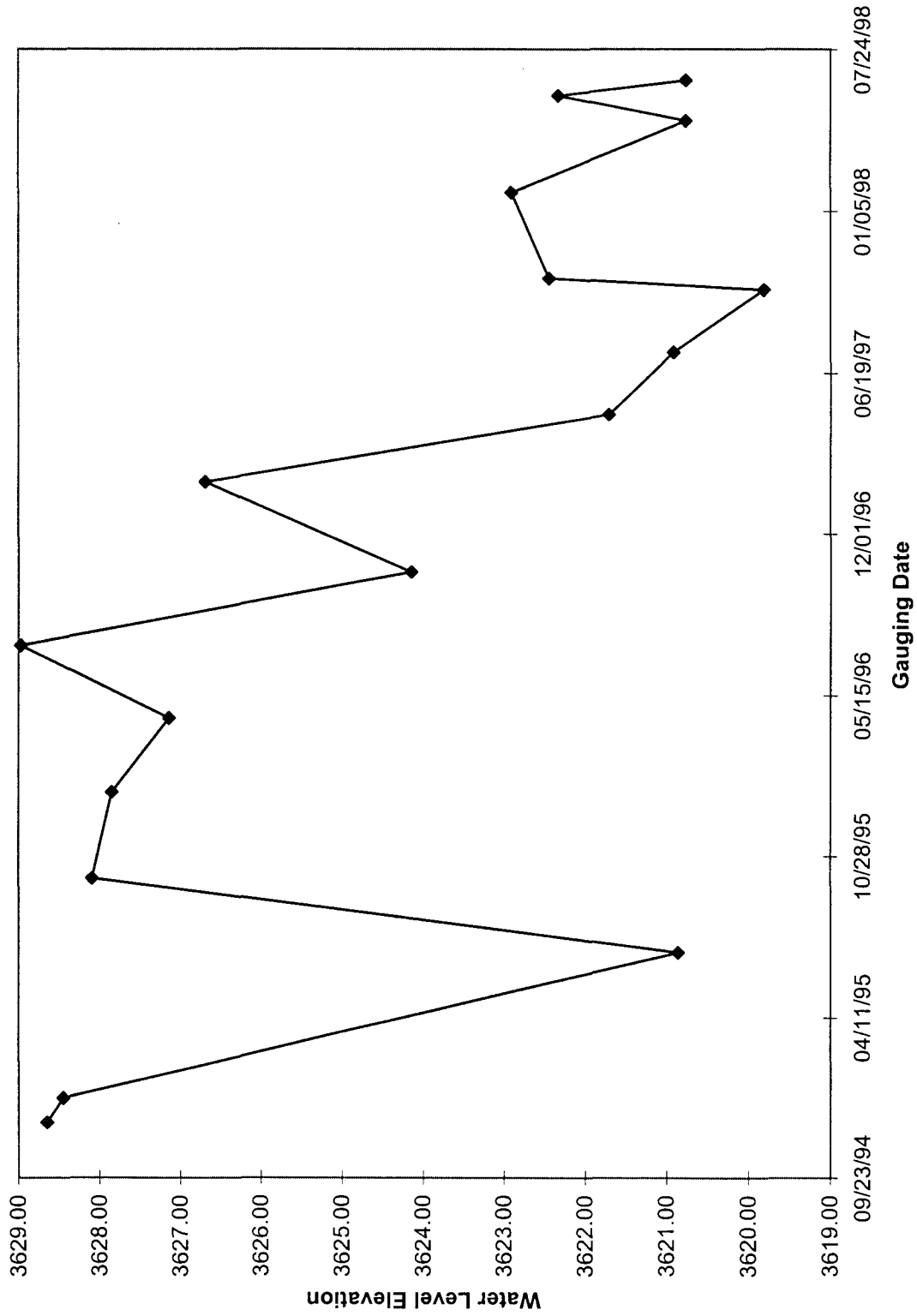
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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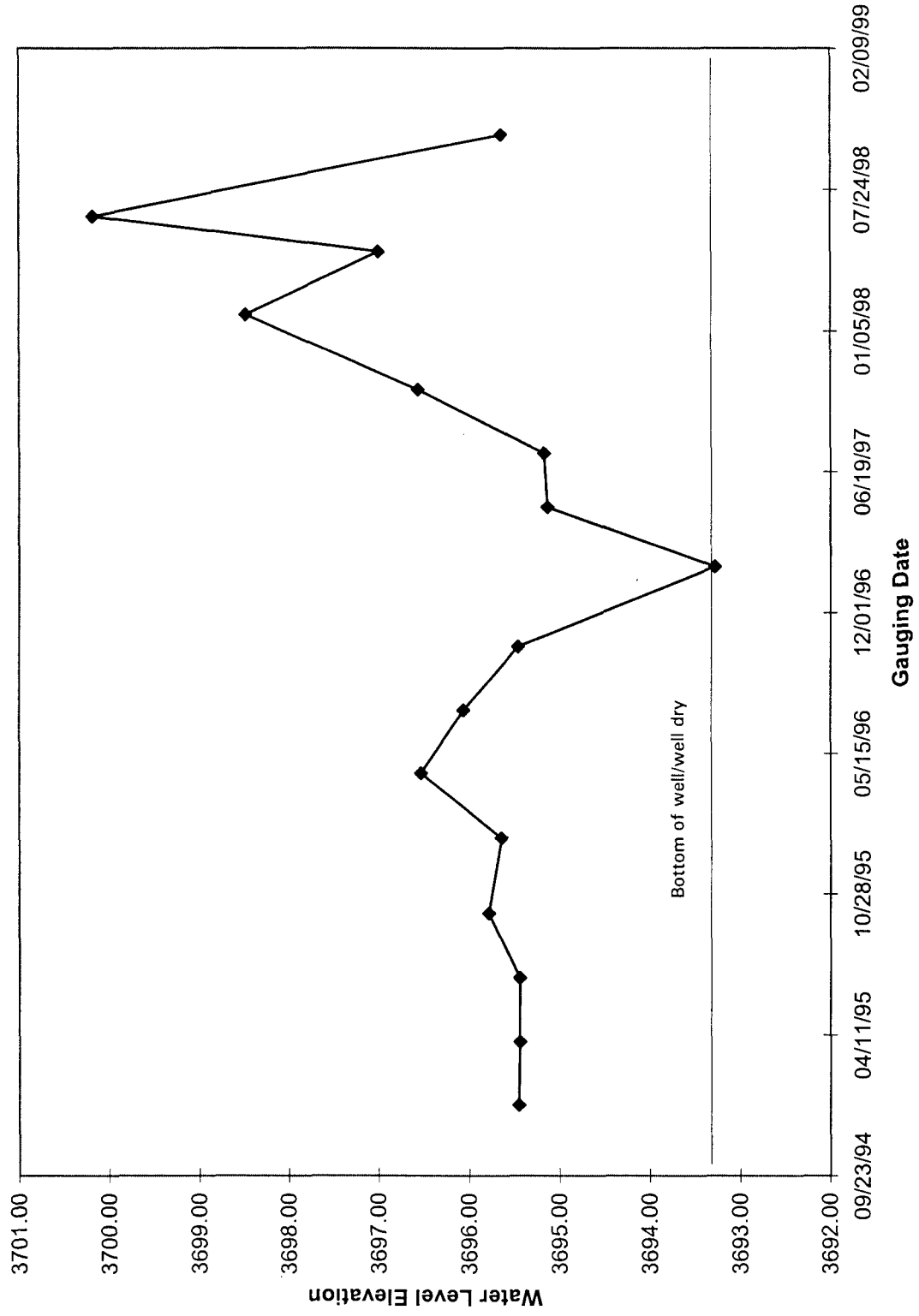
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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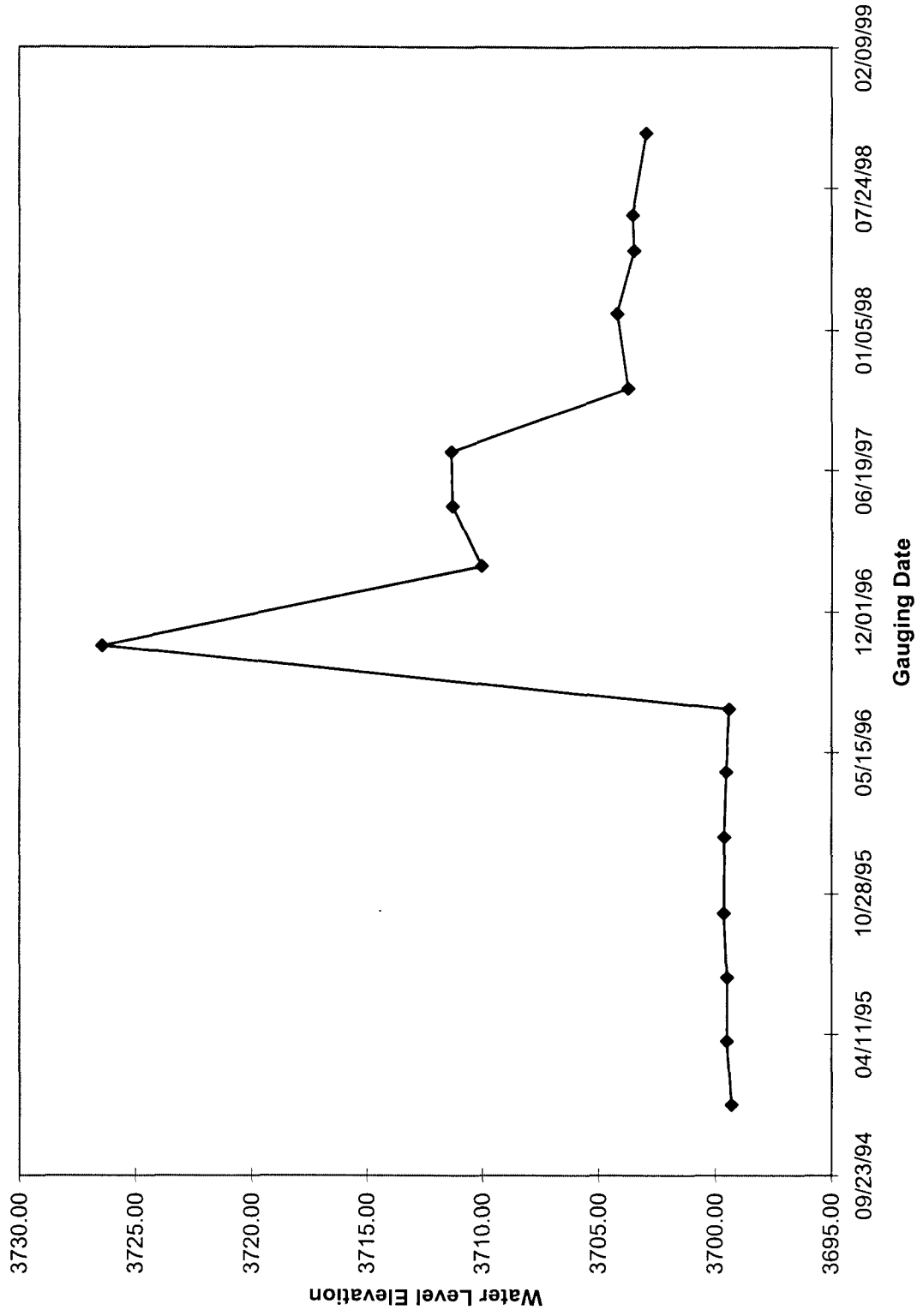
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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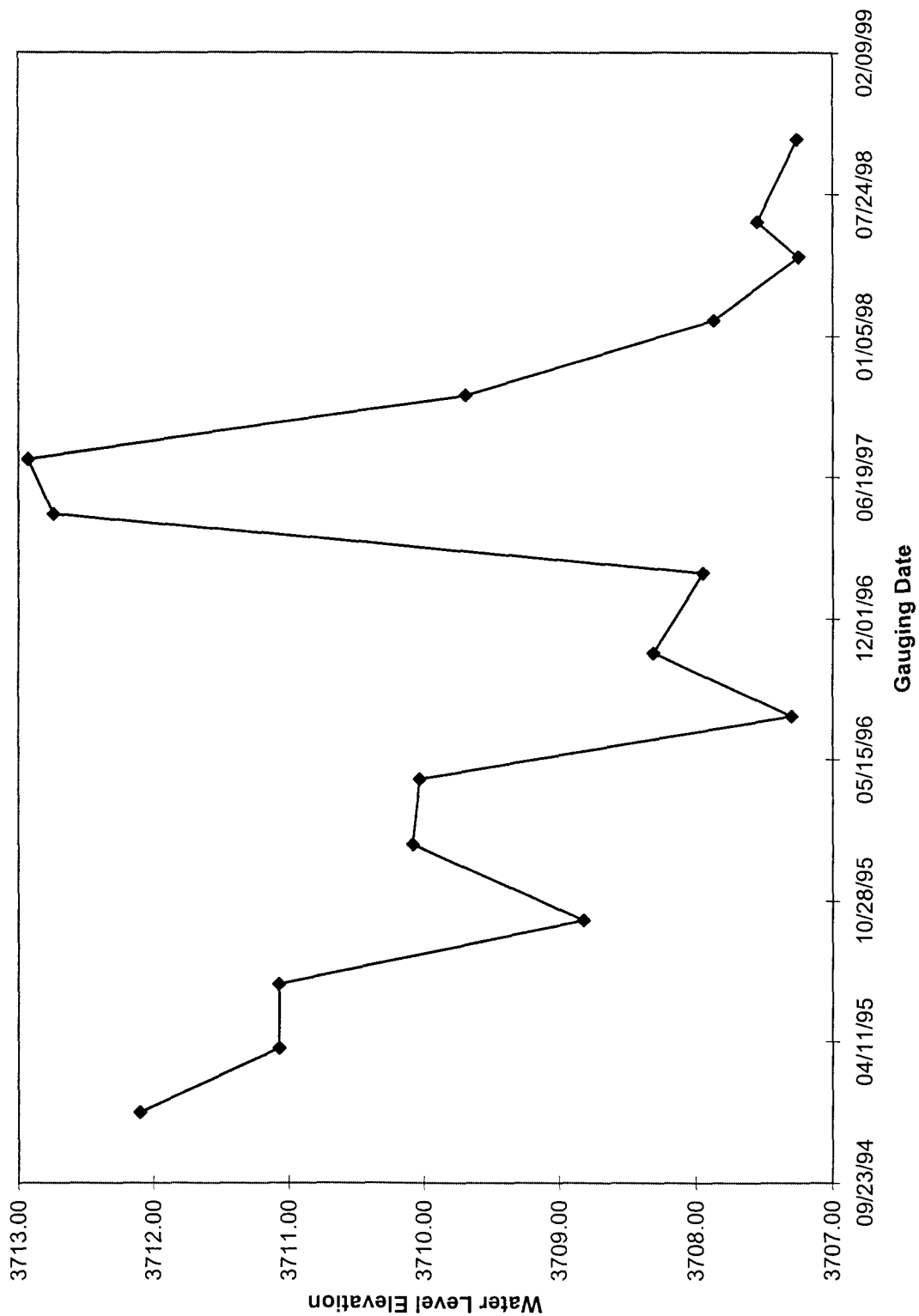
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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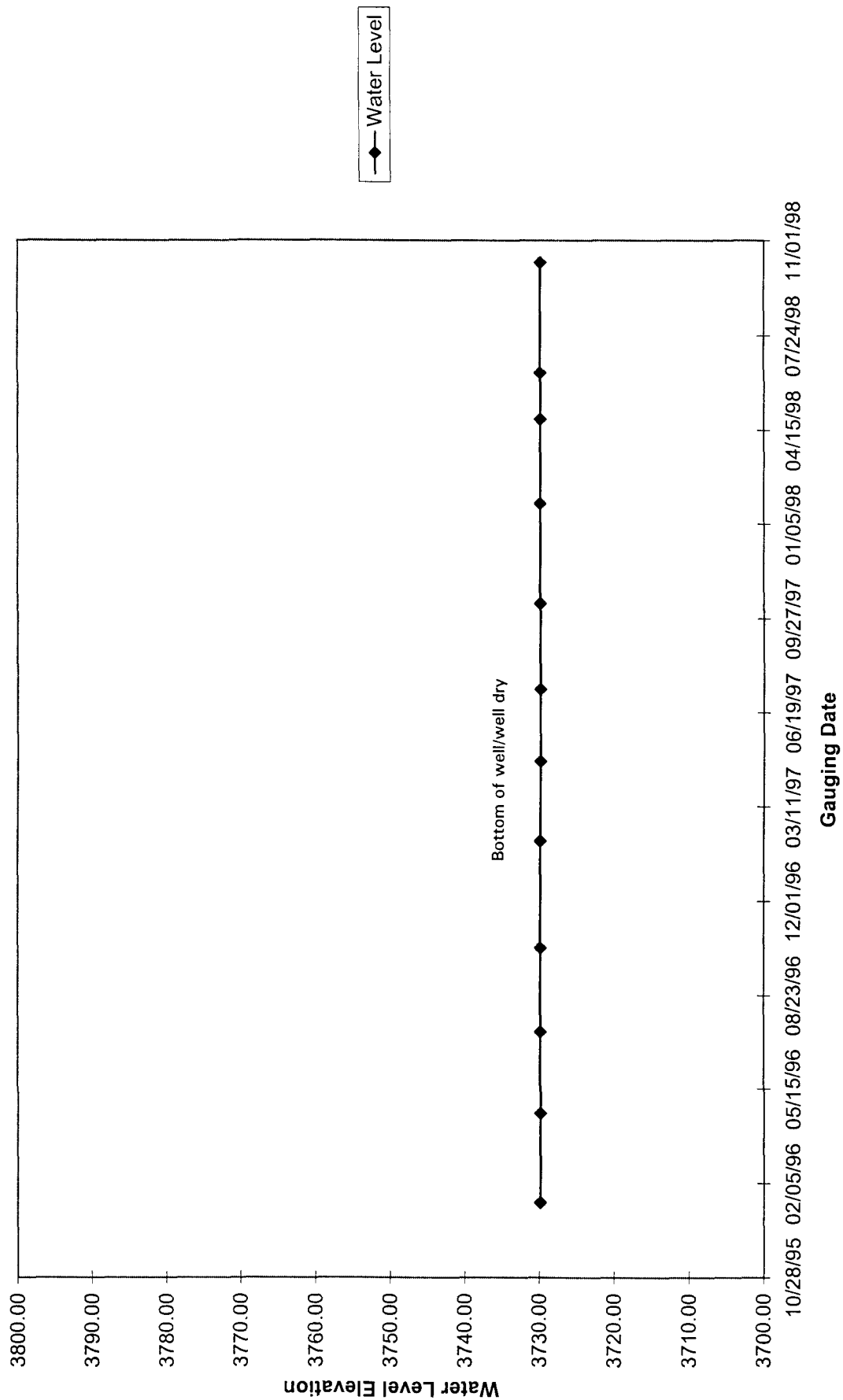
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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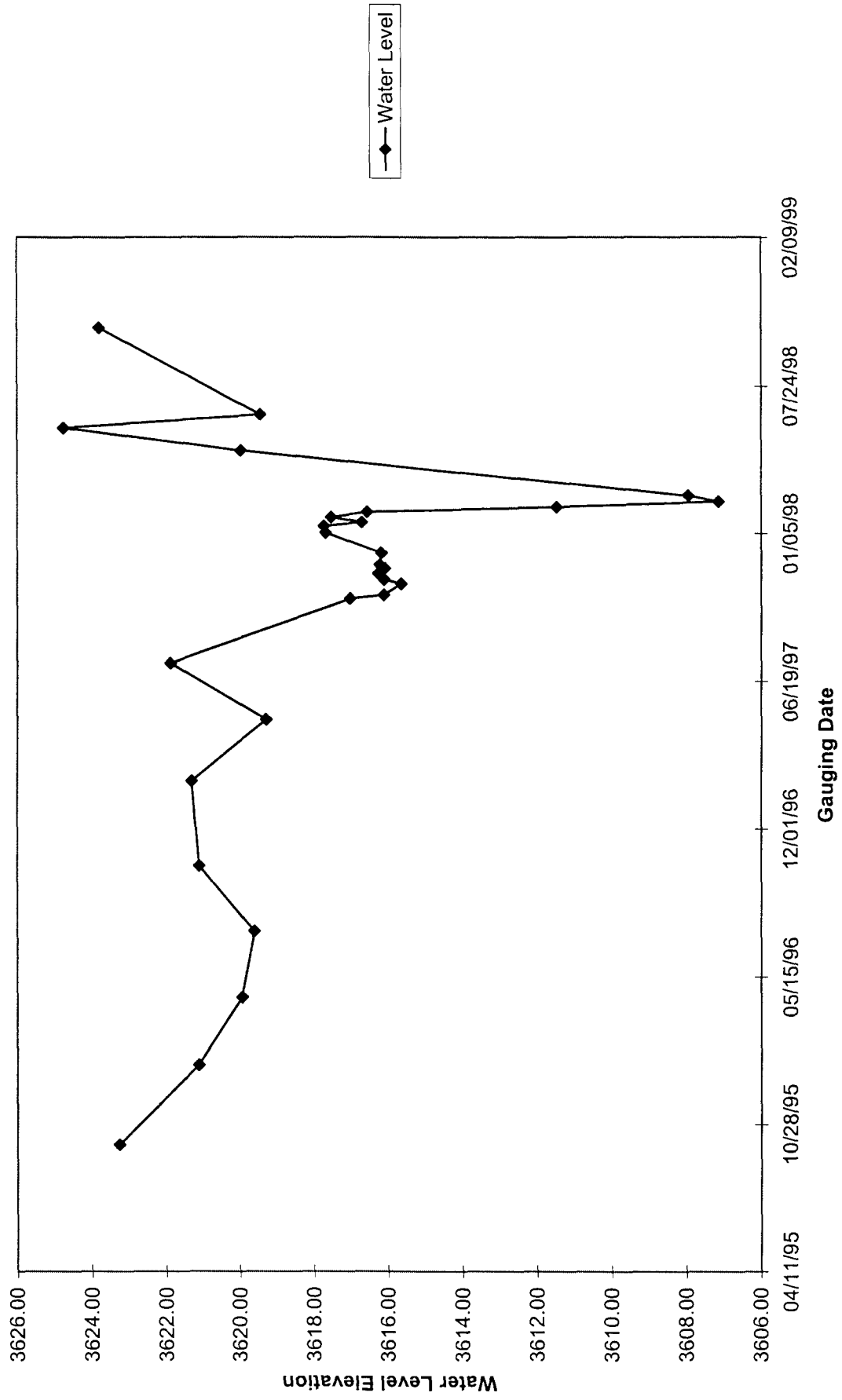
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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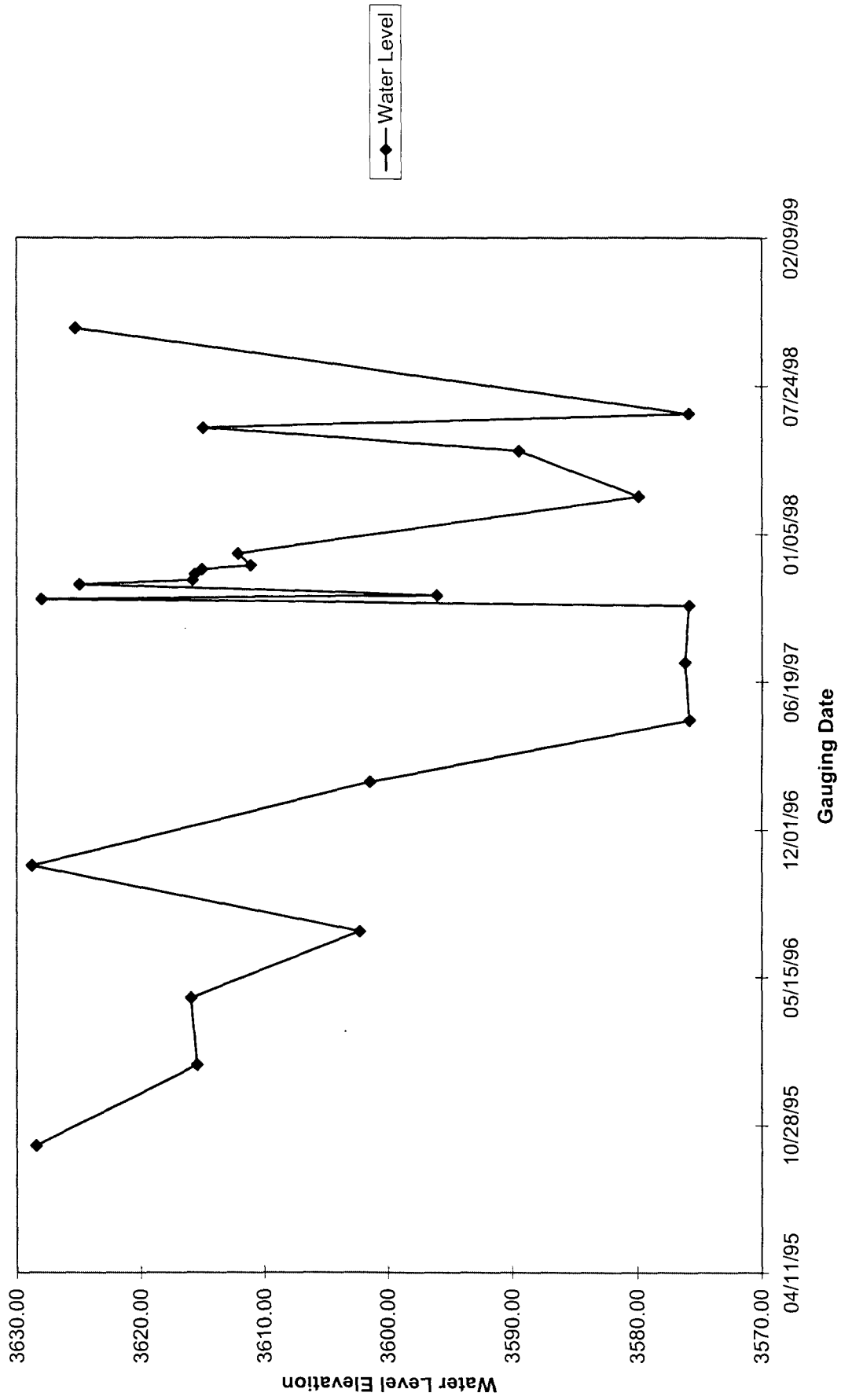
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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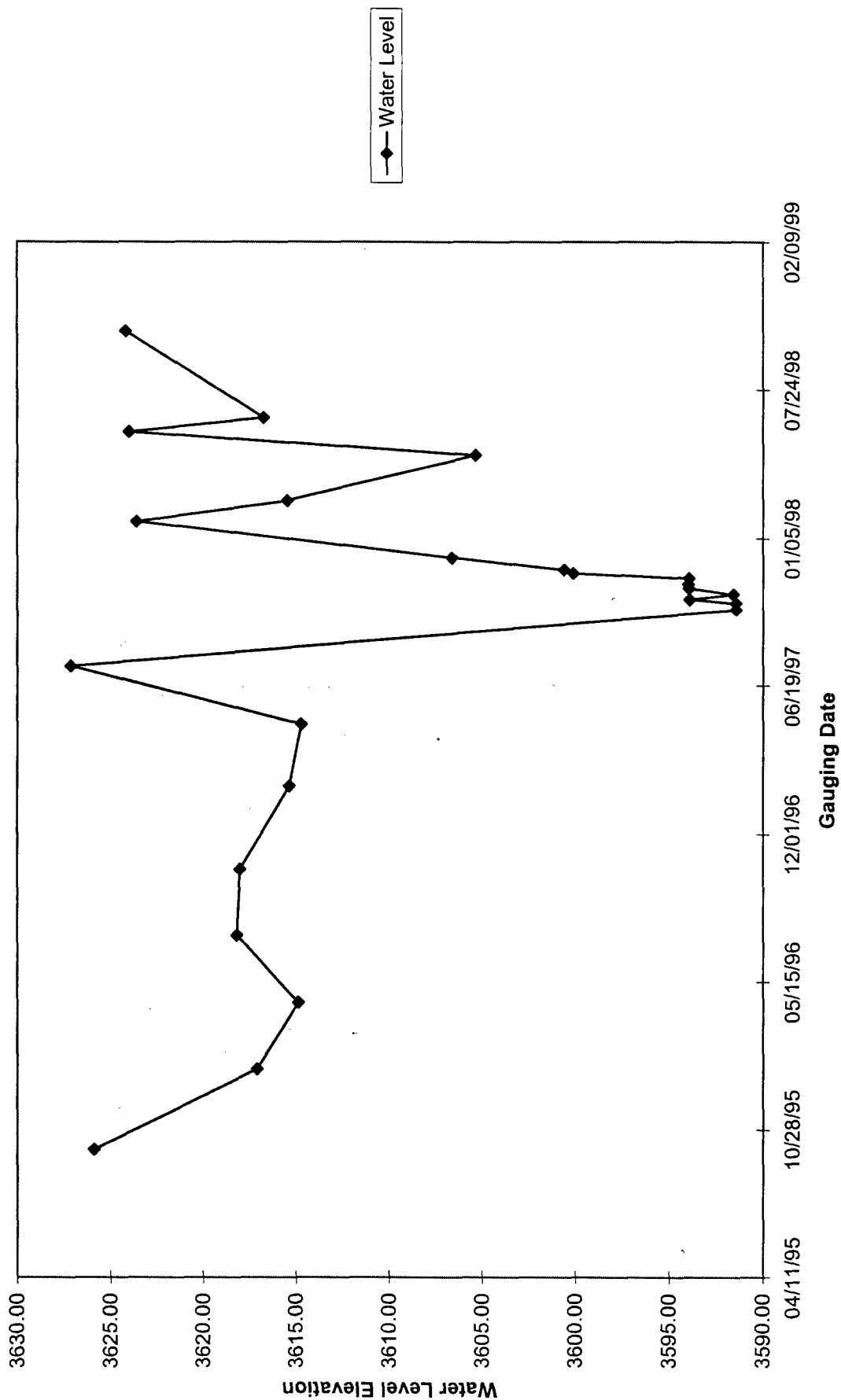
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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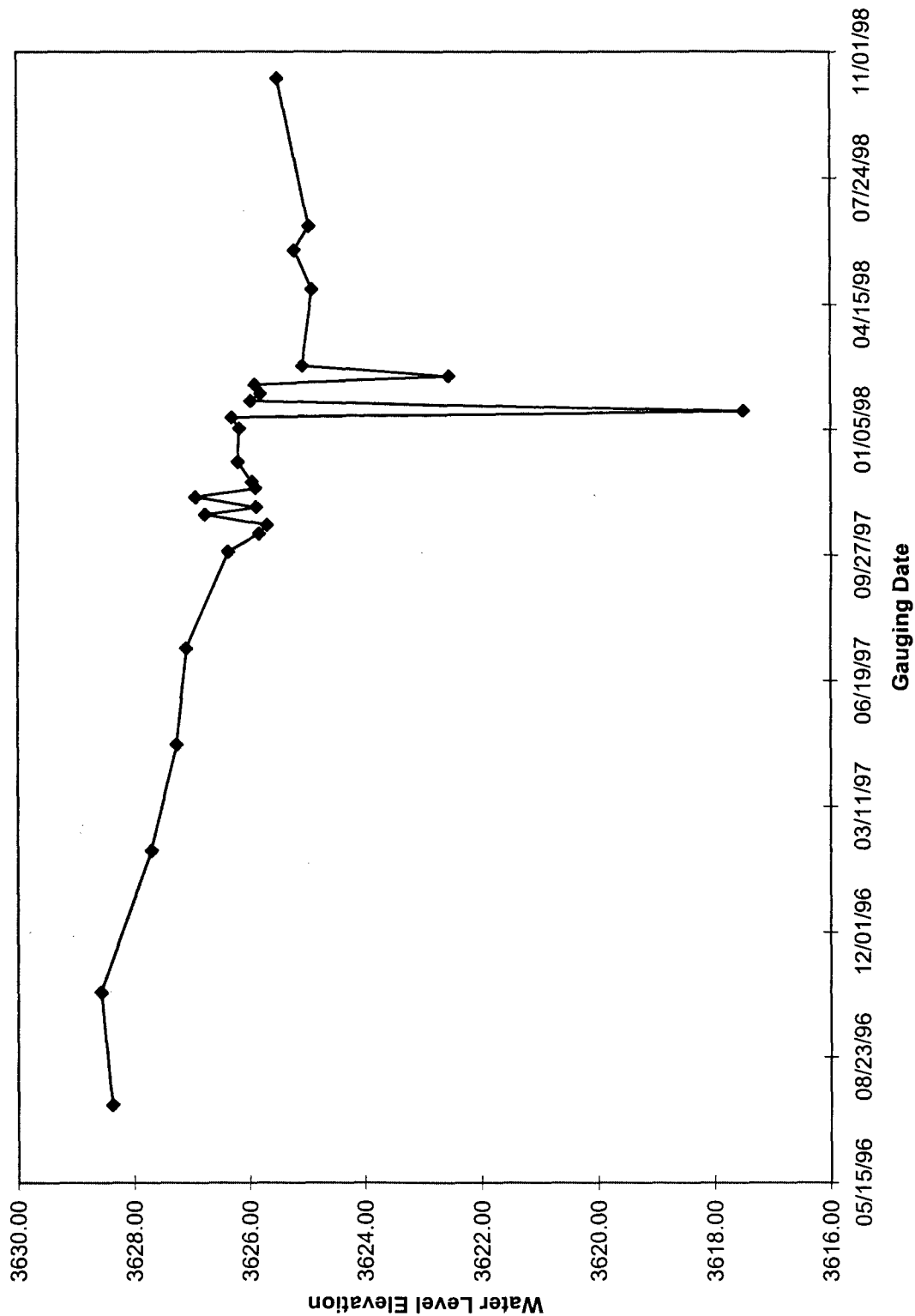
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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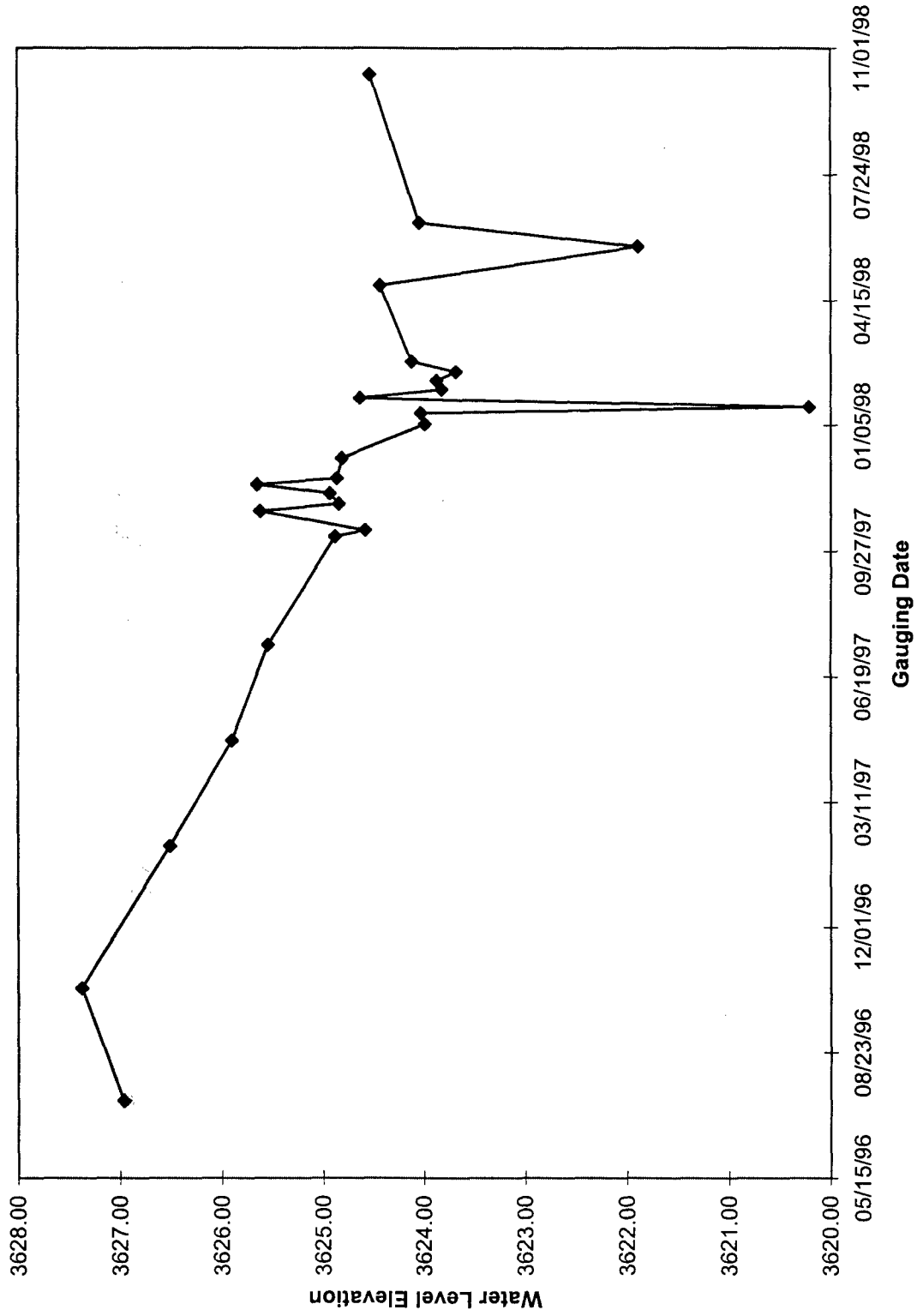
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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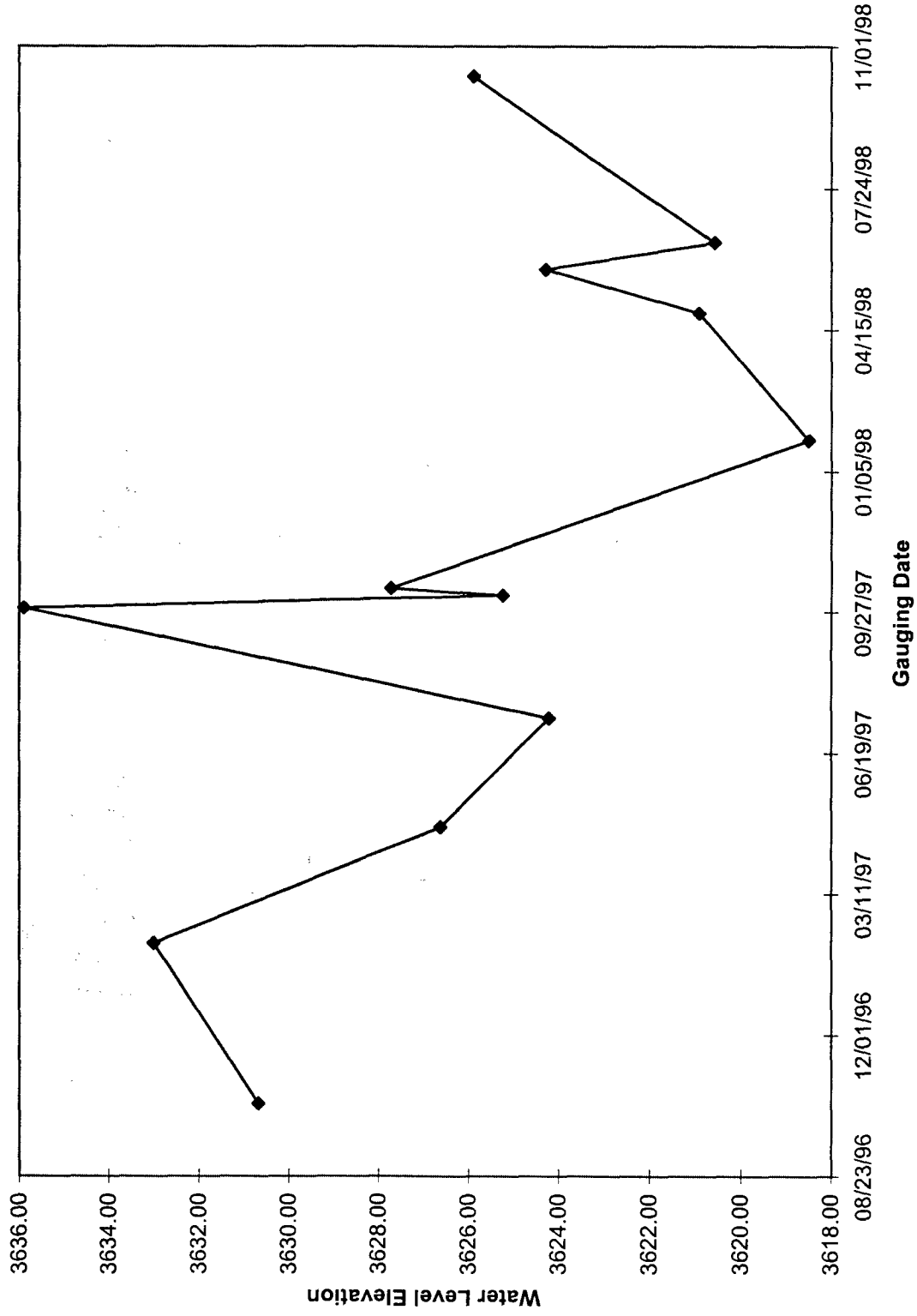
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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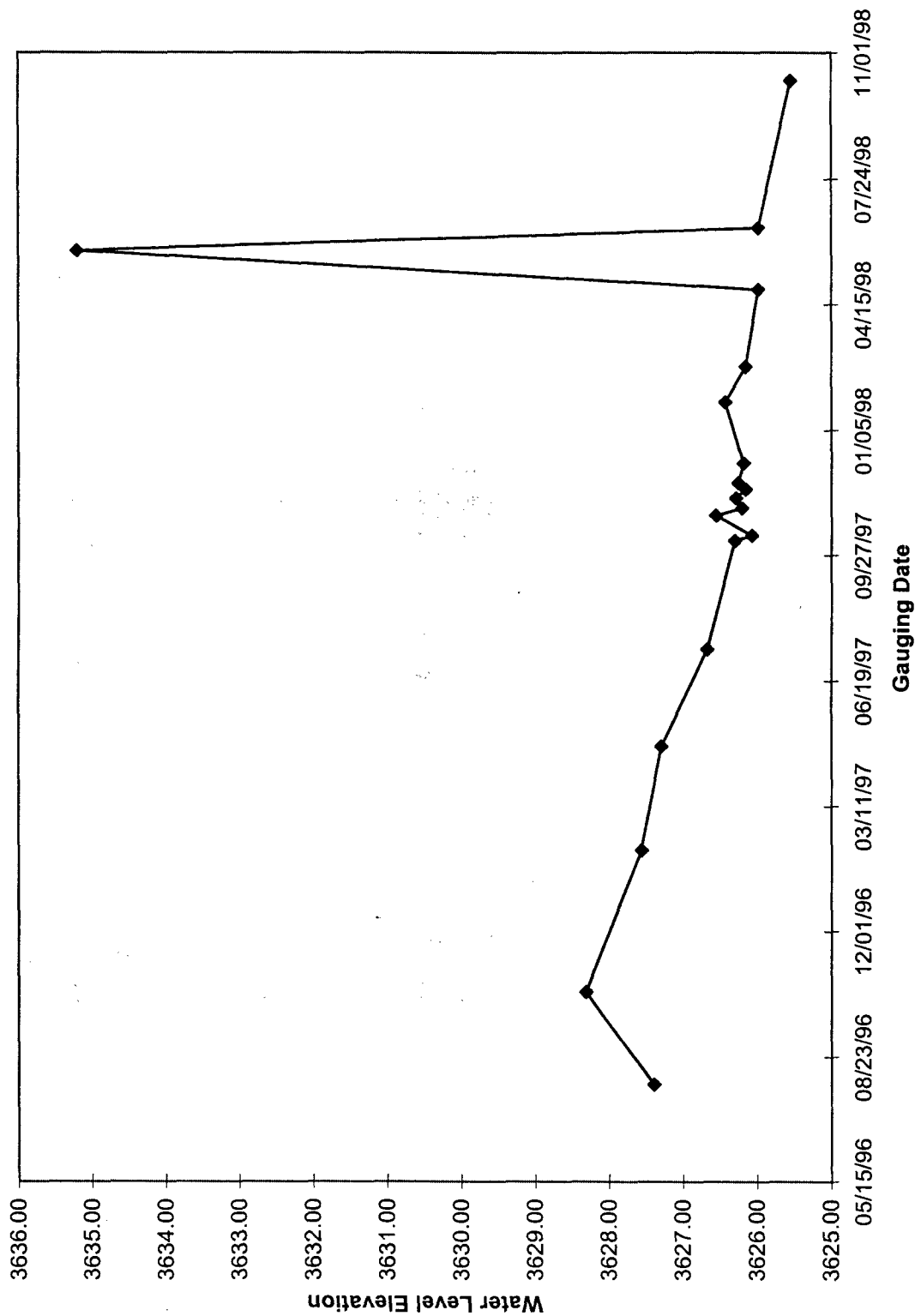
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-86



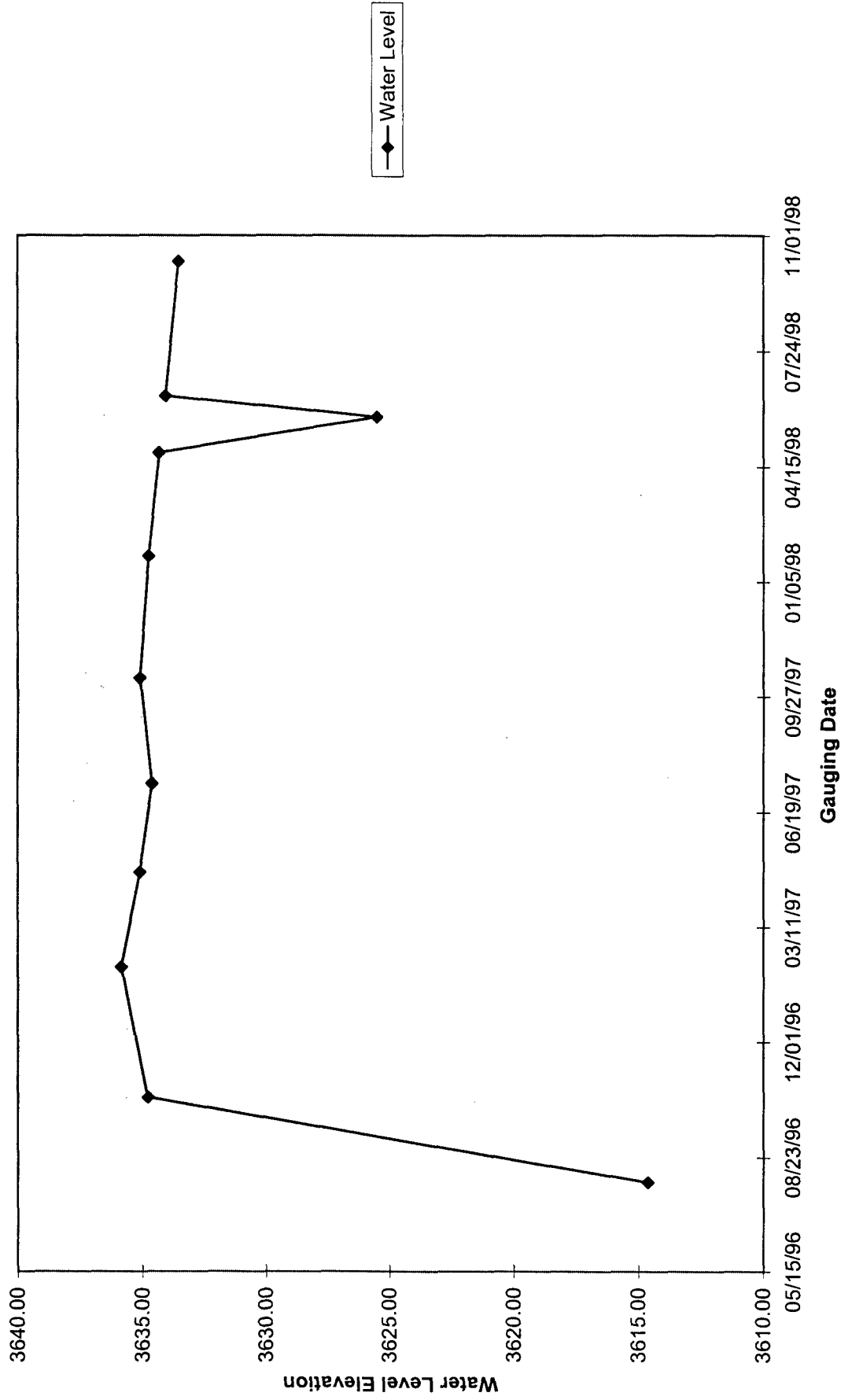
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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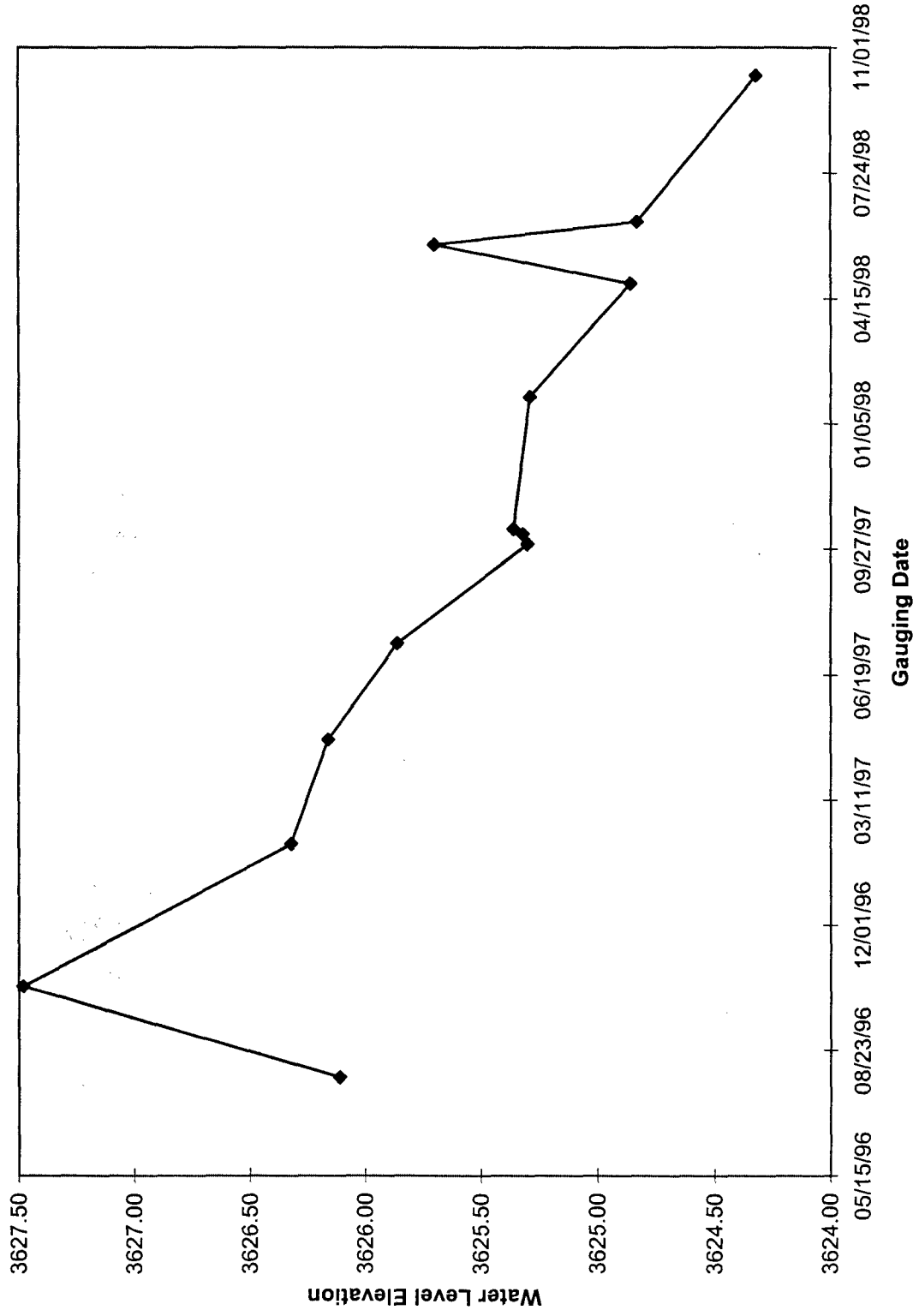
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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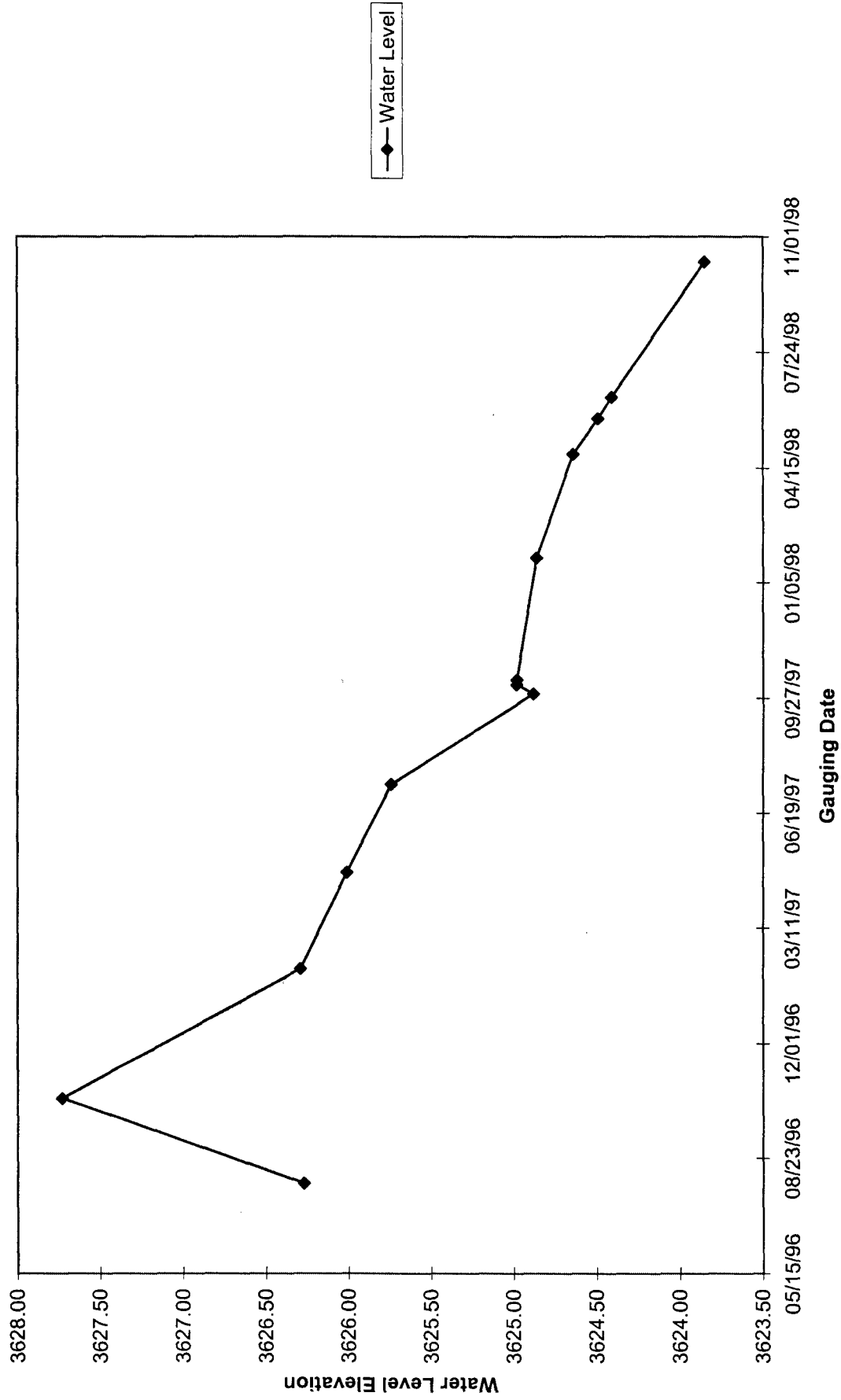
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-88



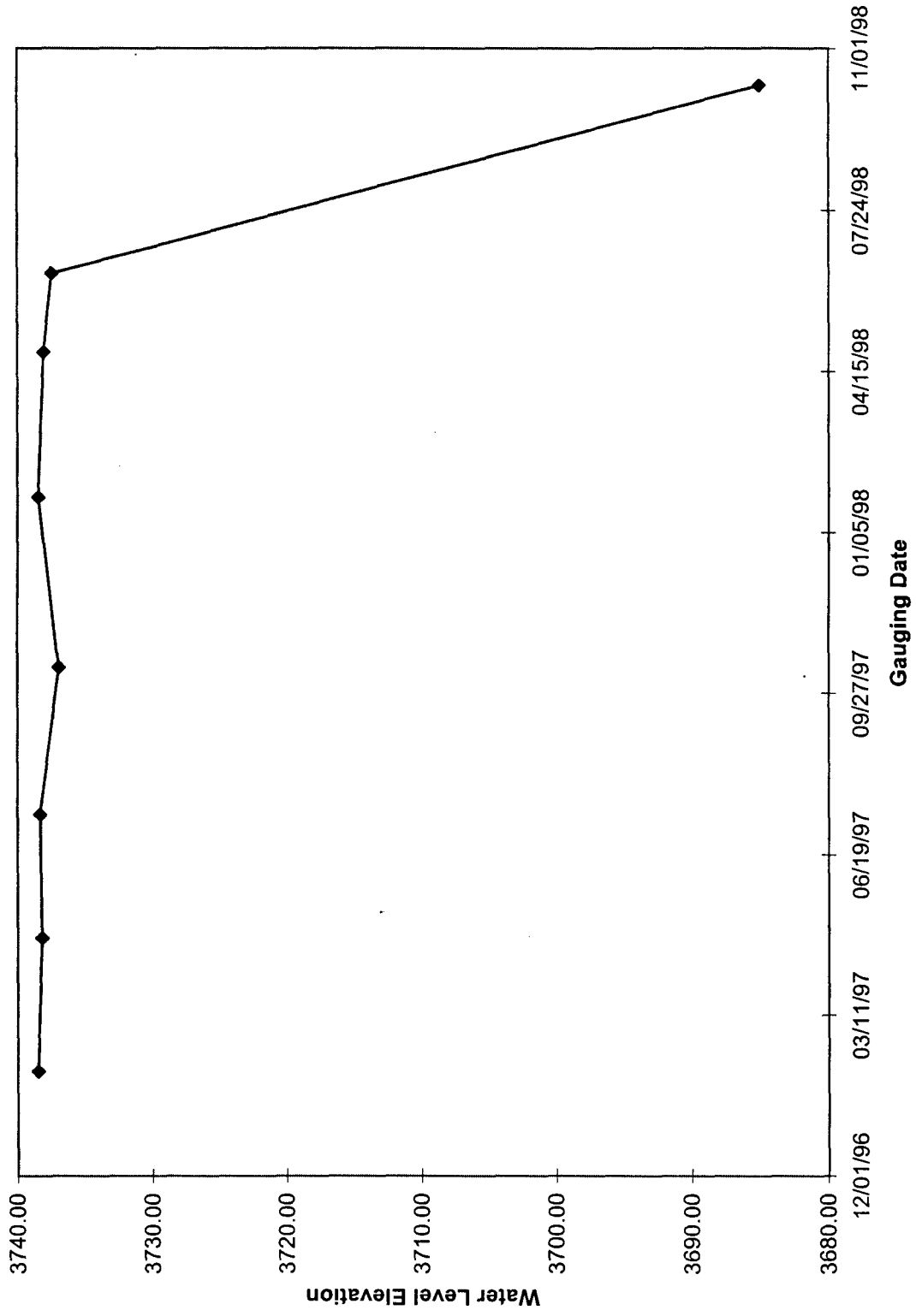
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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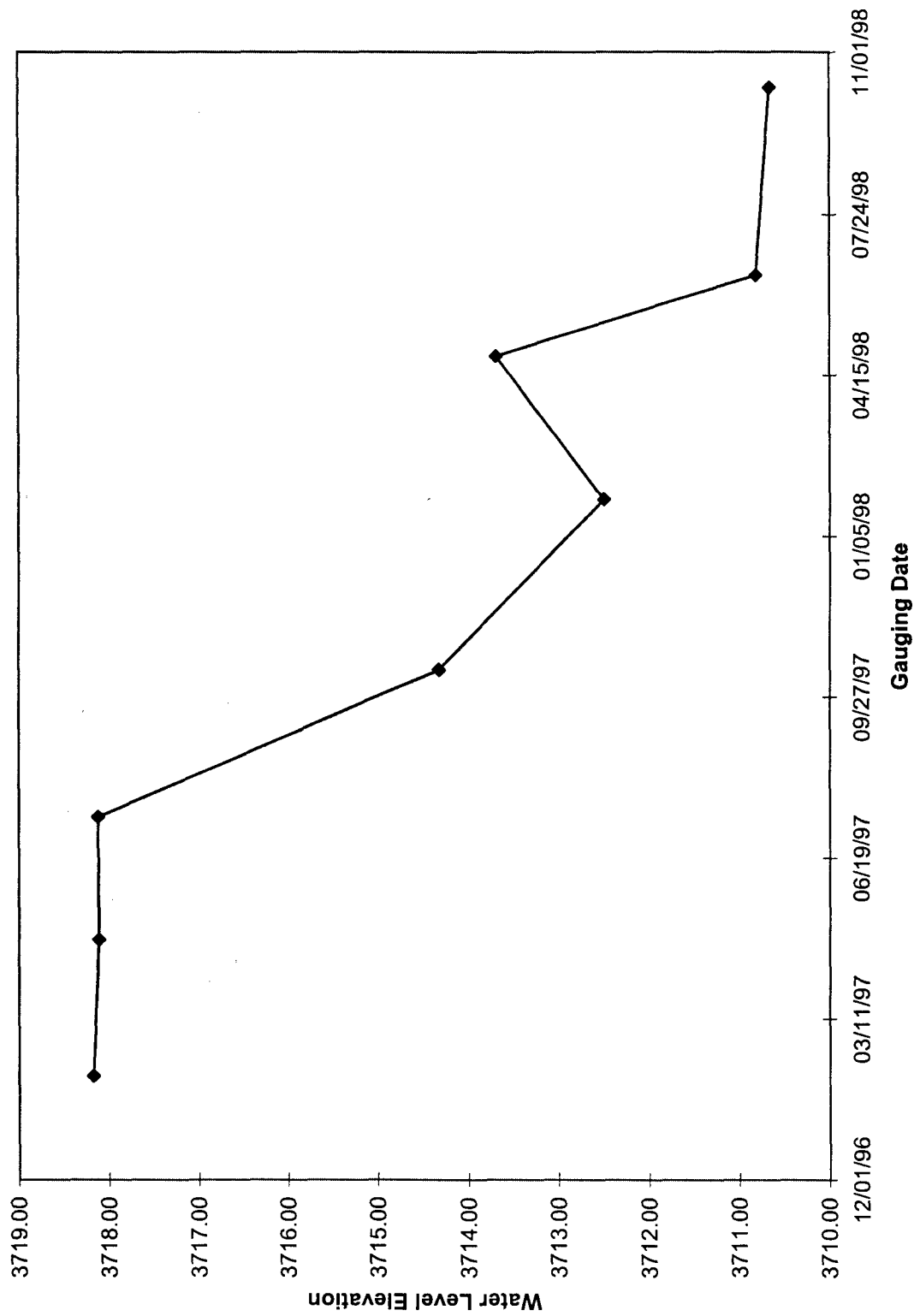
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-90



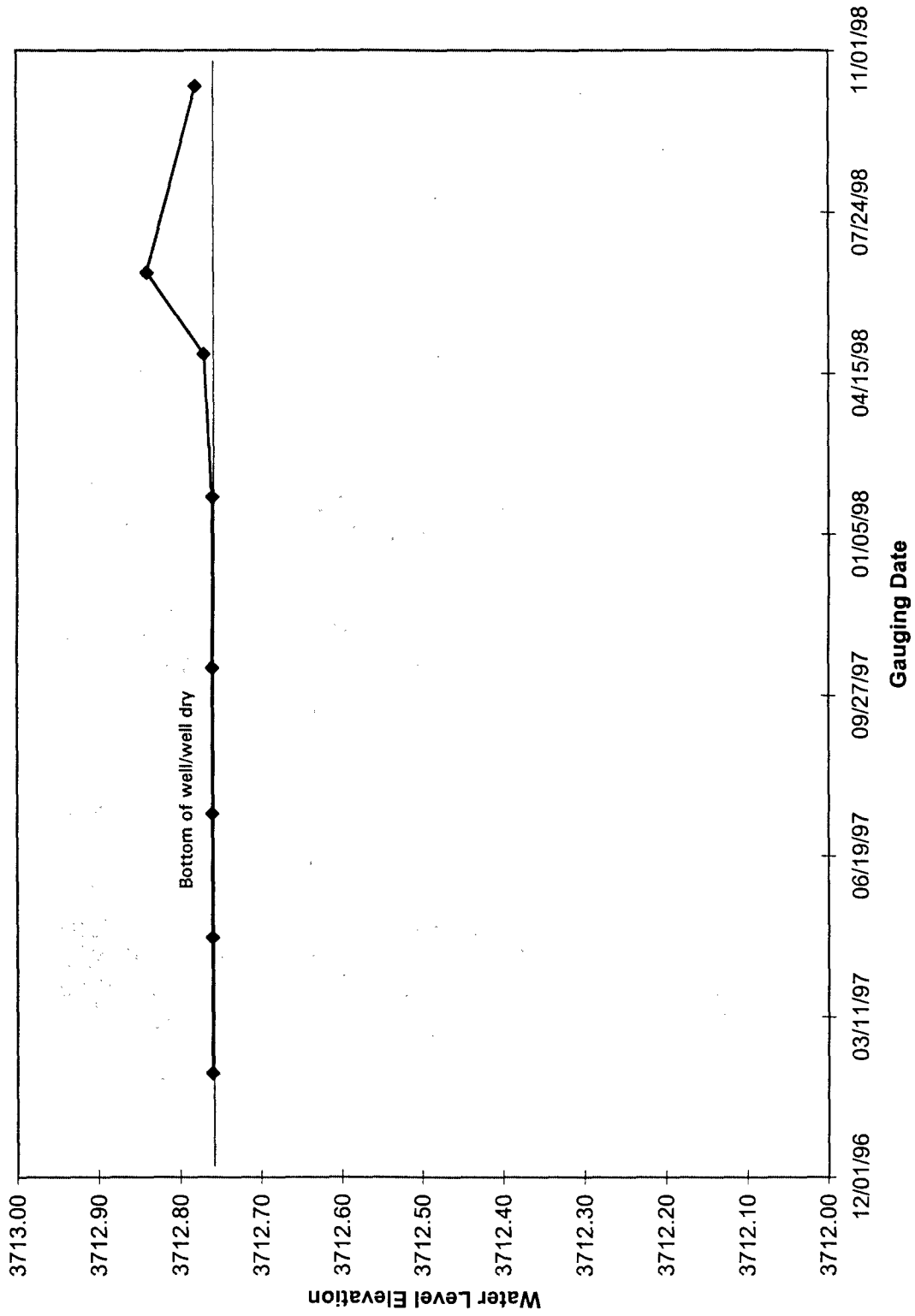
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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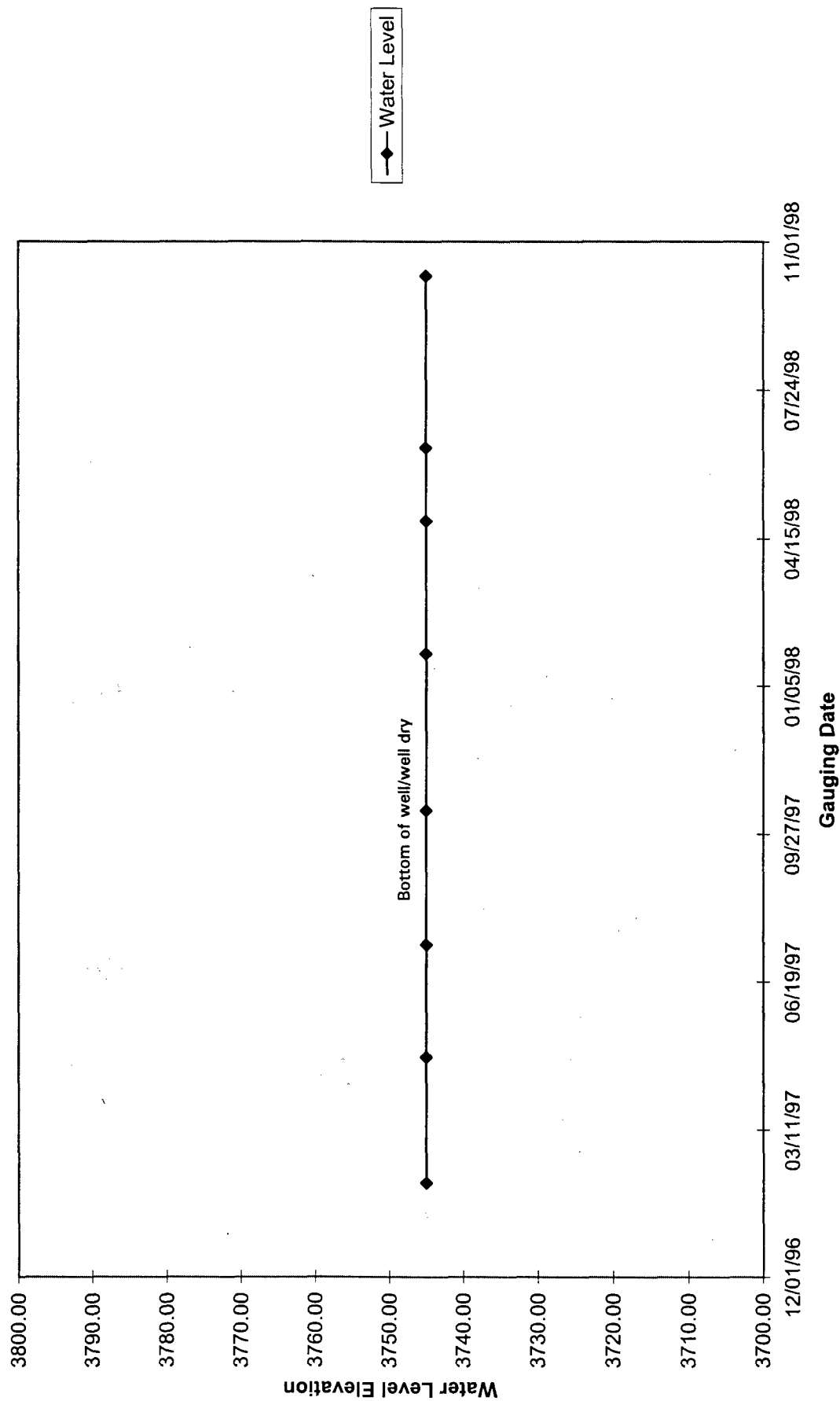
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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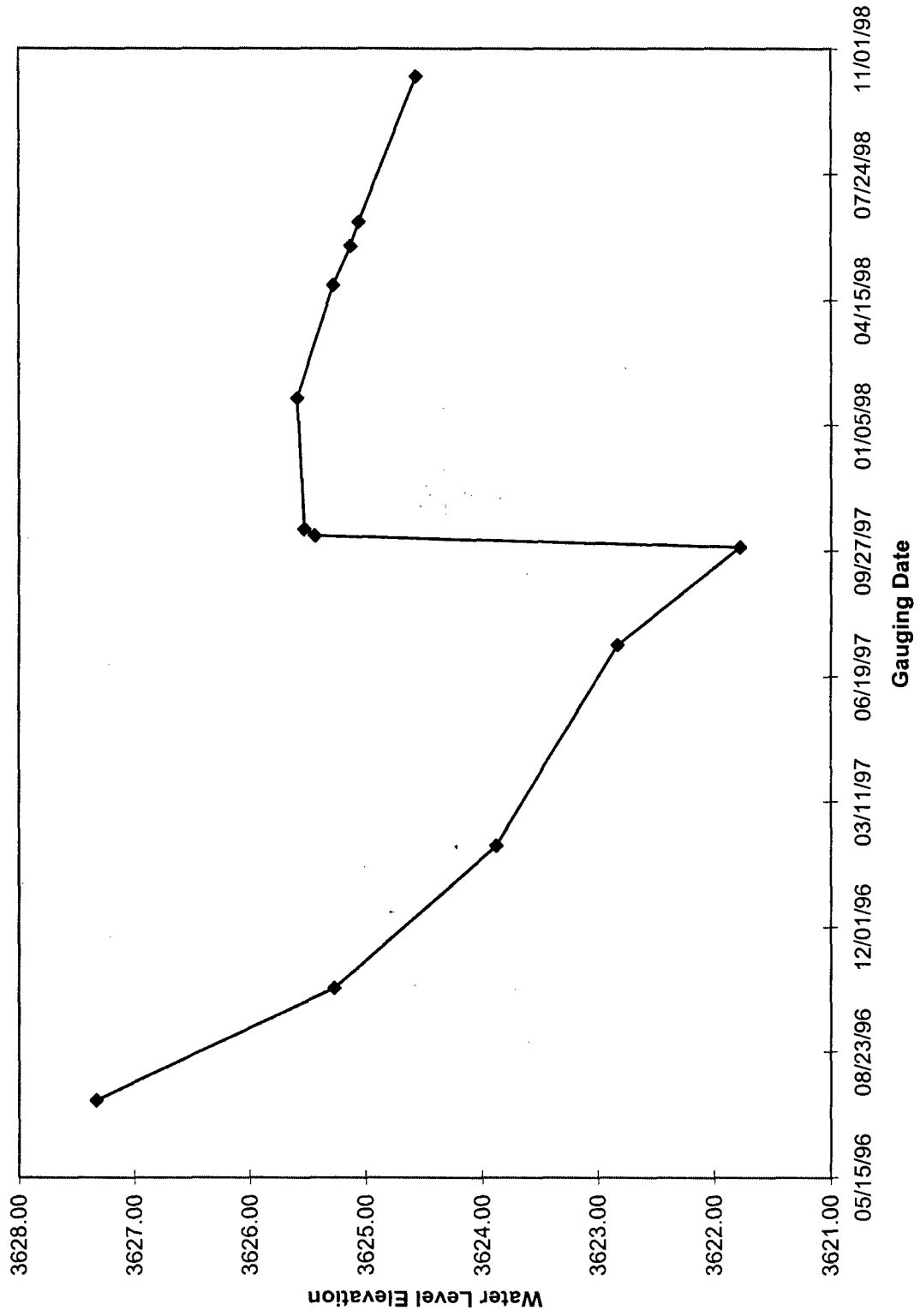
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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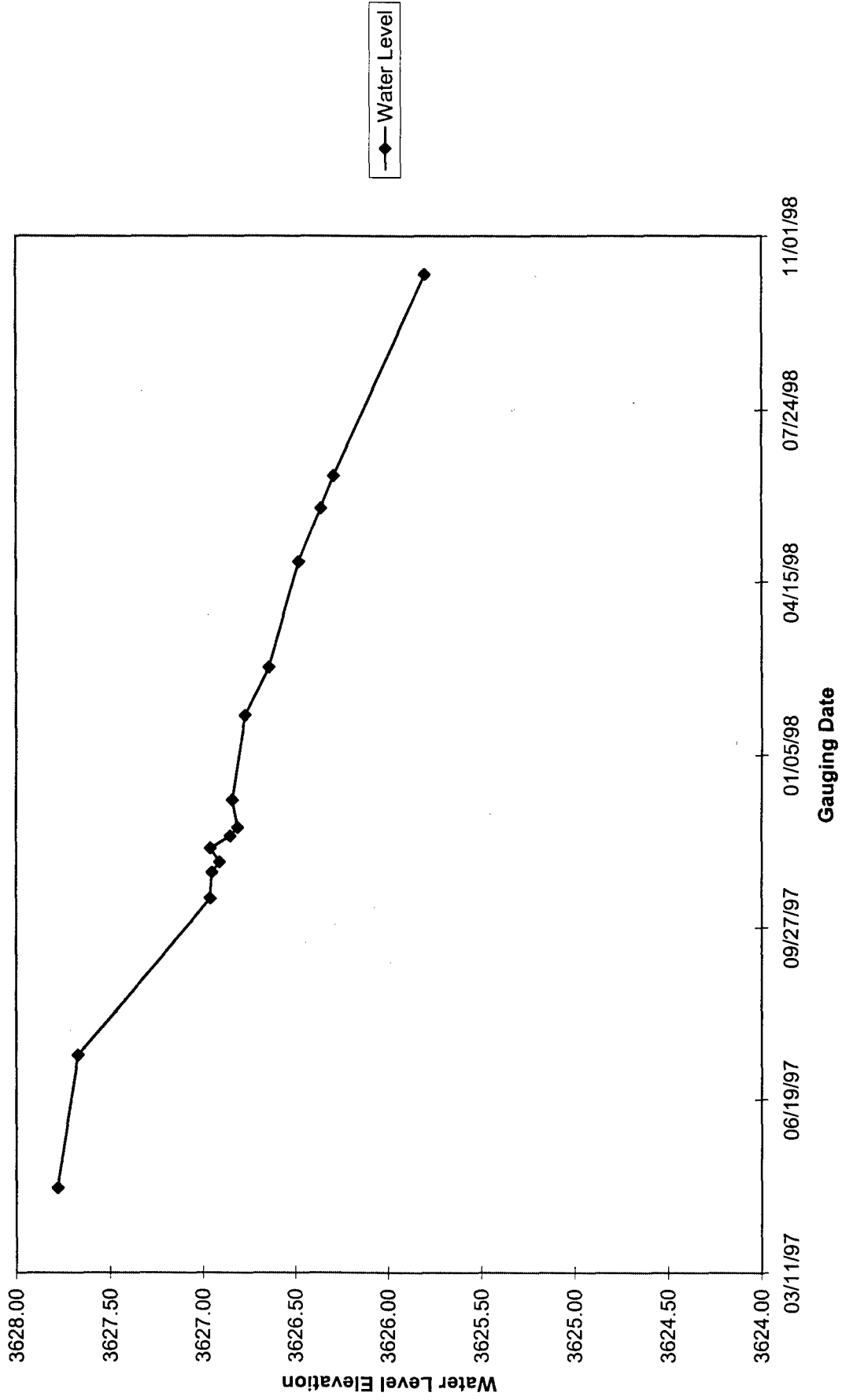
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-94



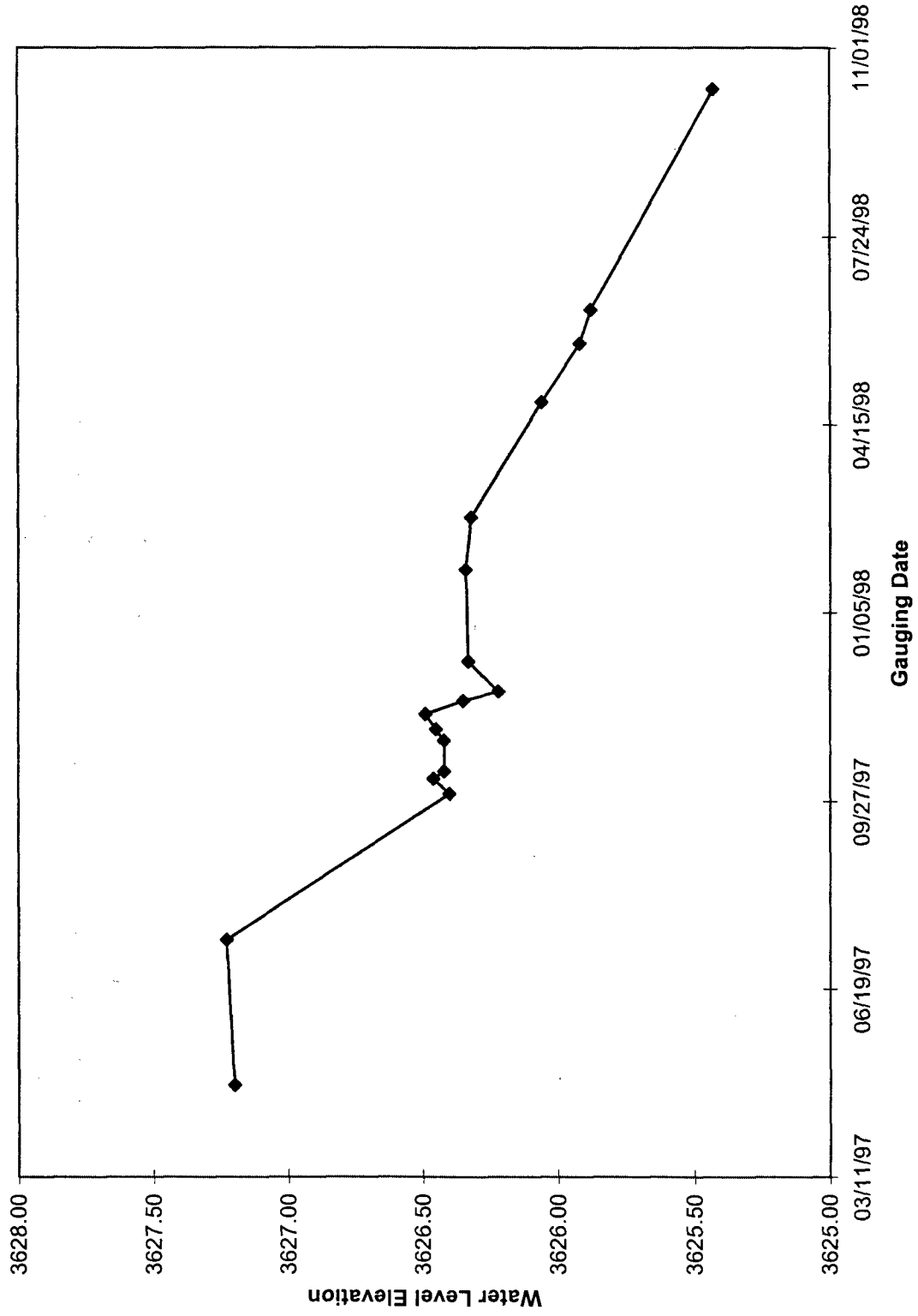
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-95



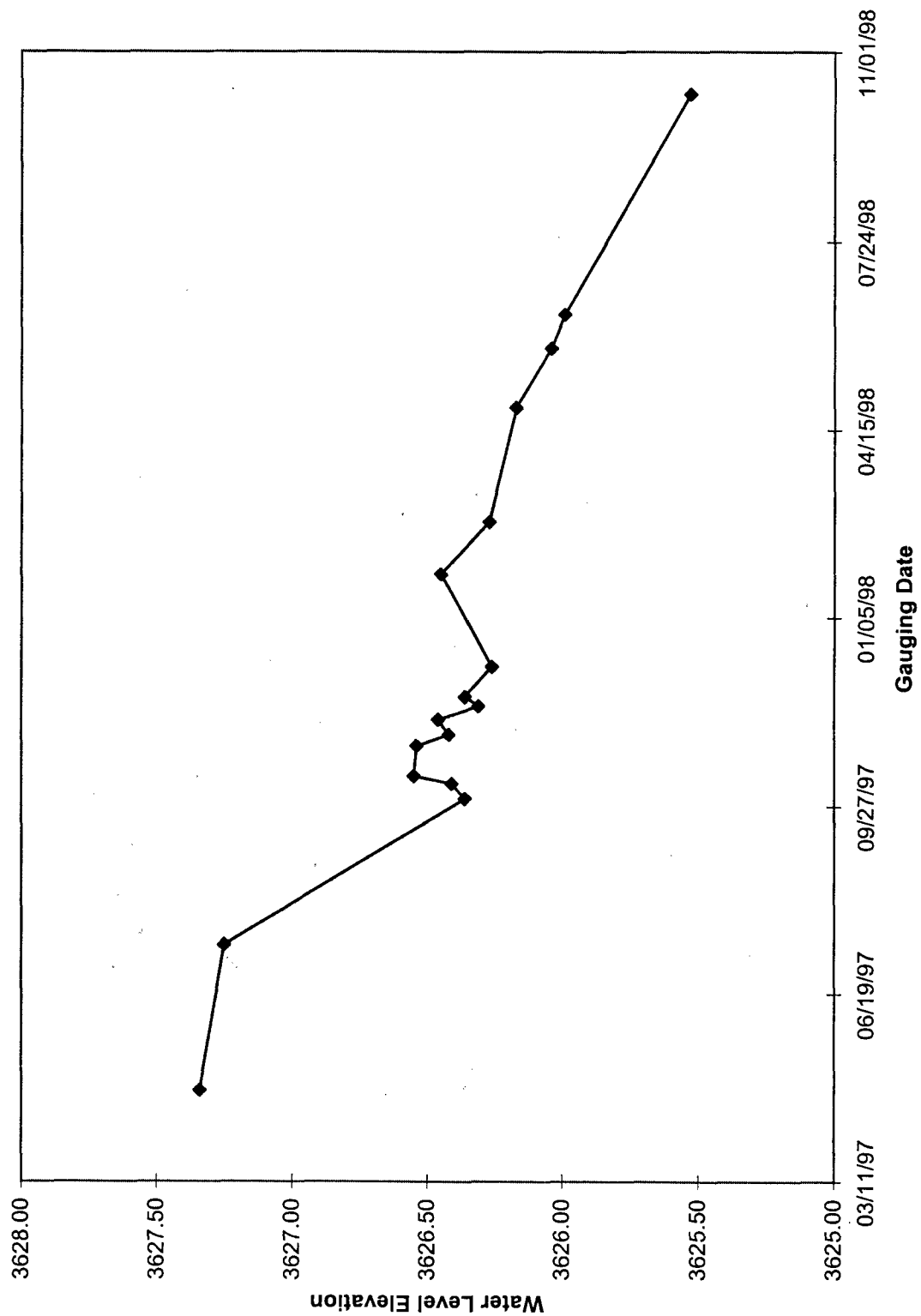
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-96



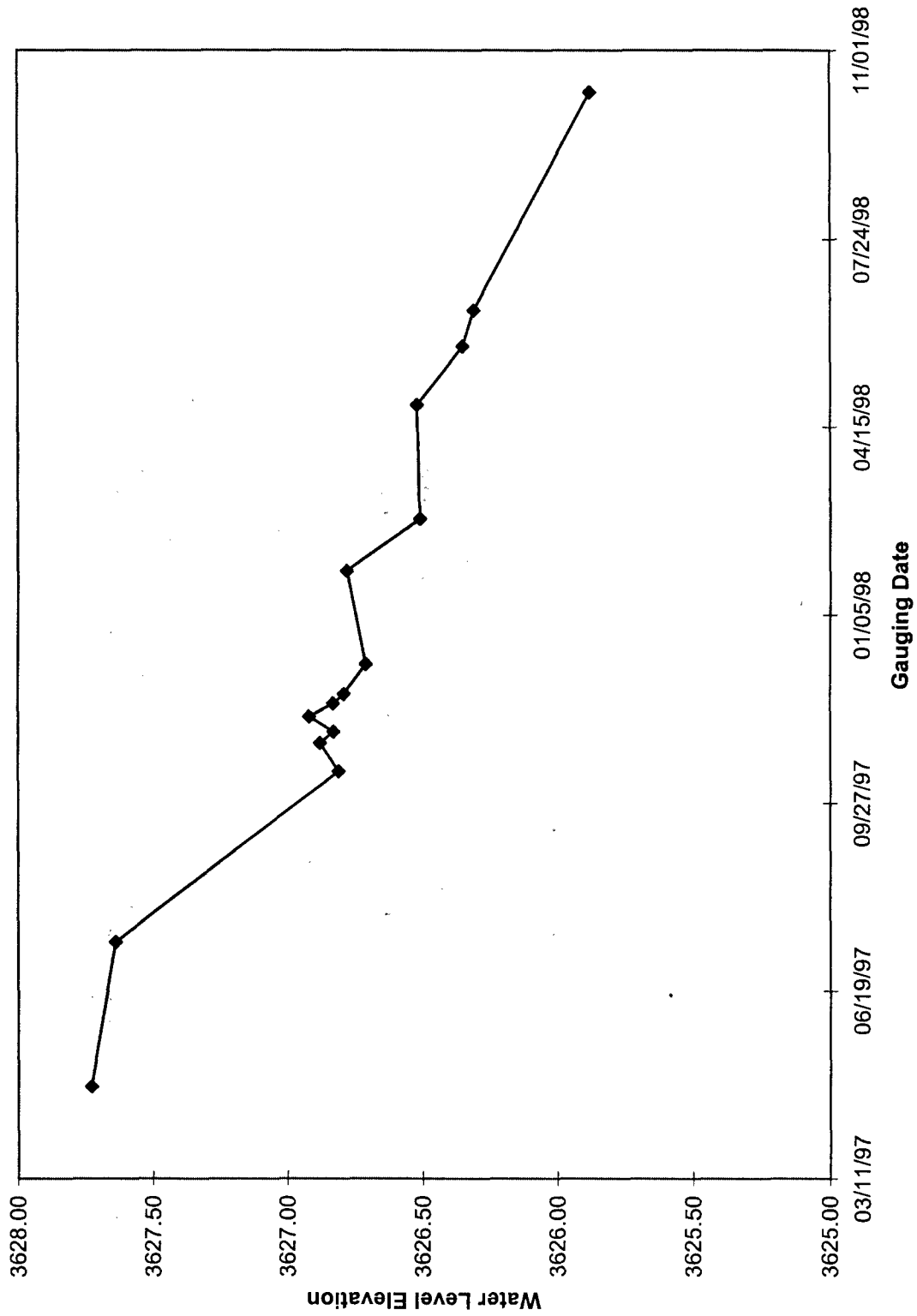
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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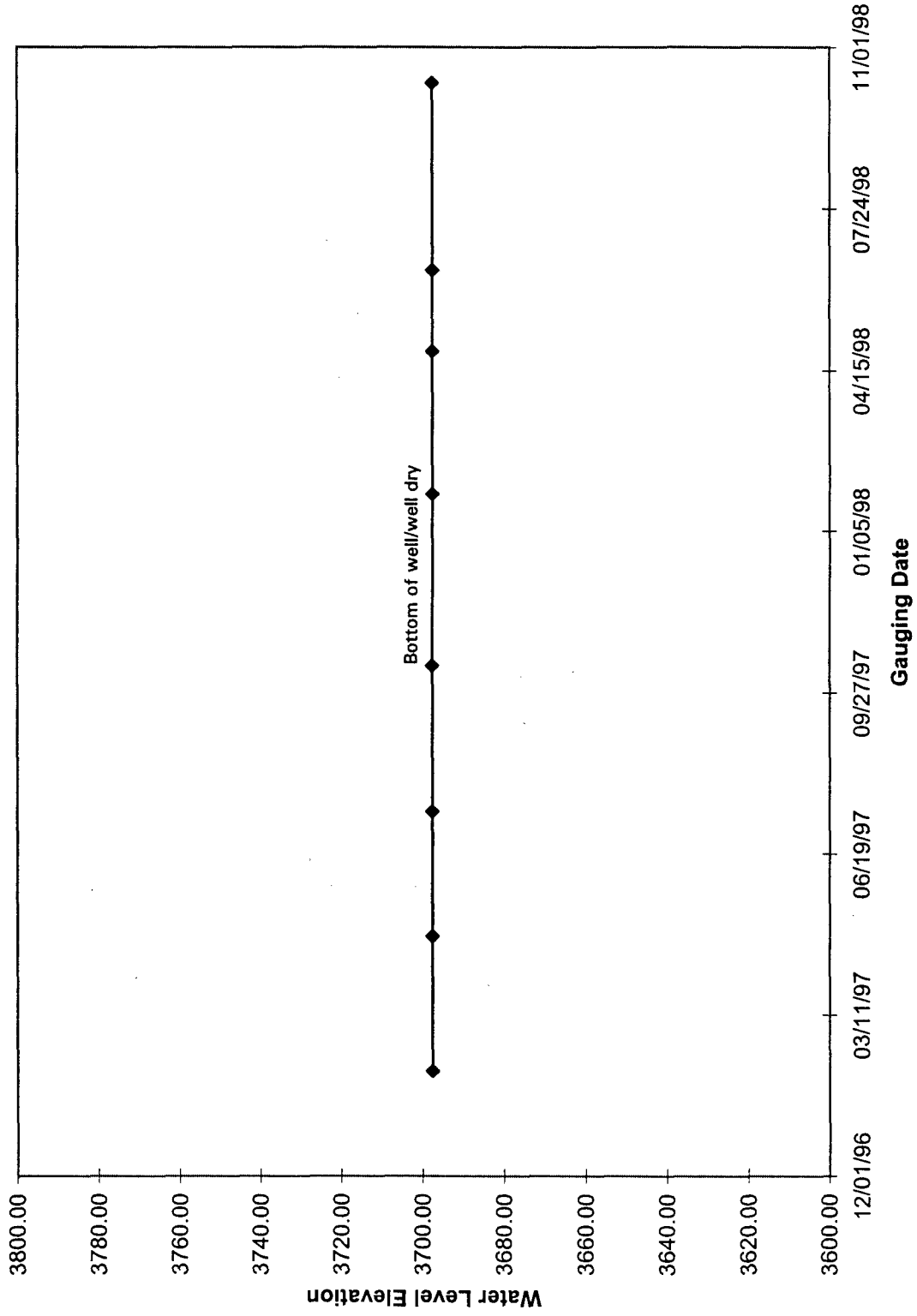
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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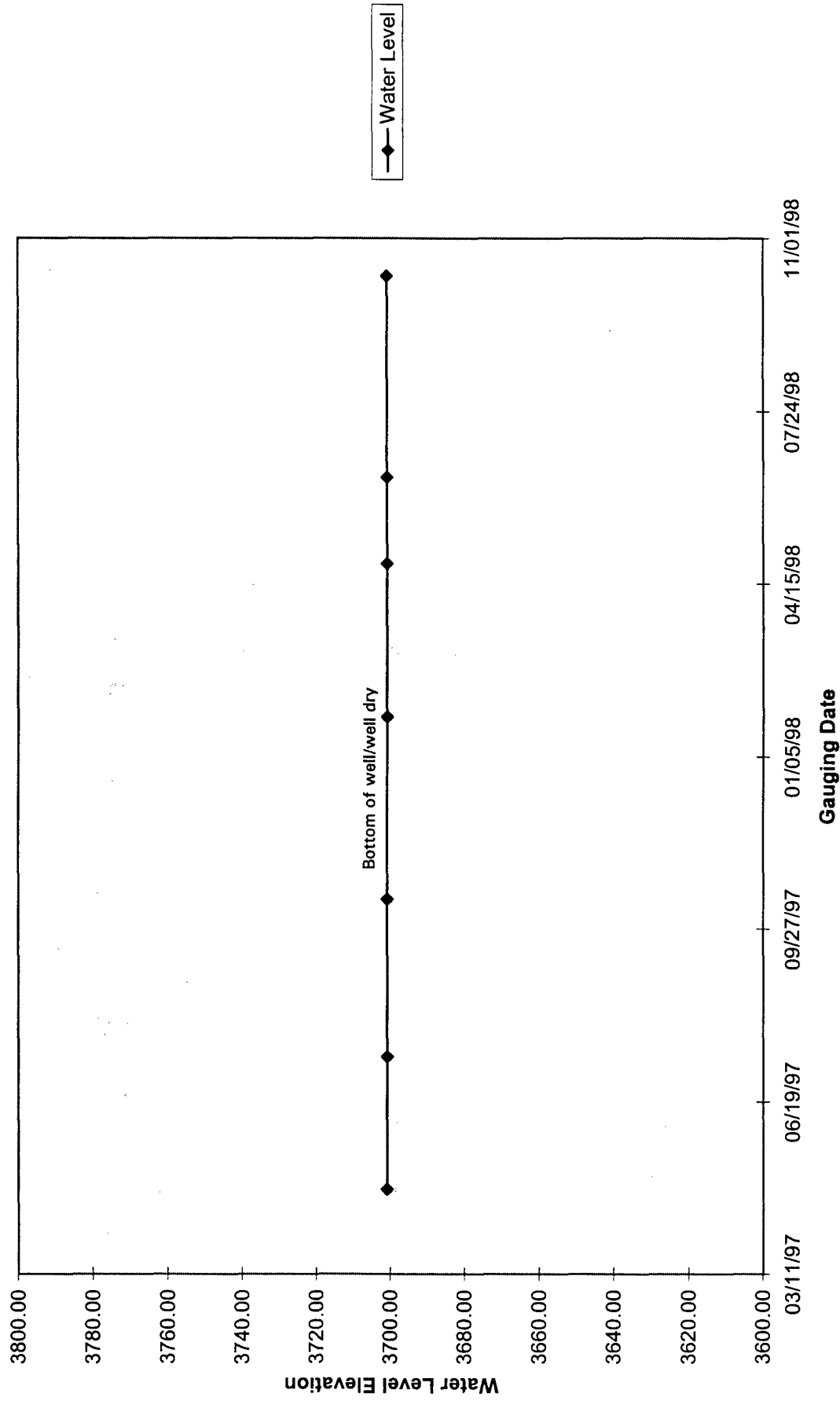
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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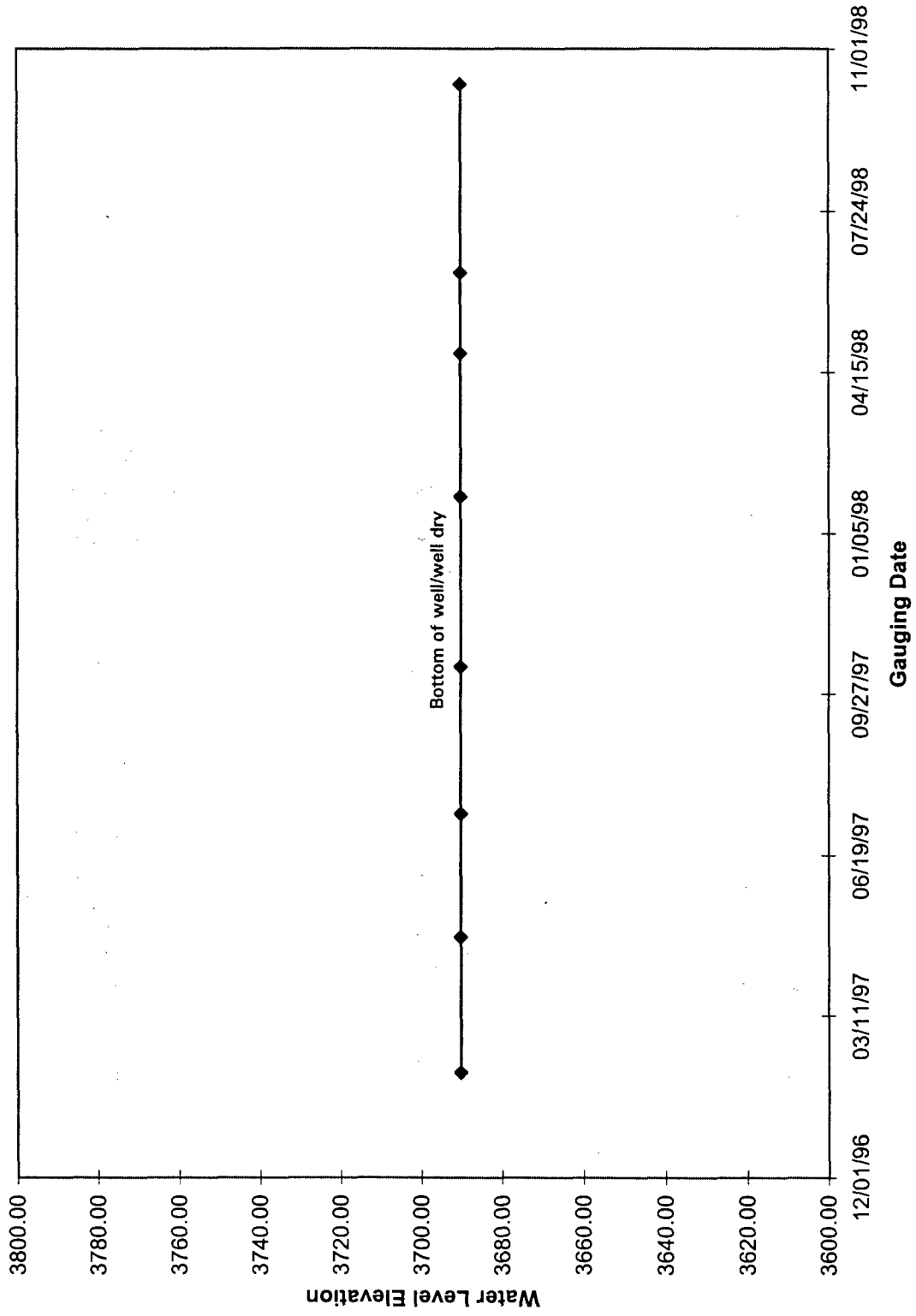
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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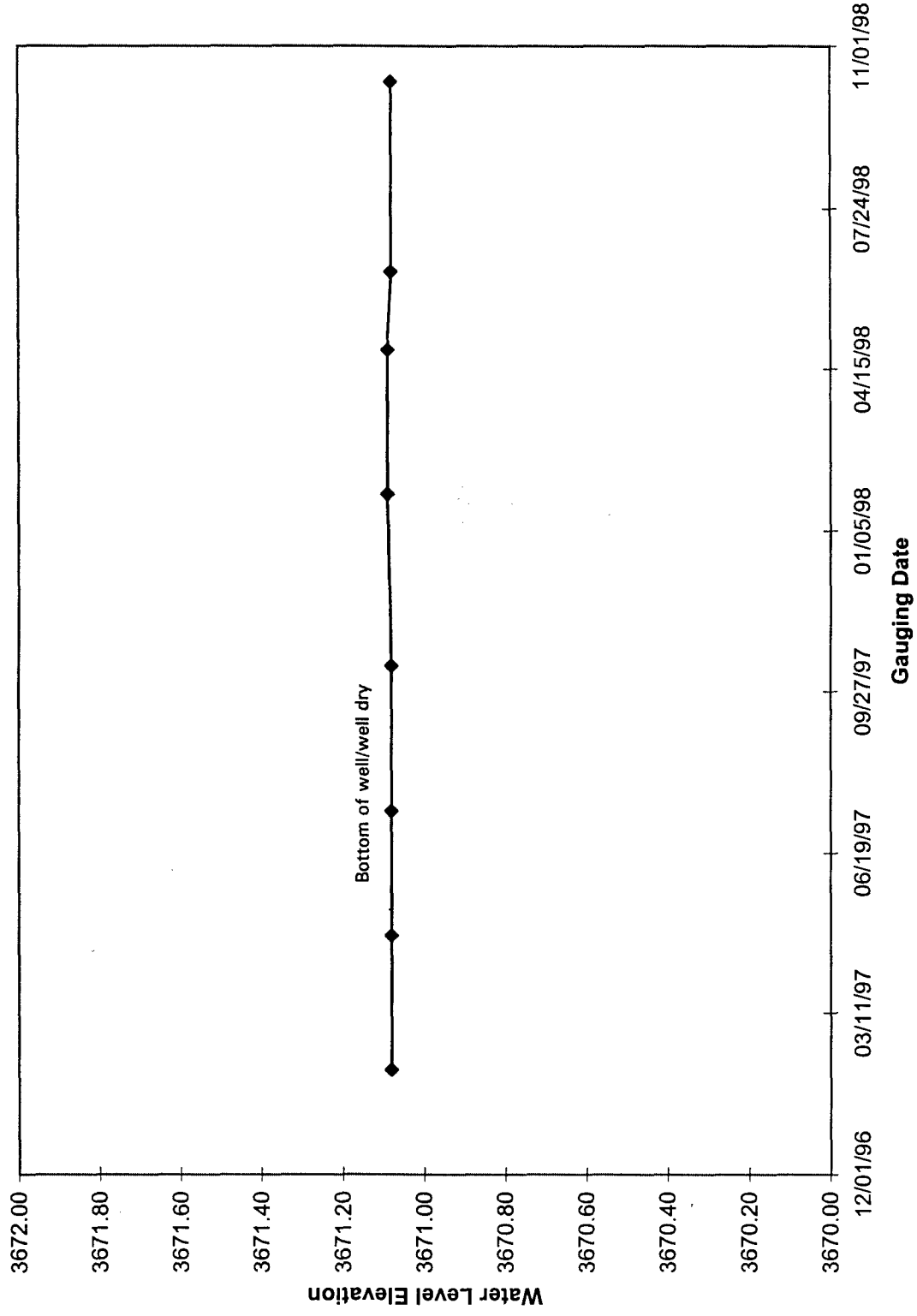
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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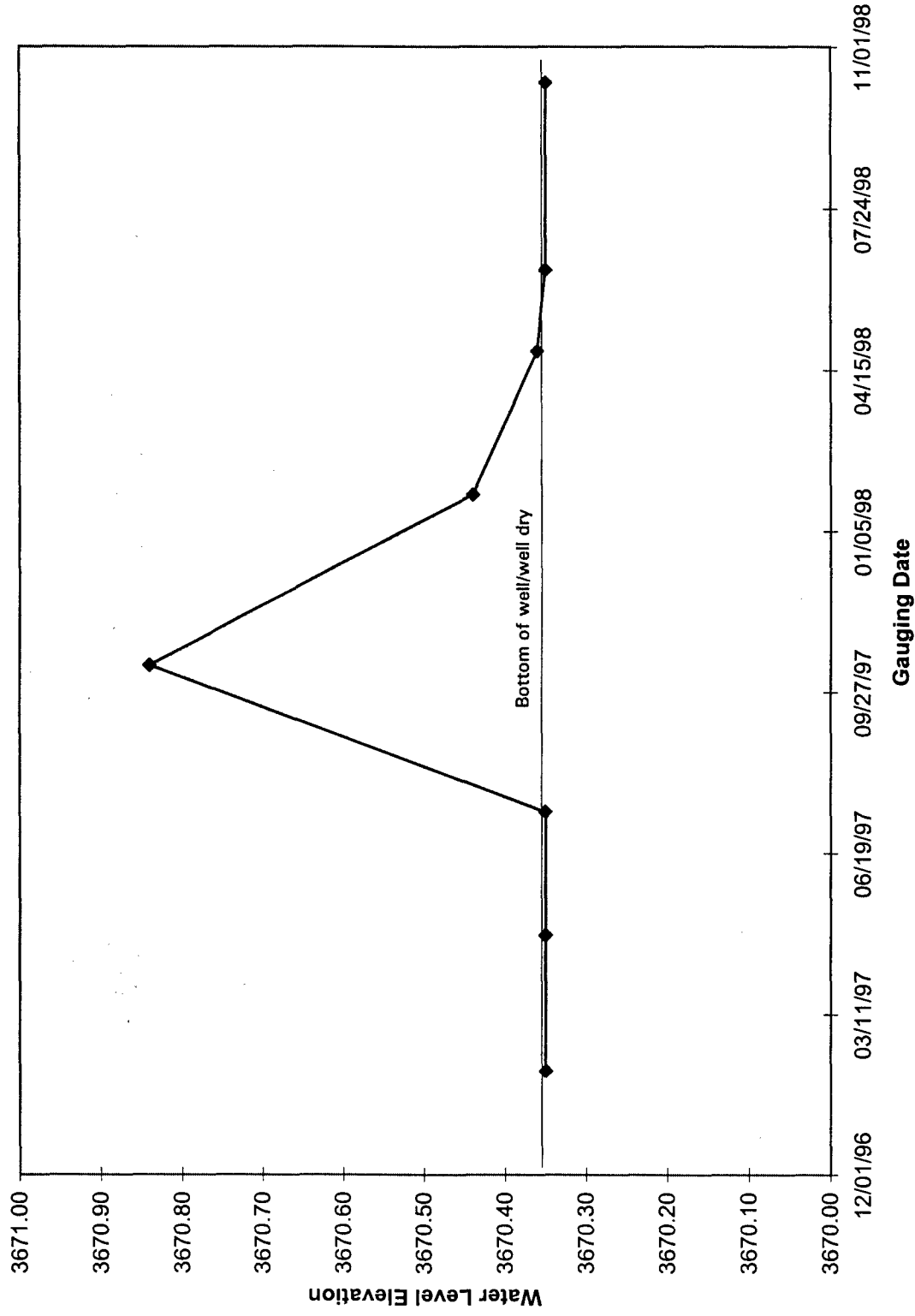
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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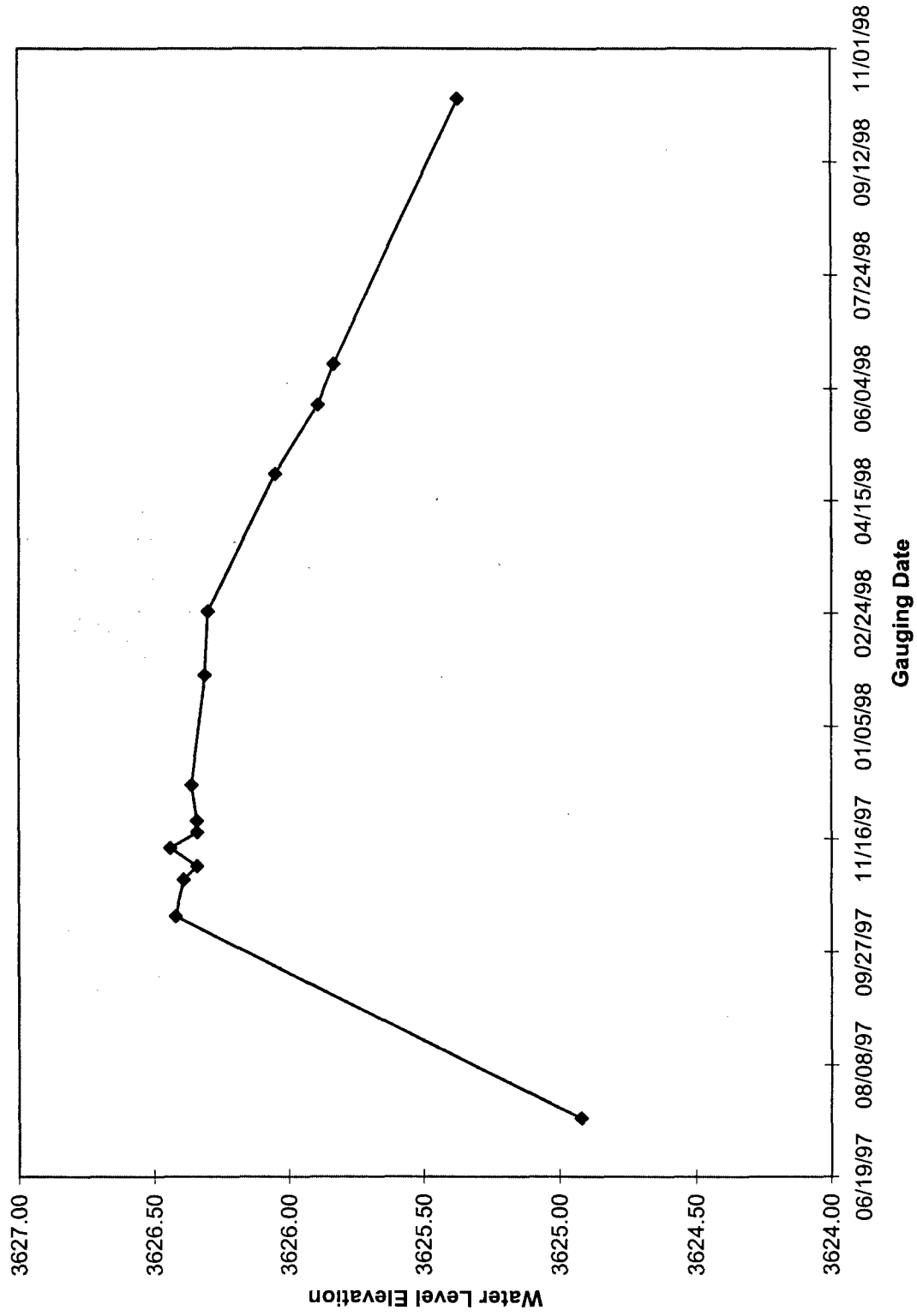
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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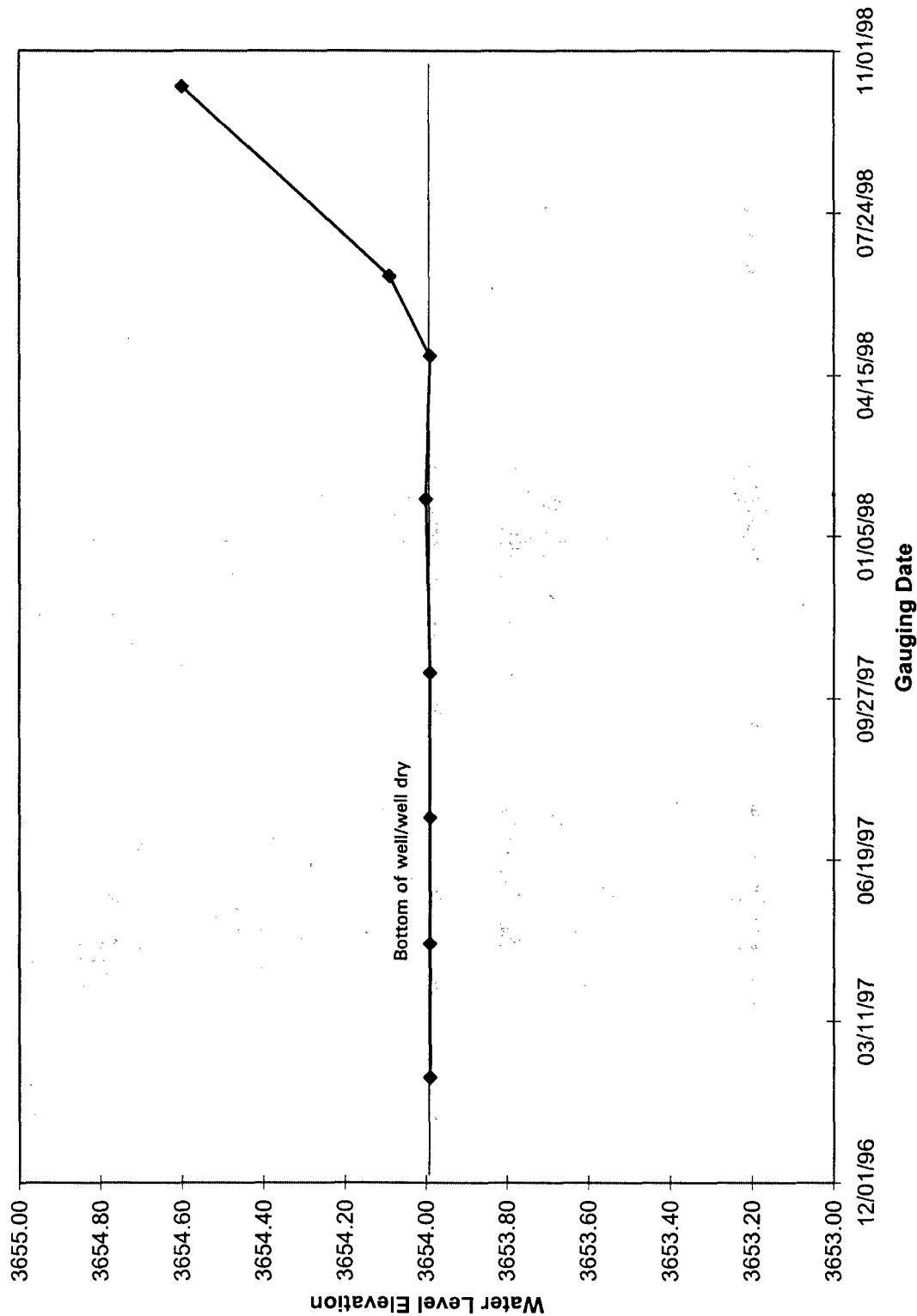
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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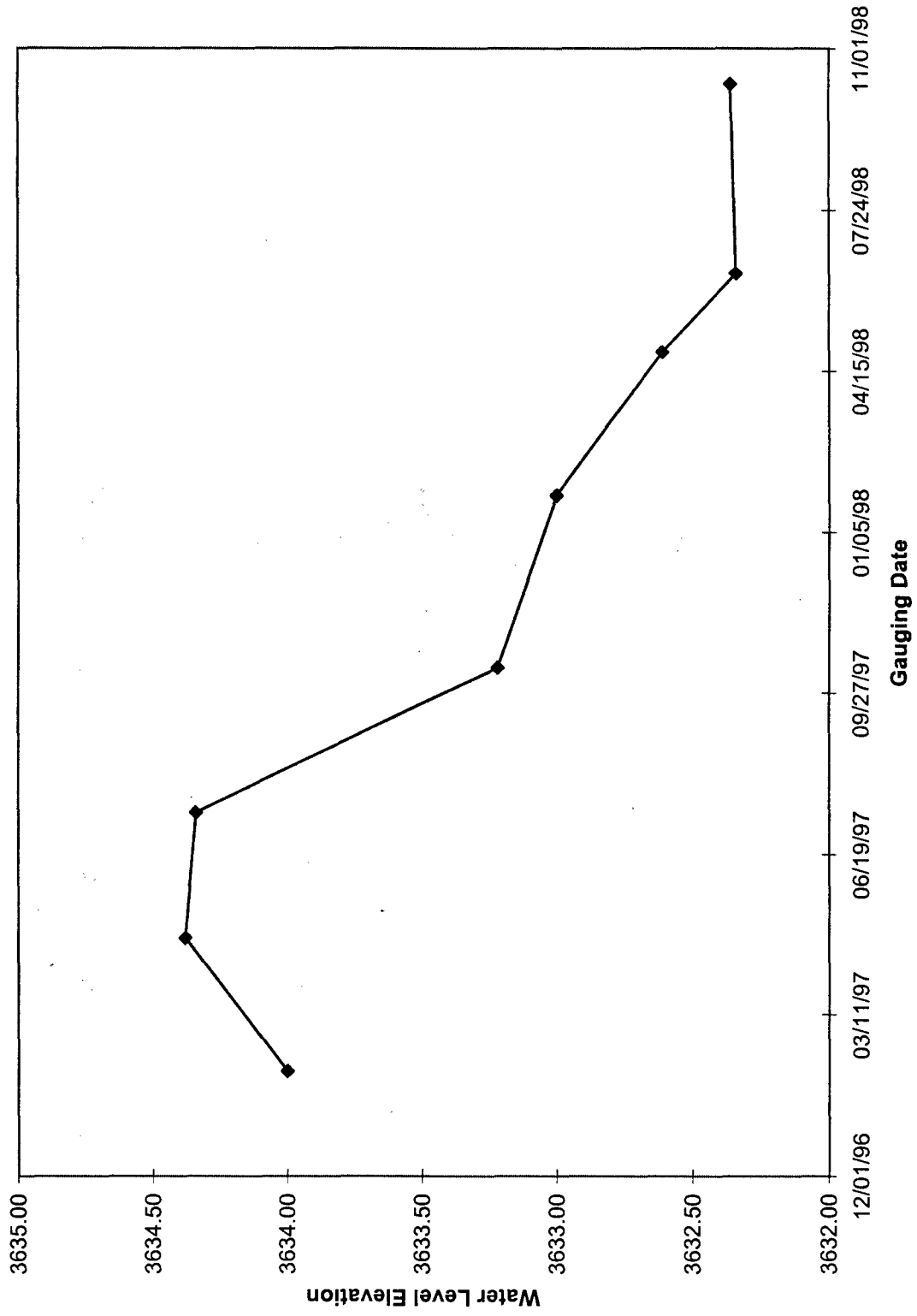
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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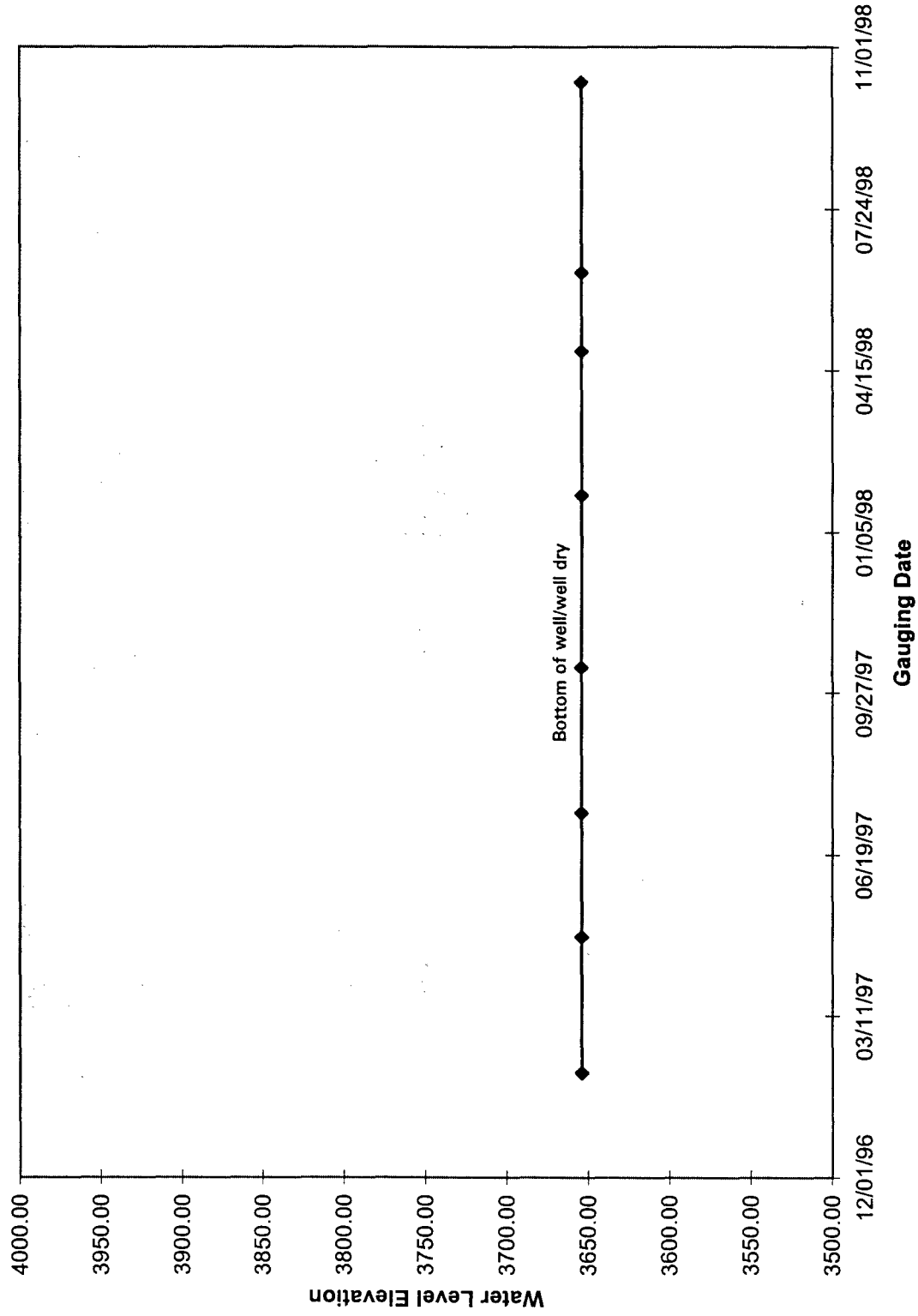
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-106



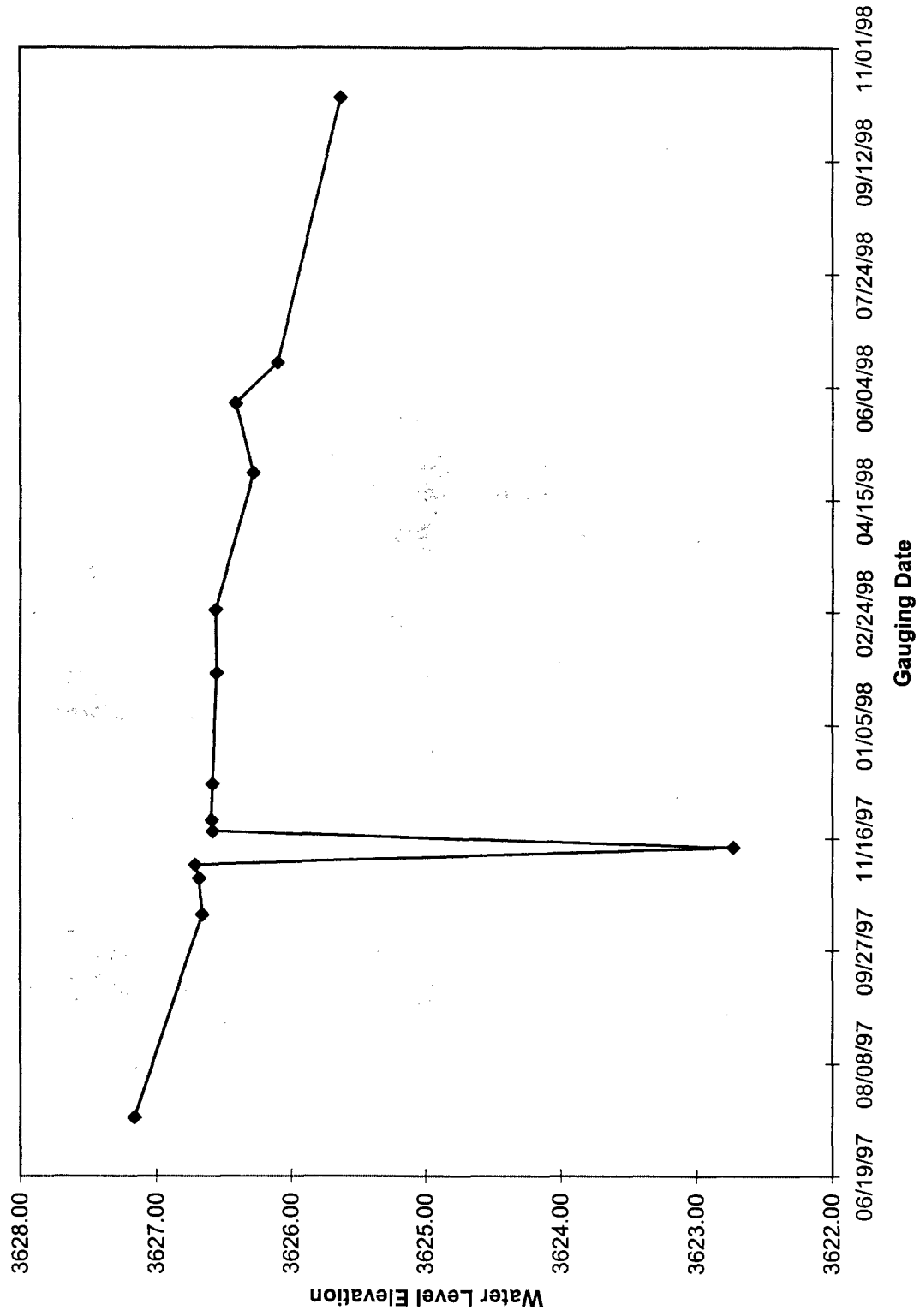
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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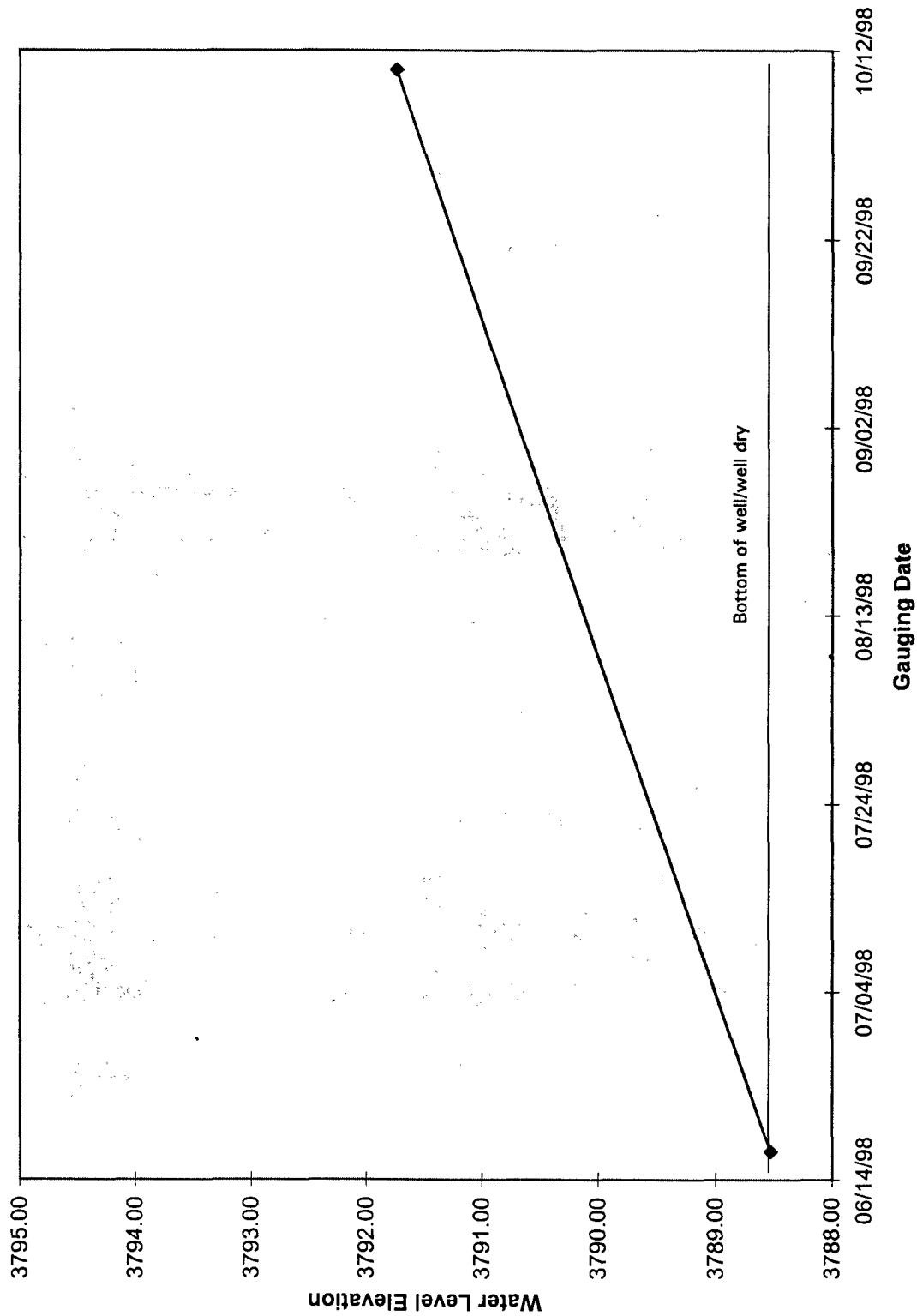
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-108



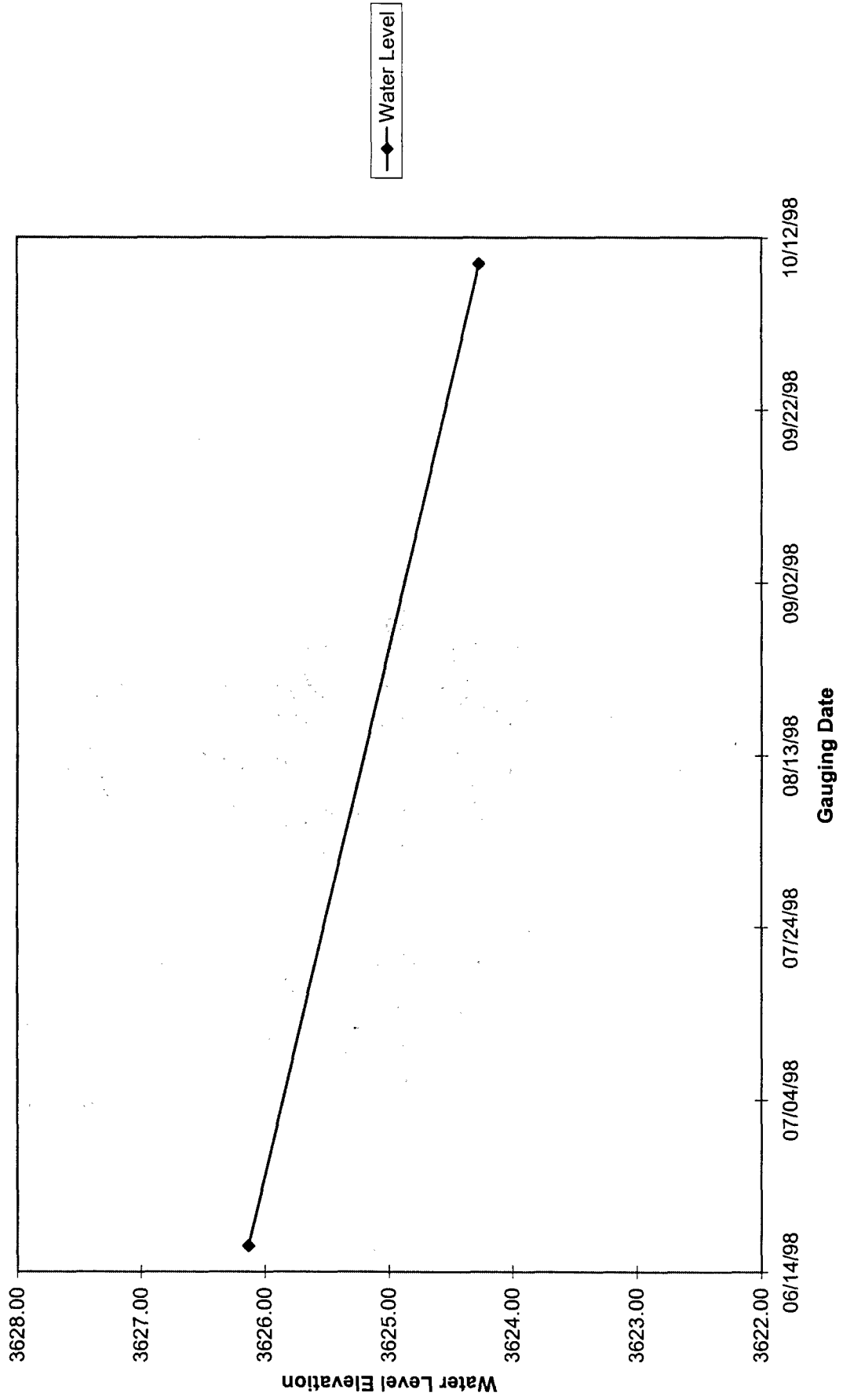
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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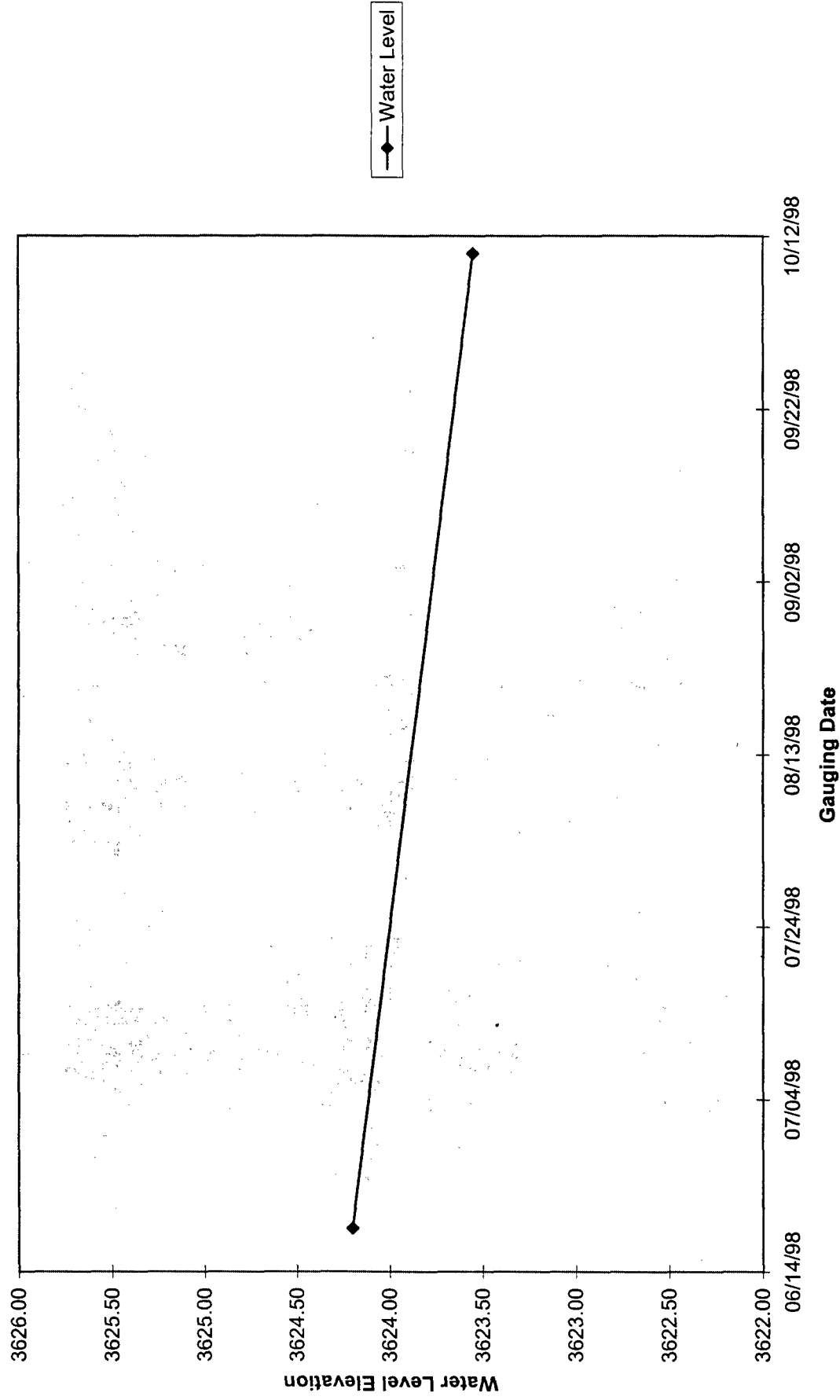
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

MW-110



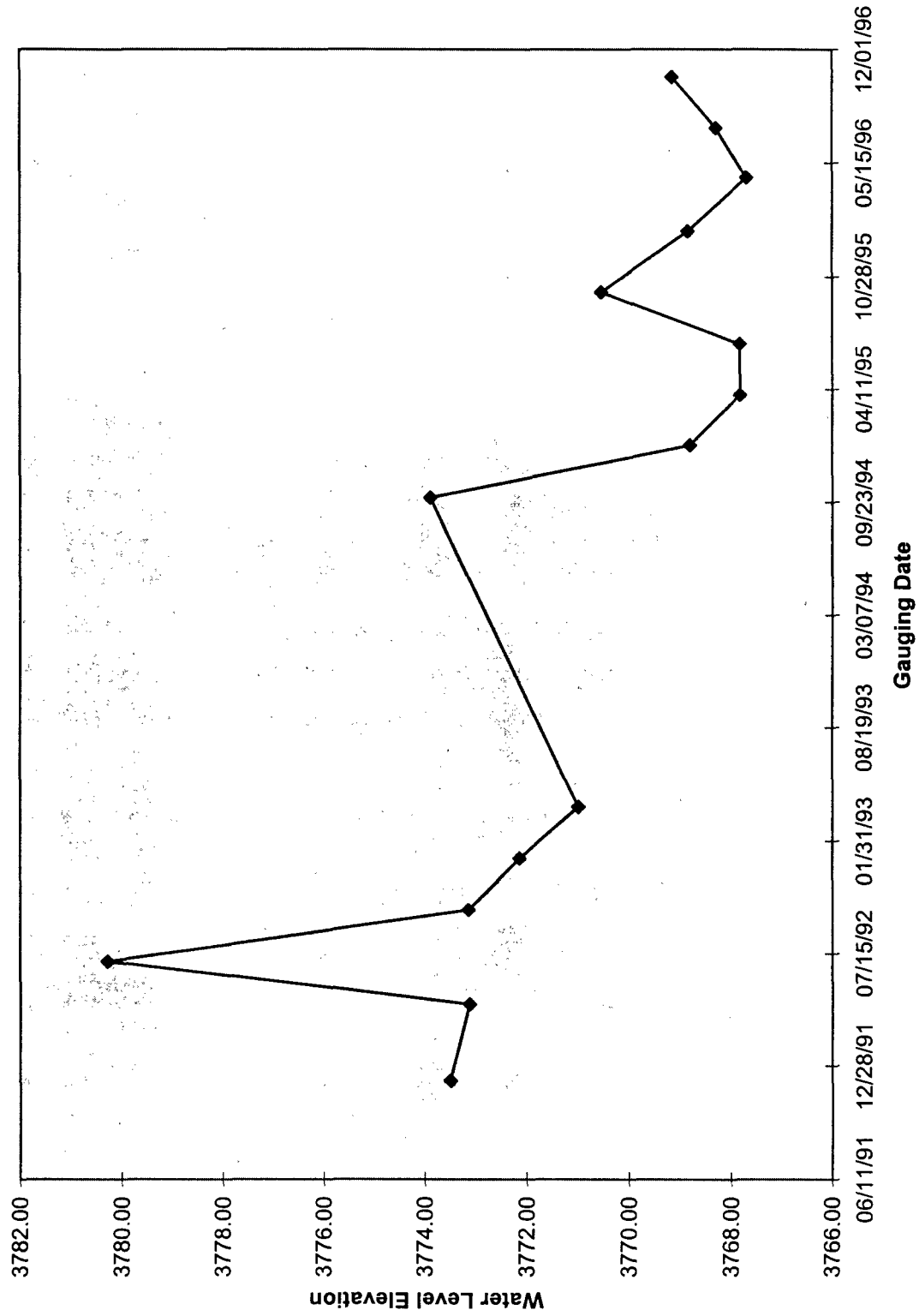
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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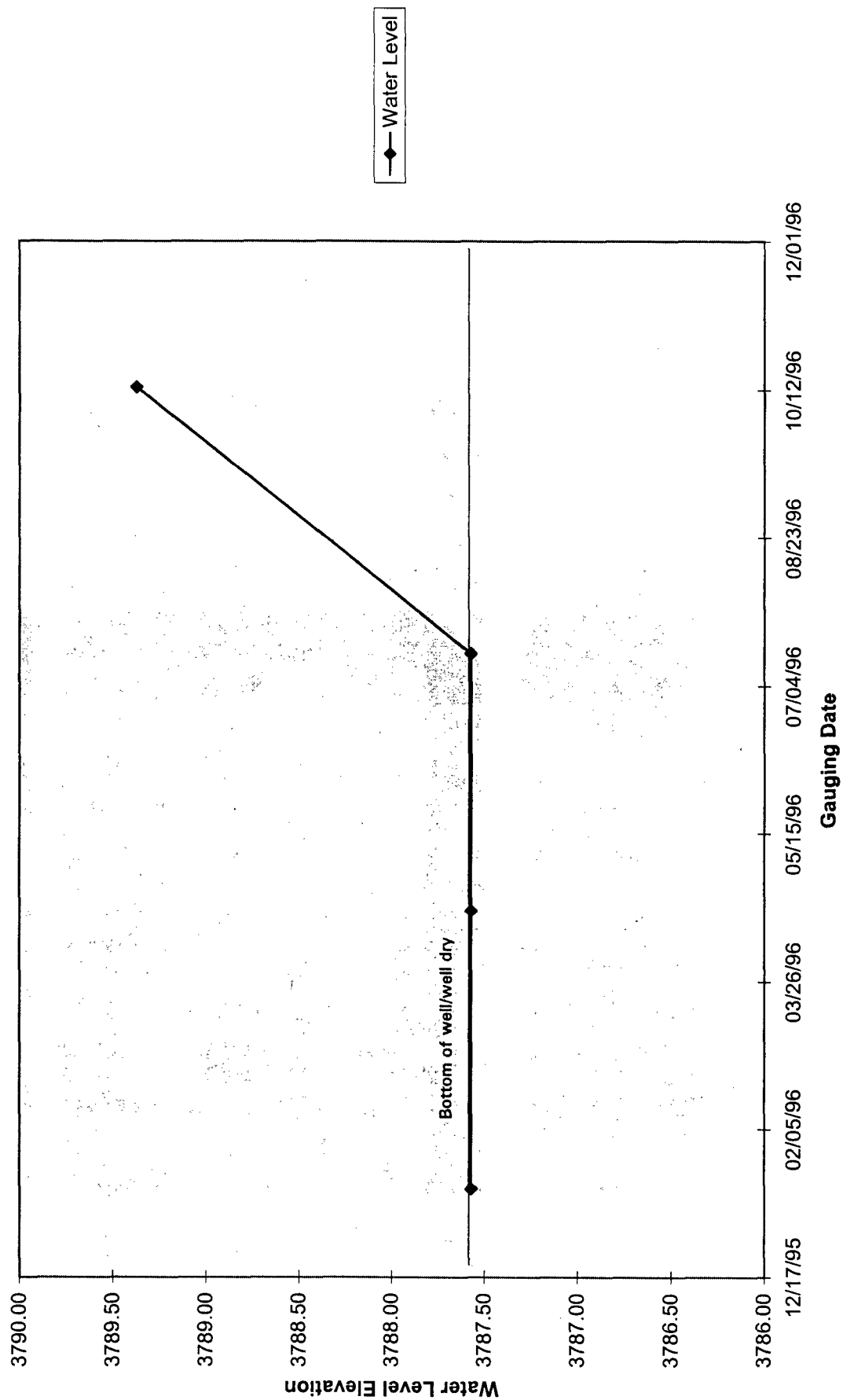
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

# Sump-16A



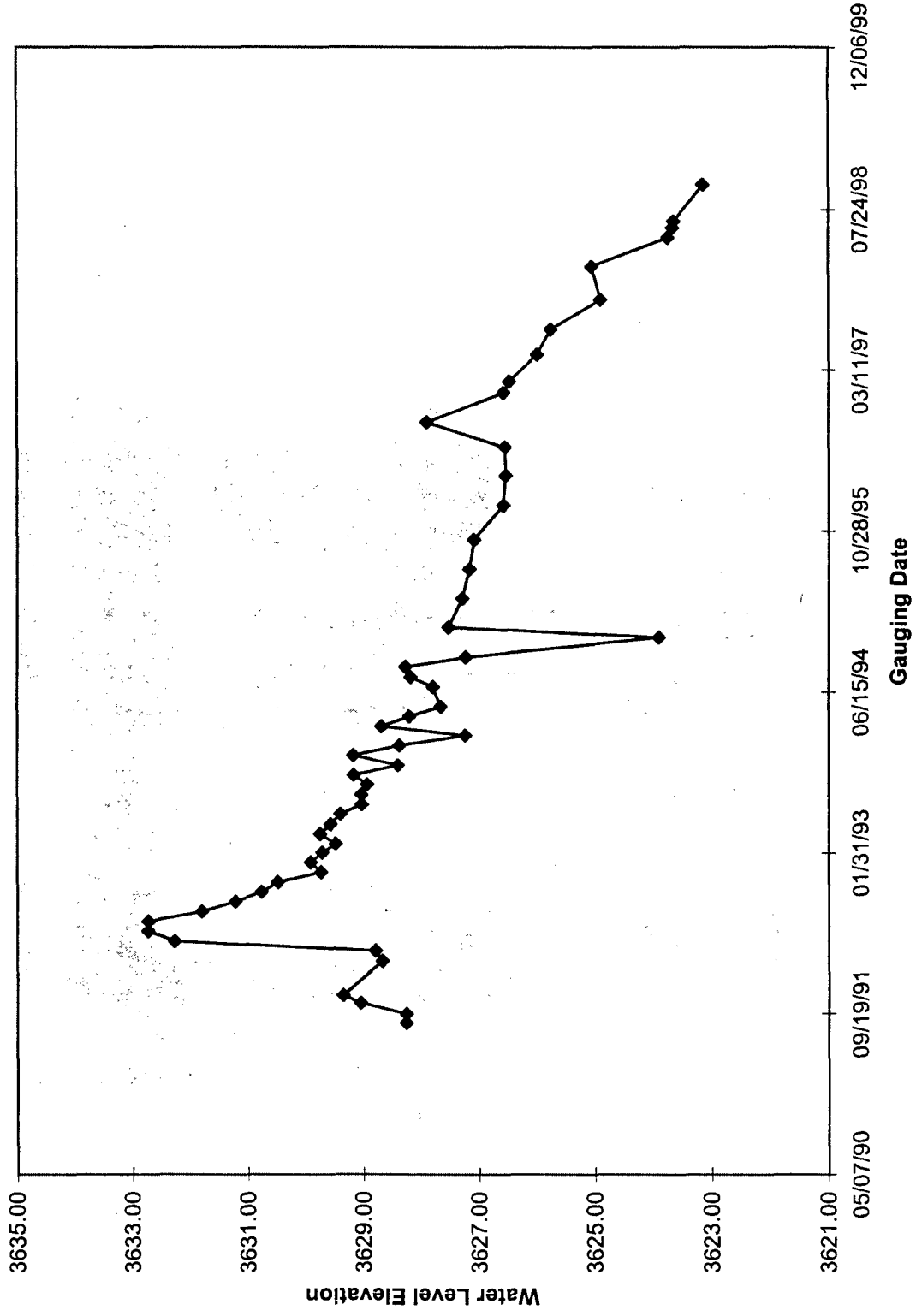
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

# Sump-A10



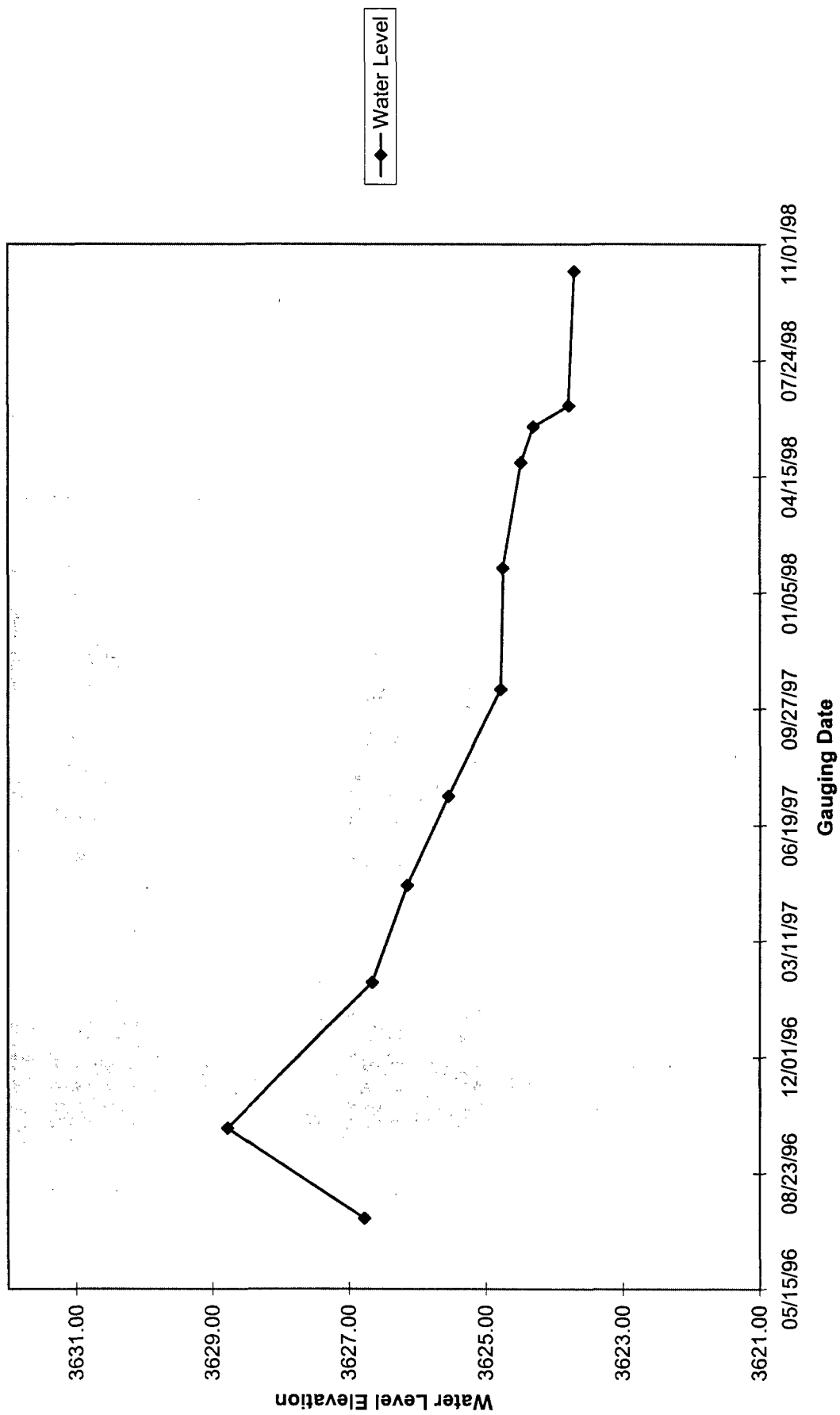
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

SW-02



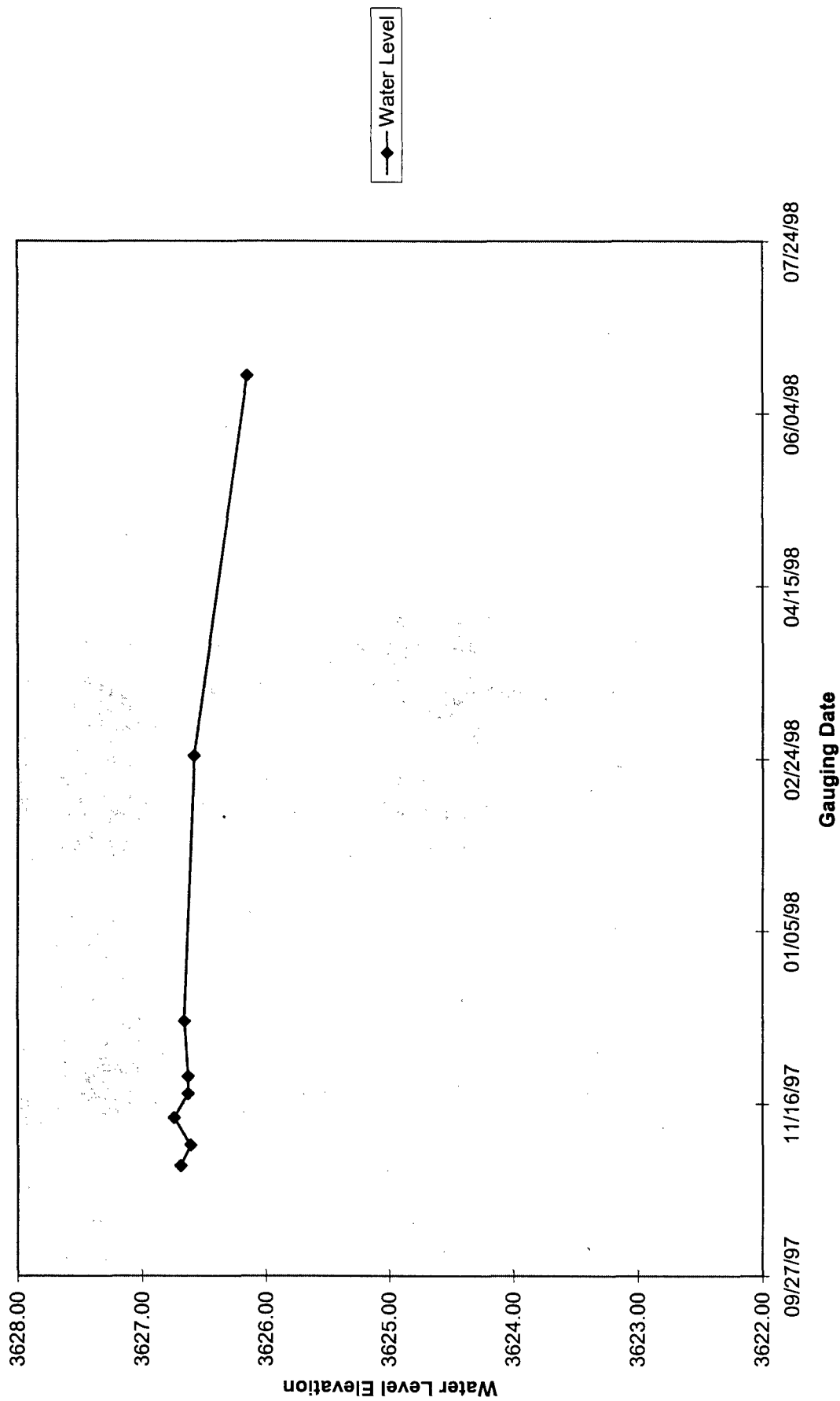
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

SW-03



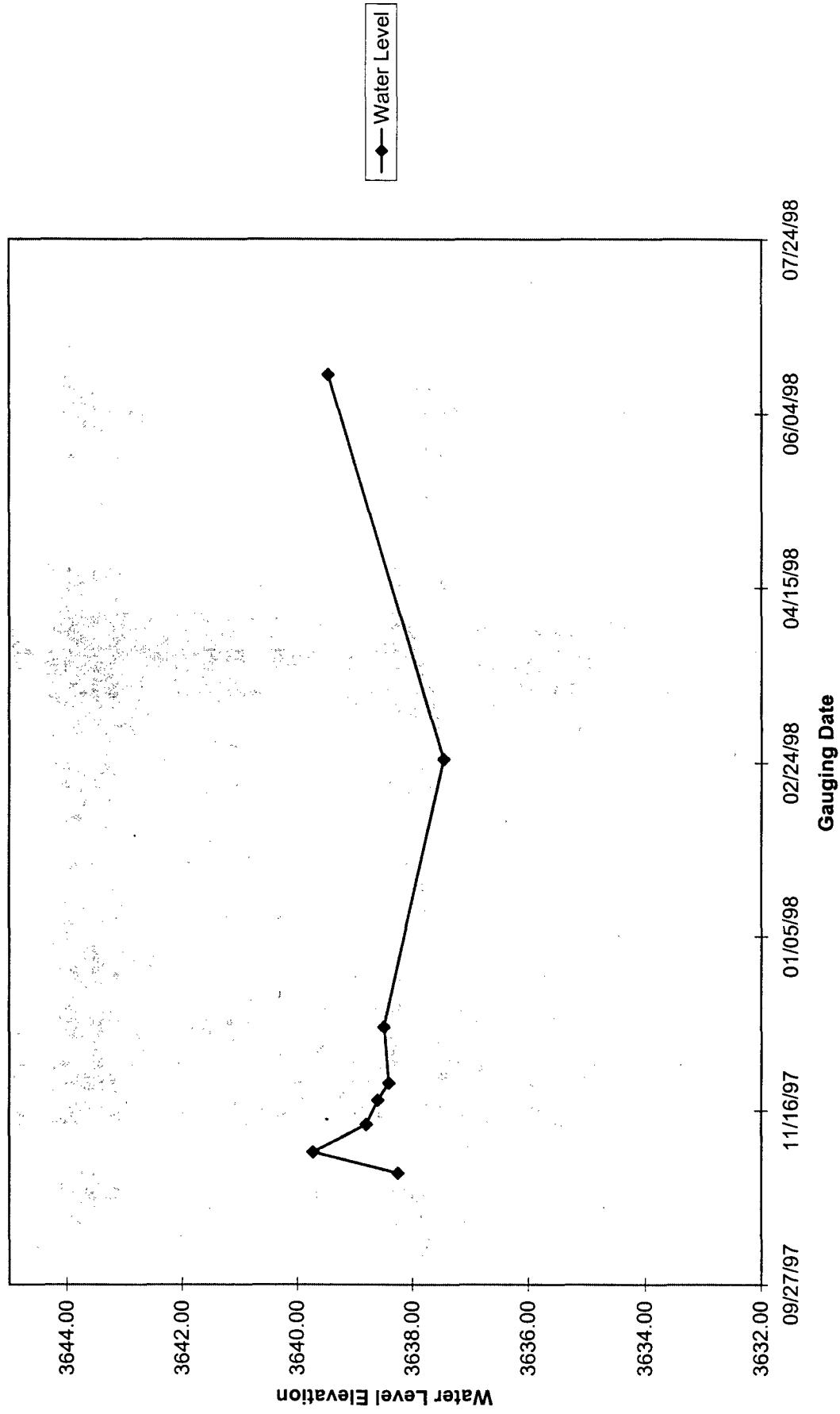
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

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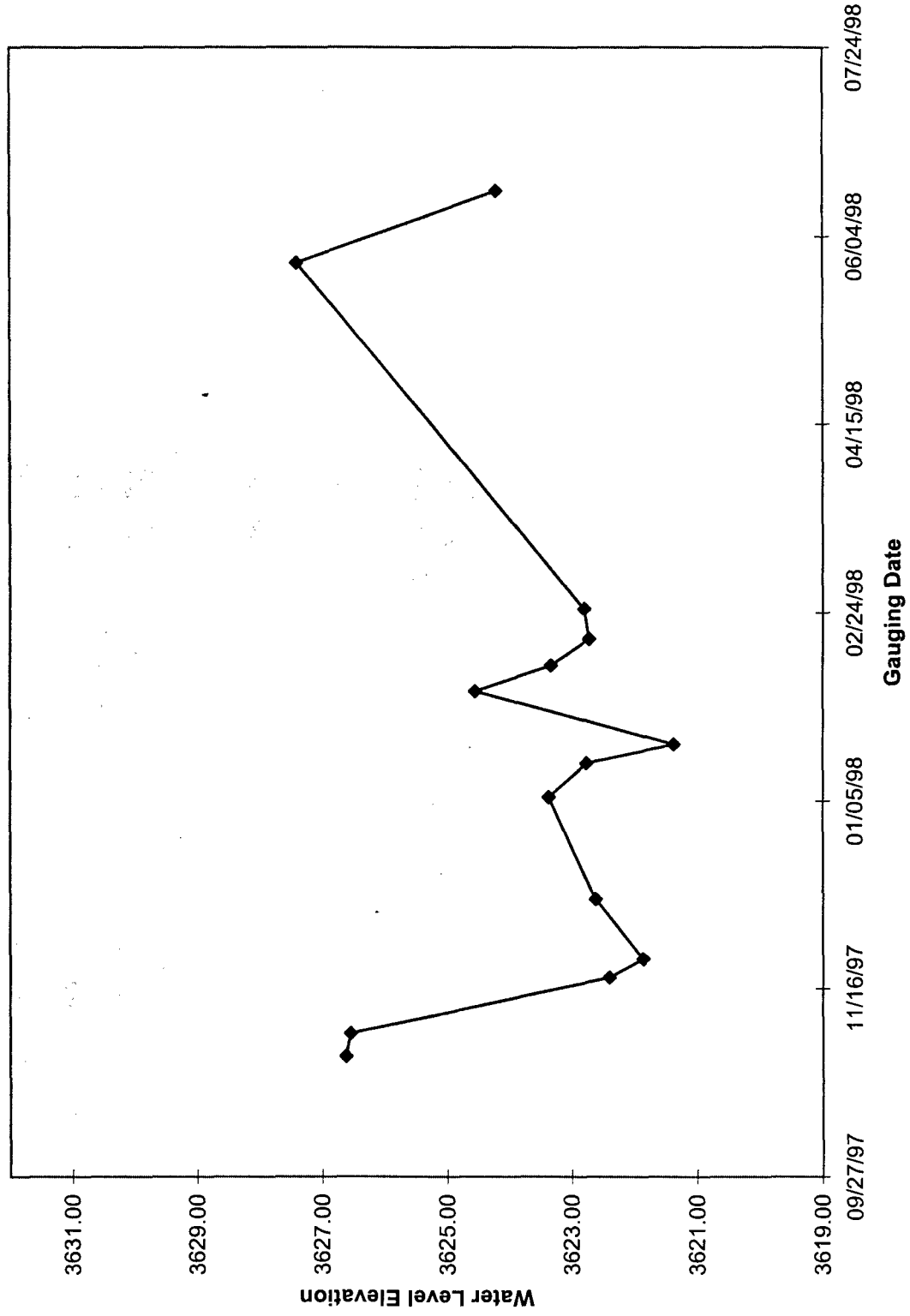
\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

VE-17



\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

VE-19



\* Water level elevations in feet above mean sea level, based on survey data provided by Marathon

## **Appendix C**

Historical Analytical Data

Historical BTEX Analytical Data  
May 1991 - October 1998

# Appendix C

Historical BTEX Analytical Data, May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID | Sample Date | Analytical Results |         |              |               |
|---------|-------------|--------------------|---------|--------------|---------------|
|         |             | Benzene            | Toluene | Ethylbenzene | Total Xylenes |
| BIEBBLE | 05/28/91    | --                 | --      | --           | <10           |
| BIEBBLE | 07/01/91    | <5                 | --      | --           | --            |
| BIEBBLE | 07/19/91    | --                 | <5      | <5           | --            |
| BIEBBLE | 04/01/92    | <1                 | <1      | <1           | <1            |
| BIEBBLE | 07/01/92    | <1                 | <1      | <1           | <1            |
| BIEBBLE | 10/01/92    | <1                 | <1      | <1           | <1            |
| BIEBBLE | 01/01/93    | <1                 | <1      | <1           | <1            |
| BIEBBLE | 04/15/93    | <1                 | <1      | <1           | <1            |
| BIEBBLE | 07/15/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| BIEBBLE | 10/14/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| BIEBBLE | 01/13/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| BIEBBLE | 04/05/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| BIEBBLE | 07/21/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| BIEBBLE | 10/06/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| BIEBBLE | 01/11/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| BIEBBLE | 04/07/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| BIEBBLE | 07/21/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| BIEBBLE | 10/12/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| BIEBBLE | 01/19/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| BIEBBLE | 04/17/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| BIEBBLE | 07/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| BIEBBLE | 10/01/96    | <0.5               | <0.5    | <0.5         | 0.5           |
| BIEBBLE | 02/10/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| IW-2    | 08/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 05/28/91    | --                 | --      | --           | <10           |
| LYMAN   | 07/01/91    | <5                 | --      | --           | --            |
| LYMAN   | 07/19/91    | --                 | <5      | <5           | --            |
| LYMAN   | 04/01/92    | <1                 | <1      | <1           | <1            |
| LYMAN   | 07/01/92    | <1                 | <1      | <1           | <1            |
| LYMAN   | 10/01/92    | <1                 | <1      | <1           | <1            |
| LYMAN   | 01/01/93    | <1                 | <1      | <1           | <1            |
| LYMAN   | 04/15/93    | <1                 | <1      | <1           | <1            |
| LYMAN   | 05/12/93    | <1                 | <1      | <1           | <1            |
| LYMAN   | 06/28/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 07/15/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 08/03/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 09/21/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 10/14/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 11/10/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 12/06/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 01/12/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 02/09/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 03/16/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 04/05/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 05/19/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 06/23/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 07/21/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 08/24/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 09/20/94    | <0.5               | <0.5    | <0.5         | 0.8           |
| LYMAN   | 10/06/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 11/30/94    | <0.5               | <0.5    | <0.5         | <0.5          |

## Notes:

Concentrations listed in micrograms per liter (ug/L)

<0.05 Constituent not detected above noted laboratory detection limit

-- Indicates parameter was not analyzed

# Appendix C

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Historical BTEX Analytical Data, May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID | Sample Date | Analytical Results |         |              |               |
|---------|-------------|--------------------|---------|--------------|---------------|
|         |             | Benzene            | Toluene | Ethylbenzene | Total Xylenes |
| LYMAN   | 12/16/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 01/11/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 03/09/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 04/07/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 05/18/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 07/21/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 10/12/95    | <0.5               | <0.5    | <0.5         | 1.6           |
| LYMAN   | 12/27/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 01/19/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 03/18/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 04/18/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 07/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 10/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 02/10/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 01/14/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 04/30/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| LYMAN   | 06/29/98    | <1                 | <1      | <1           | <1            |
| MW-1    | 05/01/91    | 500                | --      | --           | --            |
| MW-1    | 05/28/91    | --                 | <500    | 1000         | <500          |
| MW-1    | 09/01/91    | 250                | --      | --           | --            |
| MW-1    | 12/01/91    | 200                | 200     | 300          | 100           |
| MW-10   | 05/01/91    | 5500               | --      | --           | --            |
| MW-10   | 05/28/91    | --                 | 7000    | 500          | 4500          |
| MW-10   | 09/01/91    | 2300               | --      | --           | --            |
| MW-10   | 12/01/91    | 2300               | <100    | 200          | 2500          |
| MW-10   | 04/01/92    | 1840               | 106     | <3           | 2415          |
| MW-10   | 07/01/92    | 1842               | 101     | 482          | 2183          |
| MW-10   | 10/01/92    | 2100               | 144     | 436          | 759           |
| MW-10   | 01/01/94    | ND                 | --      | ND           | ND            |
| MW-10   | 02/11/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-11   | 09/01/91    | 3000               | --      | --           | --            |
| MW-11   | 12/01/91    | 3800               | 5800    | 500          | 5200          |
| MW-11   | 04/01/92    | 3573               | 2979    | 484          | 6714          |
| MW-11   | 07/01/92    | 2199               | 2440    | 463          | 3693          |
| MW-11   | 10/01/92    | 2755               | 1896    | <3           | 5196          |
| MW-11   | 01/01/93    | 2746               | 1821    | 475          | 4280          |
| MW-11   | 10/05/94    | 1800               | <50     | 450          | 3500          |
| MW-11   | 07/21/95    | 95                 | <0.5    | 4.4          | 250           |
| MW-11   | 01/20/96    | 1000               | 32      | 190          | 2800          |
| MW-11   | 04/19/96    | 650                | 38      | 84           | 2800          |
| MW-11   | 07/01/96    | 500                | 46      | 370          | 2300          |
| MW-11   | 10/01/96    | 270                | 15      | 230          | 1600          |
| MW-11   | 02/07/97    | 270                | 20      | 81           | 1400          |
| MW-12   | 09/01/91    | 3800               | --      | --           | --            |
| MW-13   | 09/01/91    | 3100               | --      | --           | --            |
| MW-13   | 12/01/91    | 3000               | 750     | 500          | 3300          |
| MW-13   | 04/01/92    | 3501               | 142     | <3           | 7137          |
| MW-13   | 07/01/92    | 2708               | 136     | 597          | 2247          |
| MW-13   | 10/01/96    | 1100               | 520     | 1200         | 2800          |
| MW-13   | 02/07/97    | 1300               | 130     | 690          | 1000          |
| MW-13   | 07/01/98    | 800                | <10     | 640          | 170           |

## Notes:

Concentrations listed in micrograms per liter (ug/L)

<0.05 Constituent not detected above noted laboratory detection limit

-- Indicates parameter was not analyzed

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Historical BTEX Analytical Data, May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID | Sample Date | Analytical Results |         |              |               |
|---------|-------------|--------------------|---------|--------------|---------------|
|         |             | Benzene            | Toluene | Ethylbenzene | Total Xylenes |
| MW-14   | 09/01/91    | 5100               | --      | --           | --            |
| MW-14   | 06/22/98    | 820                | <10     | 840          | <10           |
| MW-15   | 09/01/91    | 5100               | --      | --           | --            |
| MW-16   | 09/01/91    | 1700               | --      | --           | --            |
| MW-16   | 04/15/93    | 514                | 53      | 39           | 2134          |
| MW-17   | 09/01/91    | 2000               | --      | --           | --            |
| MW-17   | 04/15/93    | 1500               | 58      | 230          | 2900          |
| MW-18   | 09/01/91    | 4300               | --      | --           | --            |
| MW-18   | 04/01/92    | 2900               | 82      | 750          | 1200          |
| MW-18   | 07/01/92    | 2700               | 22      | 600          | 55            |
| MW-18   | 10/01/92    | 3300               | 115     | 870          | 187           |
| MW-19   | 07/01/91    | 4900               | --      | --           | --            |
| MW-19   | 07/19/91    | --                 | 1000    | 1300         | --            |
| MW-19   | 07/30/91    | --                 | --      | --           | 2500          |
| MW-19   | 09/01/91    | 4700               | --      | --           | --            |
| MW-19   | 04/01/92    | 3240               | 347     | 807          | 326           |
| MW-19   | 07/01/92    | 3000               | 40      | 800          | 41            |
| MW-19   | 10/01/92    | 2756               | 73      | 758          | 166           |
| MW-19   | 04/15/93    | 3926               | 130     | 16           | 82            |
| MW-19   | 10/01/96    | 140                | 5.9     | 5.2          | 17            |
| MW-19   | 02/07/97    | 360                | 980     | 1100         | 5600          |
| MW-20   | 09/01/91    | 110                | --      | --           | --            |
| MW-21   | 05/01/91    | 9                  | --      | --           | --            |
| MW-21   | 05/28/91    | --                 | 9       | <1           | 3             |
| MW-21   | 09/01/91    | 1000               | --      | --           | --            |
| MW-21   | 12/01/91    | 1100               | <50     | <50          | 1000          |
| MW-21   | 04/15/93    | 114                | 19      | 38           | 38            |
| MW-22   | 09/01/91    | 4                  | --      | --           | --            |
| MW-24   | 09/01/91    | 3400               | --      | --           | --            |
| MW-24   | 07/01/92    | 4353               | 27      | 55           | 708           |
| MW-26   | 09/01/91    | 3100               | --      | --           | --            |
| MW-26   | 12/01/91    | 3000               | <100    | 400          | 3700          |
| MW-26   | 07/01/92    | 2000               | 48      | 390          | 1400          |
| MW-26   | 10/01/92    | 1860               | 59      | 567          | 1774          |
| MW-26   | 01/01/93    | 1708               | 82      | 399          | 1083          |
| MW-26   | 04/15/93    | 861                | 62      | 600          | 2014          |
| MW-28   | 09/01/91    | 2200               | --      | --           | --            |
| MW-31   | 09/01/91    | <1                 | --      | --           | --            |
| MW-31   | 07/01/92    | 332                | 36      | 11           | 54            |
| MW-31   | 10/01/92    | 9                  | 32      | 10           | 18            |
| MW-32   | 09/01/91    | 200                | --      | --           | --            |
| MW-33   | 09/01/91    | 6300               | --      | --           | --            |
| MW-34   | 09/01/91    | 2500               | --      | --           | --            |
| MW-35   | 09/01/91    | 5700               | --      | --           | --            |
| MW-37   | 06/01/91    | <25                | --      | --           | --            |
| MW-37   | 06/22/91    | --                 | <25     | <25          | <25           |
| MW-37   | 09/01/91    | 150                | --      | --           | --            |
| MW-37   | 07/14/93    | 27                 | 7       | <3           | <3            |
| MW-38   | 05/01/91    | 500                | --      | --           | --            |
| MW-38   | 05/28/91    | --                 | <250    | 250          | <250          |
| MW-38   | 06/01/91    | <10                | --      | --           | --            |

## Notes:

Concentrations listed in micrograms per liter (ug/L)

<0.05 Constituent not detected above noted laboratory detection limit

-- Indicates parameter was not analyzed

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Historical BTEX Analytical Data, May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID | Sample Date | Analytical Results |         |              |               |
|---------|-------------|--------------------|---------|--------------|---------------|
|         |             | Benzene            | Toluene | Ethylbenzene | Total Xylenes |
| MW-38   | 06/22/91    | --                 | <10     | <10          | <10           |
| MW-38   | 09/01/91    | 15                 | --      | --           | --            |
| MW-38   | 12/01/91    | 15                 | <1      | 15           | <1            |
| MW-38   | 04/01/92    | 67                 | 17      | 55           | 7             |
| MW-38   | 07/01/92    | 37                 | 34      | 25           | 56            |
| MW-38   | 10/01/92    | 166                | 18      | 242          | 24            |
| MW-38   | 10/01/96    | 0.6                | <0.5    | <0.5         | 0.7           |
| MW-38   | 02/07/97    | 0.7                | <0.5    | <0.5         | 0.7           |
| MW-39   | 05/01/91    | <1                 | --      | --           | --            |
| MW-39   | 05/28/91    | --                 | <1      | 11           | 38            |
| MW-39   | 06/01/91    | <1                 | --      | --           | --            |
| MW-39   | 06/22/91    | --                 | <1      | <1           | <1            |
| MW-39   | 09/01/91    | 880                | --      | --           | --            |
| MW-39   | 01/01/93    | 14                 | 6       | <5           | <5            |
| MW-39   | 04/15/93    | 28                 | 15      | 4            | 11            |
| MW-39   | 07/15/93    | 24                 | 3       | <3           | 3             |
| MW-39   | 10/14/93    | 19                 | 23      | <3           | 10            |
| MW-39   | 01/13/94    | <2.5               | <2.5    | 8.4          | 70            |
| MW-39   | 04/07/94    | <0.5               | <0.5    | 4            | 38            |
| MW-39   | 07/20/94    | <0.5               | <0.5    | 5.9          | 78            |
| MW-39   | 01/10/95    | <5                 | 7.1     | 250          | 80            |
| MW-39   | 10/01/96    | 20                 | <0.5    | <0.5         | <0.5          |
| MW-39   | 02/07/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-39   | 07/18/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-39   | 04/30/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-39   | 07/01/98    | <1                 | <1      | <1           | <1            |
| MW-41   | 07/01/91    | 300                | --      | --           | --            |
| MW-41   | 07/19/91    | --                 | <50     | 350          | --            |
| MW-41   | 07/30/91    | --                 | --      | --           | <50           |
| MW-41   | 09/01/91    | 200                | --      | --           | --            |
| MW-41   | 12/01/91    | 170                | 30      | 400          | <10           |
| MW-41   | 07/15/93    | 12                 | <5      | 22           | <5            |
| MW-41   | 10/14/93    | 8.9                | <0.5    | 17           | <0.5          |
| MW-41   | 01/13/94    | 5.3                | <5      | 27           | 140           |
| MW-41   | 04/06/94    | 0.6                | <0.5    | 3.8          | 7.4           |
| MW-41   | 07/20/94    | 1.4                | 31      | 4.9          | <0.5          |
| MW-41   | 10/06/94    | 3.2                | 44      | 0.7          | 90            |
| MW-41   | 01/11/95    | 13                 | <5      | 42           | 23            |
| MW-41   | 04/06/95    | 4.8                | <0.5    | 19           | 33            |
| MW-41   | 07/21/95    | <0.5               | <0.5    | 1.1          | 6.3           |
| MW-41   | 10/12/95    | 1.8                | 8       | 2.6          | 18            |
| MW-41   | 01/20/96    | <5                 | 10      | <5           | 14            |
| MW-41   | 04/19/96    | 1.7                | 9.8     | 5.5          | 6.7           |
| MW-41   | 07/01/96    | <0.5               | 6.1     | 3.6          | 1.7           |
| MW-41   | 10/01/96    | 8.1                | 2.4     | 5.8          | 5.5           |
| MW-41   | 02/07/97    | 82                 | 6.2     | 7.2          | 9.1           |
| MW-41   | 07/18/97    | 280                | 6.9     | 6.9          | 23            |
| MW-41   | 04/30/98    | <0.5               | 7.1     | 4.5          | 21            |
| MW-41   | 06/28/98    | 41                 | <1      | <1           | <1            |
| MW-42   | 09/01/91    | <1                 | --      | --           | --            |
| MW-42   | 12/01/91    | <1                 | <1      | <1           | <1            |

## Notes:

Concentrations listed in micrograms per liter (ug/L)

<0.05 Constituent not detected above noted laboratory detection limit

-- Indicates parameter was not analyzed

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Historical BTEX Analytical Data, May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID | Sample Date | Analytical Results |         |              |               |
|---------|-------------|--------------------|---------|--------------|---------------|
|         |             | Benzene            | Toluene | Ethylbenzene | Total Xylenes |
| MW-43   | 06/01/91    | <10                | --      | --           | --            |
| MW-43   | 06/22/91    | --                 | <10     | 15           | 10            |
| MW-43   | 09/01/91    | 320                | --      | --           | --            |
| MW-43   | 07/15/93    | 25                 | 17      | <3           | 3             |
| MW-43   | 10/14/93    | 10                 | 11      | <3           | <3            |
| MW-43   | 01/13/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-43   | 04/06/94    | <0.5               | <0.5    | 1.2          | 14            |
| MW-43   | 07/20/94    | <0.5               | <0.5    | 1.5          | 7.1           |
| MW-43   | 10/06/94    | 0.8                | <0.5    | 2.3          | 17            |
| MW-43   | 01/11/95    | 3                  | <0.5    | 5.5          | 15            |
| MW-43   | 04/06/95    | 0.6                | <0.5    | 2.8          | 14            |
| MW-43   | 07/21/95    | 3                  | 4       | 5.8          | 5.9           |
| MW-43   | 10/12/95    | 1.2                | 2.4     | 3.8          | 5.5           |
| MW-43   | 01/20/96    | 1.4                | 3.1     | 6.6          | 5.3           |
| MW-43   | 04/19/96    | 4.4                | 4.3     | 1.3          | 5.3           |
| MW-43   | 07/01/96    | 8.2                | 5.7     | 4.4          | 7             |
| MW-43   | 10/01/96    | 230                | 2.1     | 4.3          | 3.6           |
| MW-43   | 02/07/97    | 64                 | 8.1     | 18           | 28            |
| MW-43   | 07/18/97    | 110                | <1      | 4.1          | <1            |
| MW-43   | 04/30/98    | 29                 | 5.8     | 2.8          | 26            |
| MW-43   | 06/22/98    | 7.3                | <1      | <1           | <1            |
| MW-44   | 06/01/91    | 75                 | --      | --           | --            |
| MW-44   | 06/22/91    | --                 | <25     | 220          | <25           |
| MW-44   | 09/01/91    | 59                 | --      | --           | --            |
| MW-44   | 04/01/92    | 6                  | 22      | 24           | 2             |
| MW-44   | 07/01/92    | 97                 | 25      | 102          | 96            |
| MW-44   | 10/01/92    | 12                 | 34      | 96           | 24            |
| MW-44   | 01/01/93    | 14                 | 18      | 65           | <1            |
| MW-44   | 04/15/93    | 7                  | 15      | 18           | 14            |
| MW-44   | 07/15/93    | 6                  | 16      | <3           | 18            |
| MW-44   | 10/14/93    | 3.6                | <0.5    | 19           | 5.6           |
| MW-44   | 01/13/94    | 12                 | <5      | 7.2          | 14            |
| MW-44   | 04/06/94    | 22                 | <2.5    | 3.3          | 11            |
| MW-44   | 07/20/94    | 36                 | <5      | 12           | 14            |
| MW-44   | 10/05/94    | 130                | <25     | 120          | 77            |
| MW-44   | 01/11/95    | 63                 | <5      | 140          | 26            |
| MW-44   | 04/06/95    | 19                 | 2       | 71           | 16            |
| MW-44   | 07/21/95    | 5.8                | <0.5    | 16           | 5.6           |
| MW-44   | 10/12/95    | 120                | <50     | 240          | 260           |
| MW-44   | 01/20/96    | 51                 | 14      | 130          | 15            |
| MW-44   | 04/19/96    | 26                 | 11      | 74           | 6.3           |
| MW-44   | 07/01/96    | 83                 | 99      | 280          | 310           |
| MW-44   | 10/01/96    | 33                 | 2.7     | 20           | 2.6           |
| MW-44   | 02/07/97    | 270                | 26      | 53           | 48            |
| MW-44   | 07/18/97    | 750                | <10     | 45           | <10           |
| MW-44   | 04/30/98    | 520                | 22      | 17           | 44            |
| MW-44   | 06/22/98    | 440                | <5      | 9.2          | <5            |
| MW-45   | 06/01/91    | <1                 | --      | --           | --            |
| MW-45   | 06/22/91    | --                 | <1      | <1           | <1            |
| MW-45   | 09/01/91    | <1                 | --      | --           | --            |
| MW-45   | 12/01/91    | <1                 | <1      | <1           | <1            |

## Notes:

Concentrations listed in micrograms per liter (ug/L)

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-- Indicates parameter was not analyzed

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Historical BTEX Analytical Data, May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID | Sample Date | Analytical Results |         |              |               |
|---------|-------------|--------------------|---------|--------------|---------------|
|         |             | Benzene            | Toluene | Ethylbenzene | Total Xylenes |
| MW-45   | 07/15/93    | <3                 | 6       | 7            | 4             |
| MW-45   | 10/14/93    | <3                 | 3       | <3           | 3             |
| MW-45   | 01/13/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-45   | 04/06/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-45   | 07/20/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-46   | 06/01/91    | 3200               | --      | --           | --            |
| MW-46   | 06/22/91    | --                 | <50     | 900          | <50           |
| MW-46   | 07/01/91    | 300                | --      | --           | --            |
| MW-46   | 07/19/91    | --                 | <50     | 250          | --            |
| MW-46   | 07/30/91    | --                 | --      | --           | 250           |
| MW-46   | 09/01/91    | 140                | --      | --           | --            |
| MW-46   | 10/01/96    | 900                | 33      | 440          | 59            |
| MW-46   | 02/11/97    | 3300               | 550     | 1000         | 1400          |
| MW-46   | 05/29/97    | 5000               | 1200    | 230          | <100          |
| MW-46   | 07/18/97    | 6100               | 1900    | 270          | 130           |
| MW-46   | 04/30/98    | 1600               | 41      | 140          | 290           |
| MW-46   | 07/01/98    | 1700               | <5      | 97           | 120           |
| MW-47   | 06/01/91    | 600                | --      | --           | --            |
| MW-47   | 06/22/91    | --                 | <100    | 2000         | 2700          |
| MW-47   | 09/01/91    | 2600               | --      | --           | --            |
| MW-47   | 12/01/91    | 2200               | <50     | <50          | <50           |
| MW-47   | 10/01/96    | 1500               | 59      | 200          | 250           |
| MW-48   | 09/01/91    | <1                 | --      | --           | --            |
| MW-48   | 12/01/91    | <1                 | 5       | 10           | <1            |
| MW-48   | 07/01/92    | 47                 | 18      | 6            | 18            |
| MW-48   | 10/01/96    | <0.5               | <0.5    | <0.5         | 1             |
| MW-49   | 06/01/91    | 60                 | --      | --           | --            |
| MW-49   | 06/22/91    | --                 | <10     | 60           | 40            |
| MW-49   | 09/01/91    | 35                 | --      | --           | --            |
| MW-49   | 07/15/93    | 210                | 27      | 42           | 30            |
| MW-49   | 10/14/93    | 68                 | 26      | 9            | 20            |
| MW-49   | 01/13/94    | 13                 | <5      | 15           | 110           |
| MW-49   | 04/06/94    | 82                 | <0.5    | 11           | 10            |
| MW-49   | 07/20/94    | 150                | <5      | 32           | 27            |
| MW-49   | 10/05/94    | 78                 | 49      | 40           | 300           |
| MW-49   | 01/11/95    | 220                | <5      | 46           | 97            |
| MW-49   | 04/06/95    | 120                | <0.5    | 24           | 26            |
| MW-49   | 07/21/95    | 17                 | <0.5    | 3.5          | 3.4           |
| MW-49   | 10/12/95    | 240                | <50     | 59           | 130           |
| MW-49   | 01/20/96    | 160                | 130     | 120          | 570           |
| MW-49   | 04/19/96    | 87                 | 23      | 18           | 32            |
| MW-49   | 07/01/96    | 370                | 220     | 190          | 630           |
| MW-49   | 10/01/96    | 95                 | 16      | 36           | 12            |
| MW-49   | 02/07/97    | 79                 | 66      | 45           | 160           |
| MW-49   | 07/18/97    | 130                | <1      | 35           | 9.8           |
| MW-49   | 04/30/98    | 130                | 39      | 41           | 69            |
| MW-49   | 07/01/98    | 78                 | <1      | 15           | <1            |
| MW-50   | 06/01/91    | <1                 | --      | --           | --            |
| MW-50   | 06/22/91    | --                 | <1      | <1           | <1            |
| MW-50   | 09/01/91    | <1                 | --      | --           | --            |
| MW-50   | 12/01/91    | <1                 | <1      | <1           | <1            |

## Notes:

Concentrations listed in micrograms per liter (ug/L)

<0.05 Constituent not detected above noted laboratory detection limit

-- Indicates parameter was not analyzed

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Historical BTEX Analytical Data, May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID | Sample Date | Analytical Results |         |              |               |
|---------|-------------|--------------------|---------|--------------|---------------|
|         |             | Benzene            | Toluene | Ethylbenzene | Total Xylenes |
| MW-50   | 04/01/92    | 7                  | 18      | <3           | 17            |
| MW-50   | 07/01/92    | 4                  | 167     | 7            | 11            |
| MW-50   | 10/01/92    | 8                  | 10      | 3            | 2             |
| MW-50   | 01/01/93    | 8                  | 5       | <3           | 5             |
| MW-50   | 04/15/93    | <1                 | <1      | <1           | <1            |
| MW-50   | 07/15/93    | <3                 | 12      | 10           | 4             |
| MW-50   | 10/14/93    | 9                  | 16      | <3           | <3            |
| MW-50   | 01/13/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-50   | 04/06/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-50   | 07/20/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-50   | 10/05/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-50   | 01/11/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-50   | 04/06/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-50   | 07/21/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-50   | 10/12/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-50   | 01/20/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-50   | 04/19/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-50   | 07/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-50   | 10/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-50   | 02/07/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-50   | 07/18/97    | <1                 | <1      | <1           | <1            |
| MW-50   | 04/30/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-50   | 06/28/98    | <1                 | <1      | <1           | <1            |
| MW-51   | 09/01/91    | 800                | --      | --           | --            |
| MW-51   | 12/01/91    | <1                 | <1      | <1           | <1            |
| MW-52   | 09/01/91    | <1                 | --      | --           | --            |
| MW-52   | 07/01/92    | 5                  | 31      | 4            | 5             |
| MW-53   | 09/01/91    | <1                 | --      | --           | --            |
| MW-54   | 09/01/91    | <1                 | --      | --           | --            |
| MW-54   | 12/01/91    | <1                 | <1      | <1           | <1            |
| MW-54   | 04/01/92    | 10                 | 10      | <3           | 14            |
| MW-54   | 07/01/92    | 8                  | 44      | 23           | 195           |
| MW-54   | 10/01/92    | 62                 | 7       | 195          | 630           |
| MW-54   | 01/01/93    | 14                 | 4       | 15           | 113           |
| MW-54   | 04/14/93    | 10                 | <3      | <3           | 8             |
| MW-54   | 07/14/93    | <3                 | <3      | <3           | 3             |
| MW-54   | 10/14/93    | 17                 | 35      | 16           | 24            |
| MW-54   | 01/12/94    | 8.6                | <0.5    | 7.4          | <0.5          |
| MW-54   | 04/06/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-54   | 07/20/94    | 15                 | 1.2     | 8.5          | 8.7           |
| MW-54   | 10/05/94    | 19                 | 0.6     | 29           | 6.3           |
| MW-54   | 01/10/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-54   | 04/06/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-54   | 07/21/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-54   | 10/11/95    | 0.7                | <0.5    | 1.7          | 3             |
| MW-54   | 01/20/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-54   | 04/18/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-54   | 07/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-54   | 10/01/96    | 0.9                | <0.5    | 0.6          | <0.5          |
| MW-54   | 02/10/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-54   | 07/16/97    | 0.9                | 3.2     | 2.1          | 17            |

## Notes:

Concentrations listed in micrograms per liter (ug/L)

<0.05 Constituent not detected above noted laboratory detection limit

-- Indicates parameter was not analyzed

# Appendix C

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Historical BTEX Analytical Data, May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID | Sample Date | Analytical Results |         |              |               |
|---------|-------------|--------------------|---------|--------------|---------------|
|         |             | Benzene            | Toluene | Ethylbenzene | Total Xylenes |
| MW-54   | 04/29/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-54   | 06/25/98    | <1                 | <1      | <1           | <1            |
| MW-55   | 06/01/91    | <50                | --      | --           | --            |
| MW-55   | 06/22/91    | --                 | <50     | <50          | 100           |
| MW-55   | 09/01/91    | 940                | --      | --           | --            |
| MW-55   | 12/01/91    | 400                | 25      | <25          | 25            |
| MW-55   | 04/01/92    | 297                | 24      | 15           | 34            |
| MW-55   | 07/01/92    | 483                | 36      | 64           | 66            |
| MW-55   | 10/01/92    | 215                | 56      | 92           | 26            |
| MW-55   | 01/01/93    | 390                | 68      | 90           | 32            |
| MW-55   | 04/14/93    | 412                | 20      | 89           | 18            |
| MW-55   | 07/14/93    | 625                | 21      | 8            | 50            |
| MW-55   | 10/14/93    | 581                | 27      | 102          | 18            |
| MW-55   | 01/12/94    | 290                | <2.5    | 89           | <2.5          |
| MW-55   | 04/08/94    | 370                | <2.5    | 33           | <2.5          |
| MW-55   | 07/20/94    | 360                | 5.5     | 16           | 120           |
| MW-55   | 10/05/94    | 910                | <5      | 480          | <5            |
| MW-55   | 01/11/95    | 650                | <5      | 400          | 41            |
| MW-55   | 04/11/95    | 420                | <2.5    | 260          | 21            |
| MW-55   | 07/20/95    | 350                | <5      | 270          | 22            |
| MW-55   | 10/11/95    | 100                | 6.1     | 70           | 15            |
| MW-55   | 01/19/96    | 650                | 15      | 430          | 29            |
| MW-55   | 04/18/96    | 370                | 13      | 310          | 22            |
| MW-55   | 07/01/96    | 800                | 35      | 520          | 99            |
| MW-55   | 10/01/96    | 520                | 32      | 460          | 84            |
| MW-55   | 02/10/97    | 410                | 20      | 230          | 64            |
| MW-55   | 07/16/97    | 140                | 11      | 110          | 9.2           |
| MW-55   | 04/29/98    | 110                | 12      | 31           | 7.7           |
| MW-55   | 06/25/98    | 180                | <1      | 31           | <1            |
| MW-56   | 06/01/91    | 2100               | --      | --           | --            |
| MW-56   | 06/22/91    | --                 | <50     | 2900         | <50           |
| MW-56   | 07/01/91    | 2000               | --      | --           | --            |
| MW-56   | 07/19/91    | --                 | 500     | 1000         | --            |
| MW-56   | 07/30/91    | --                 | --      | --           | 1000          |
| MW-56   | 09/01/91    | 2200               | --      | --           | --            |
| MW-56   | 12/01/91    | 1000               | 2000    | 3000         | 6000          |
| MW-56   | 07/01/92    | 1114               | 64      | 962          | 49            |
| MW-56   | 10/01/92    | 1026               | 47      | <3           | 839           |
| MW-56   | 01/01/93    | 1128               | 40      | 10           | 804           |
| MW-56   | 10/01/96    | 1000               | 23      | 94           | 92            |
| MW-56   | 02/11/97    | 370                | 12      | 51           | 51            |
| MW-57   | 05/28/91    | --                 | --      | --           | <0.2          |
| MW-57   | 06/01/91    | <1                 | --      | --           | --            |
| MW-57   | 06/22/91    | --                 | 1       | <1           | <1            |
| MW-57   | 07/01/91    | <1                 | --      | --           | --            |
| MW-57   | 07/19/91    | --                 | 0.2     | 0.4          | --            |
| MW-57   | 09/01/91    | 1600               | --      | --           | --            |
| MW-57   | 12/01/91    | 350                | <10     | <10          | <10           |
| MW-57   | 04/01/92    | 127                | 29      | <3           | 16            |
| MW-57   | 07/01/92    | 948                | 422     | 112          | 876           |
| MW-57   | 10/01/92    | 15                 | 33      | <3           | 78            |

## Notes:

Concentrations listed in micrograms per liter (ug/L)

<0.05 Constituent not detected above noted laboratory detection limit

-- Indicates parameter was not analyzed

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Historical BTEX Analytical Data, May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID | Sample Date | Analytical Results |         |              |               |
|---------|-------------|--------------------|---------|--------------|---------------|
|         |             | Benzene            | Toluene | Ethylbenzene | Total Xylenes |
| MW-57   | 01/01/93    | 21                 | 40      | 165          | 19            |
| MW-57   | 04/14/93    | 8                  | 21      | 15           | 16            |
| MW-57   | 07/14/93    | 6                  | 8       | <3           | <3            |
| MW-57   | 10/13/93    | <0.5               | 1.6     | <0.5         | 1.2           |
| MW-57   | 01/12/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-57   | 04/07/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-57   | 07/19/94    | 0.7                | <0.5    | <0.5         | 1.8           |
| MW-57   | 10/05/94    | 1.1                | <0.5    | <0.5         | 4             |
| MW-57   | 01/11/95    | 4.3                | <0.5    | <0.5         | 1.3           |
| MW-57   | 04/08/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-57   | 07/20/95    | <0.5               | 0.8     | <0.5         | <0.5          |
| MW-57   | 10/11/95    | 64                 | 1.7     | 0.7          | 5             |
| MW-57   | 01/19/96    | 16                 | 1.5     | 1            | 4.2           |
| MW-57   | 04/18/96    | <0.5               | 0.9     | <0.5         | <0.5          |
| MW-57   | 07/01/96    | 2.8                | 1       | <0.5         | 1.4           |
| MW-57   | 10/01/96    | 54                 | 2.8     | 3.4          | 13            |
| MW-57   | 02/10/97    | <0.5               | 0.9     | <0.5         | <0.5          |
| MW-57   | 07/15/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-57   | 04/29/98    | <0.5               | <0.5    | <0.5         | 0.9           |
| MW-57   | 06/24/98    | <1                 | <1      | <1           | <1            |
| MW-58   | 09/01/91    | 40                 | --      | --           | --            |
| MW-58   | 12/01/91    | 90                 | 40      | 20           | 80            |
| MW-58   | 04/01/92    | 203                | 32      | 56           | 68            |
| MW-58   | 07/01/92    | 178                | 58      | 32           | 44            |
| MW-58   | 10/01/92    | 190                | 49      | 26           | 57            |
| MW-58   | 01/01/93    | 192                | 30      | 23           | 39            |
| MW-58   | 04/13/93    | 55                 | 16      | 31           | 9             |
| MW-58   | 07/13/93    | 25                 | 42      | 14           | 13            |
| MW-58   | 10/13/93    | 50                 | 21      | 212          | 555           |
| MW-58   | 04/05/94    | <2.5               | <2.5    | 7.4          | 27            |
| MW-58   | 07/19/94    | 2                  | 29      | 4.5          | 27            |
| MW-58   | 10/06/94    | 6.7                | <5      | 15           | 39            |
| MW-58   | 04/08/95    | 2.2                | <0.5    | 2.1          | 6.8           |
| MW-58   | 10/01/96    | 110                | 320     | 940          | 10000         |
| MW-58   | 01/30/98    | 350                | 23      | 42           | 96            |
| MW-58   | 06/22/98    | 22                 | <1      | 28           | 35            |
| MW-59   | 09/01/91    | 540                | --      | --           | --            |
| MW-59   | 12/01/91    | 420                | 40      | 240          | 420           |
| MW-59   | 04/01/92    | 42                 | 12      | 20           | 20            |
| MW-59   | 07/01/92    | 268                | 45      | 110          | 232           |
| MW-59   | 10/01/92    | 99                 | 37      | 44           | 46            |
| MW-59   | 01/01/93    | 26                 | <3      | 55           | 10            |
| MW-59   | 04/13/93    | 10                 | 14      | 12           | 5             |
| MW-59   | 10/13/93    | 10                 | 13      | 89           | 433           |
| MW-59   | 04/05/94    | <2.5               | <2.5    | 3.3          | 25            |
| MW-59   | 07/19/94    | 13                 | 69      | 0.5          | 73            |
| MW-59   | 10/06/94    | 4.1                | 3.7     | 23           | 37            |
| MW-59   | 06/24/98    | <5                 | <5      | 79           | 42            |
| MW-60   | 05/28/91    | --                 | --      | --           | <0.2          |
| MW-60   | 07/01/91    | <0.2               | --      | --           | --            |
| MW-60   | 07/19/91    | --                 | <0.2    | 0.4          | --            |

## Notes:

Concentrations listed in micrograms per liter (ug/L)

<0.05 Constituent not detected above noted laboratory detection limit

-- Indicates parameter was not analyzed

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Historical BTEX Analytical Data, May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID | Sample Date | Analytical Results |         |              |               |
|---------|-------------|--------------------|---------|--------------|---------------|
|         |             | Benzene            | Toluene | Ethylbenzene | Total Xylenes |
| MW-60   | 09/01/91    | 33                 | --      | --           | --            |
| MW-60   | 12/01/91    | <1                 | <1      | <1           | <1            |
| MW-60   | 04/01/92    | 5                  | 9       | <3           | 4             |
| MW-60   | 07/01/92    | 17                 | 1       | <1           | 1             |
| MW-60   | 10/01/92    | 32                 | 109     | 36           | 57            |
| MW-60   | 01/01/93    | 138                | 4       | 260          | 6             |
| MW-60   | 04/14/93    | 17                 | 16      | <3           | 12            |
| MW-60   | 07/14/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-60   | 10/13/93    | <0.5               | 1       | 0.5          | 1             |
| MW-60   | 01/12/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-60   | 04/07/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-60   | 07/19/94    | <0.5               | 1.3     | <0.5         | 3.5           |
| MW-60   | 10/05/94    | <0.5               | 0.6     | 0.6          | 4.9           |
| MW-60   | 01/10/95    | <0.5               | <0.5    | <0.5         | 0.6           |
| MW-60   | 04/07/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-60   | 07/19/95    | <0.5               | 4.9     | <0.5         | <0.5          |
| MW-60   | 10/11/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-60   | 01/19/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-60   | 04/18/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-60   | 07/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-60   | 10/01/96    | 2.5                | 0.9     | <0.5         | <0.5          |
| MW-60   | 02/09/97    | <0.5               | <0.5    | 0.5          | 0.8           |
| MW-60   | 05/06/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-60   | 07/15/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-60   | 10/16/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-60   | 01/30/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-60   | 04/28/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-60   | 07/01/98    | <1                 | <1      | <1           | <1            |
| MW-60   | 10/12/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-61   | 09/01/91    | <1                 | --      | --           | --            |
| MW-61   | 12/01/91    | --                 | <1      | <1           | <1            |
| MW-61   | 01/13/94    | 1.4                | 1       | 1.7          | 1.1           |
| MW-61   | 04/07/94    | <0.5               | <0.5    | 0.5          | <0.5          |
| MW-61   | 07/20/94    | 3.2                | <0.5    | <0.5         | 0.8           |
| MW-61   | 10/04/94    | <5                 | 23      | 14           | 160           |
| MW-61   | 01/11/95    | <0.5               | 0.7     | 2.5          | 0.8           |
| MW-61   | 04/11/95    | 7                  | <0.5    | 7.8          | 35            |
| MW-61   | 07/21/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-61   | 10/10/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-61   | 01/20/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-61   | 04/18/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-61   | 07/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-61   | 10/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-61   | 02/10/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-61   | 07/17/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-61   | 04/29/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-61   | 06/28/98    | <1                 | <1      | <1           | <1            |
| MW-61A  | 05/28/91    | --                 | --      | --           | 0.5           |
| MW-61A  | 07/01/91    | 2                  | --      | --           | --            |
| MW-61A  | 07/19/91    | --                 | 1.5     | 0.4          | --            |
| MW-61A  | 09/01/91    | 190                | --      | --           | --            |

## Notes:

Concentrations listed in micrograms per liter (ug/L)

<0.05 Constituent not detected above noted laboratory detection limit

-- Indicates parameter was not analyzed

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Historical BTEX Analytical Data, May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID | Sample Date | Analytical Results |         |              |               |
|---------|-------------|--------------------|---------|--------------|---------------|
|         |             | Benzene            | Toluene | Ethylbenzene | Total Xylenes |
| MW-61A  | 12/01/91    | 10                 | 10      | 5            | 75            |
| MW-61A  | 04/01/92    | 6                  | 7       | <3           | 13            |
| MW-61A  | 07/01/92    | 60                 | <10     | 3            | 8             |
| MW-61A  | 10/01/92    | 470                | 17      | <3           | 2351          |
| MW-61A  | 01/01/93    | 585                | 82      | 397          | 2368          |
| MW-61A  | 04/13/93    | 2821               | 173     | 817          | 3993          |
| MW-61A  | 04/05/94    | <0.5               | <0.5    | 0.5          | 3.8           |
| MW-61A  | 07/19/94    | <0.5               | <0.5    | <0.5         | 2.5           |
| MW-61A  | 10/04/94    | 4.8                | 4.5     | 3.7          | 37            |
| MW-61A  | 01/10/95    | 16                 | <5      | 30           | 220           |
| MW-61A  | 01/20/96    | <0.5               | <0.5    | <0.5         | 0.8           |
| MW-61A  | 04/19/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-61A  | 07/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-61A  | 10/01/96    | 1.7                | 1.7     | 1.3          | 9.4           |
| MW-61A  | 02/06/97    | 42                 | 3.4     | 8.4          | 46            |
| MW-61A  | 05/07/97    | 330                | 59      | <25          | 850           |
| MW-61A  | 06/27/97    | 22                 | 11      | -5.4         | 26            |
| MW-61A  | 07/15/97    | 16                 | <10     | 10           | 93            |
| MW-61A  | 10/15/97    | 35                 | 13      | 22           | 95            |
| MW-61A  | 01/29/98    | 15                 | 16      | 26           | 130           |
| MW-61A  | 04/29/98    | 7.1                | 9.5     | 24           | 93            |
| MW-61A  | 06/28/98    | 1.5                | <1      | 7.9          | 20            |
| MW-61A  | 10/11/98    | 4.5                | 22      | 15           | 61            |
| MW-62   | 09/01/91    | 2200               | --      | --           | --            |
| MW-62   | 12/01/91    | 1400               | <200    | 400          | 2400          |
| MW-62   | 04/01/92    | 263                | 48      | 170          | 298           |
| MW-62   | 07/01/92    | 357                | 13      | 184          | 301           |
| MW-62   | 10/01/92    | 212                | 19      | 416          | 1692          |
| MW-62   | 01/01/93    | 78                 | 18      | --           | 207           |
| MW-62   | 04/13/93    | 33                 | 15      | 16           | 24            |
| MW-62   | 07/14/93    | 98                 | 12      | 70           | 204           |
| MW-62   | 10/13/93    | 19                 | 20      | 20           | 32            |
| MW-62   | 01/11/94    | 4.1                | <2.5    | 13           | 44            |
| MW-62   | 04/05/94    | <2.5               | <2.5    | 4.4          | 26            |
| MW-62   | 07/19/94    | 4.3                | 32      | 7.5          | 26            |
| MW-62   | 10/06/94    | 13                 | 13      | 11           | 39            |
| MW-62   | 04/08/95    | 7.5                | 30      | 12           | 30            |
| MW-62   | 07/18/97    | 20                 | 19      | 58           | 210           |
| MW-62   | 06/26/98    | <10                | <10     | 41           | 56            |
| MW-63   | 09/01/91    | <1                 | --      | --           | --            |
| MW-63   | 12/01/91    | <1                 | <1      | <1           | <1            |
| MW-63   | 04/01/92    | 5                  | 6       | <3           | 8             |
| MW-63   | 07/01/92    | 12                 | 28      | 3            | 20            |
| MW-63   | 10/01/92    | 4                  | 7       | 17           | 33            |
| MW-63   | 01/01/93    | 12                 | 4       | <3           | 13            |
| MW-63   | 04/13/93    | <1                 | <1      | <1           | <1            |
| MW-63   | 07/13/93    | 4                  | <3      | <3           | <3            |
| MW-63   | 10/12/93    | 14                 | 48      | 11           | 39            |
| MW-63   | 01/11/94    | <0.5               | 0.7     | <0.5         | 0.7           |
| MW-63   | 04/06/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-63   | 07/18/94    | 1                  | 9.6     | 1.4          | 13            |

## Notes:

Concentrations listed in micrograms per liter (ug/L)

<0.05 Constituent not detected above noted laboratory detection limit

-- Indicates parameter was not analyzed

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Historical BTEX Analytical Data, May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID | Sample Date | Analytical Results |         |              |               |
|---------|-------------|--------------------|---------|--------------|---------------|
|         |             | Benzene            | Toluene | Ethylbenzene | Total Xylenes |
| MW-63   | 10/04/94    | <0.5               | 2.6     | 1            | 8             |
| MW-63   | 01/09/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-63   | 04/07/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-63   | 07/18/95    | <0.5               | 1       | <0.5         | <0.5          |
| MW-63   | 10/10/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-63   | 01/18/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-63   | 04/17/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-63   | 07/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-63   | 10/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-63   | 02/05/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-63   | 07/15/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-63   | 10/15/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-63   | 06/25/98    | <1                 | <1      | <1           | <1            |
| MW-63   | 10/11/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-64   | 09/01/91    | 150                | --      | --           | --            |
| MW-64   | 12/01/91    | 130                | <10     | 40           | 160           |
| MW-64   | 04/01/92    | 245                | 32      | 82           | 331           |
| MW-64   | 07/01/92    | 115                | 19      | 10           | 40            |
| MW-64   | 10/01/92    | 37                 | 61      | <3           | 96            |
| MW-64   | 01/01/93    | 6                  | 2       | 1            | 4             |
| MW-64   | 04/13/93    | 5                  | 11      | 5            | 9             |
| MW-64   | 07/13/93    | 2                  | <0.5    | <0.5         | <0.5          |
| MW-64   | 10/13/93    | 18                 | 12      | 3            | 71            |
| MW-64   | 11/10/93    | <4                 | <4      | <4           | <4            |
| MW-64   | 01/12/94    | 1.7                | <0.5    | <0.5         | 0.9           |
| MW-64   | 04/06/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-64   | 07/19/94    | <0.5               | 0.5     | <0.5         | 3.6           |
| MW-64   | 10/05/94    | <0.5               | 0.5     | 0.6          | 5.6           |
| MW-64   | 01/10/95    | 12                 | <0.5    | 5.1          | 13            |
| MW-64   | 04/07/95    | 18                 | <0.5    | 18           | 41            |
| MW-64   | 07/19/95    | 17                 | 1.1     | 9.8          | 23            |
| MW-64   | 10/11/95    | 25                 | 1.7     | 13           | 32            |
| MW-64   | 01/19/96    | 14                 | 2.2     | 9.3          | 23            |
| MW-64   | 04/18/96    | 10                 | 2       | 4.3          | 7.9           |
| MW-64   | 07/16/97    | 84                 | <25     | 130          | 310           |
| MW-64   | 06/23/98    | <1                 | <1      | <1           | <1            |
| MW-65   | 09/01/91    | <1                 | --      | --           | --            |
| MW-65   | 12/01/91    | --                 | <1      | <1           | <1            |
| MW-65   | 07/15/93    | <3                 | 6       | <3           | 3             |
| MW-65   | 10/05/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-65   | 07/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-65   | 10/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-65   | 02/11/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-65   | 05/07/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-65   | 04/30/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-65A  | 09/01/91    | 680                | --      | --           | --            |
| MW-65A  | 12/01/91    | 150                | 15      | <1           | 15            |
| MW-65A  | 04/01/92    | 26                 | 15      | <3           | 12            |
| MW-65A  | 07/01/92    | 413                | 235     | 93           | 551           |
| MW-65A  | 10/01/92    | 11                 | <3      | <3           | 67            |
| MW-65A  | 01/01/93    | 3                  | <3      | <3           | 11            |

## Notes:

Concentrations listed in micrograms per liter (ug/L)

<0.05 Constituent not detected above noted laboratory detection limit

-- Indicates parameter was not analyzed

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Historical BTEX Analytical Data, May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID | Sample Date | Analytical Results |         |              |               |
|---------|-------------|--------------------|---------|--------------|---------------|
|         |             | Benzene            | Toluene | Ethylbenzene | Total Xylenes |
| MW-65A  | 04/13/93    | 4                  | 9       | 3            | 8             |
| MW-65A  | 07/13/93    | <3                 | 3       | <3           | <3            |
| MW-65A  | 10/13/93    | 7                  | 3       | <3           | <3            |
| MW-65A  | 01/11/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-65A  | 04/05/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-65A  | 07/19/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-65A  | 10/06/94    | 1.7                | <0.5    | <0.5         | <0.5          |
| MW-65A  | 01/11/95    | <0.5               | <0.5    | <0.5         | 0.7           |
| MW-65A  | 04/08/95    | <0.5               | <0.5    | <0.5         | 0.5           |
| MW-65A  | 01/20/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-65A  | 04/18/96    | <0.5               | <0.5    | <0.5         | 2             |
| MW-65A  | 06/25/98    | <1                 | <1      | 16           | 415           |
| MW-66   | 09/01/91    | <1                 | --      | --           | --            |
| MW-66   | 12/01/91    | <1                 | <1      | <1           | <1            |
| MW-66   | 04/01/92    | 4                  | 7       | <3           | 4             |
| MW-66   | 07/01/92    | 8                  | 25      | 7            | 11            |
| MW-66   | 10/01/92    | 12                 | 36      | <3           | 34            |
| MW-66   | 01/01/93    | 3                  | 6       | 3            | 20            |
| MW-66   | 04/13/93    | <3                 | 5       | 5            | <3            |
| MW-66   | 07/13/93    | 8                  | 4       | <3           | <3            |
| MW-66   | 10/12/93    | 13                 | 60      | 4            | 29            |
| MW-66   | 11/10/93    | <4                 | <4      | <4           | <4            |
| MW-66   | 01/11/94    | <0.5               | <0.5    | <0.5         | 0.6           |
| MW-66   | 04/07/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-66   | 07/19/94    | <0.5               | 0.6     | <0.5         | 0.8           |
| MW-66   | 10/04/94    | <0.5               | 3       | 1.5          | 17            |
| MW-66   | 01/09/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-66   | 04/11/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-66   | 07/19/95    | <0.5               | 0.9     | <0.5         | <0.5          |
| MW-66   | 10/10/95    | <0.5               | <0.5    | <0.5         | 3.5           |
| MW-66   | 01/19/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-66   | 04/17/96    | <0.5               | 0.8     | <0.5         | 1             |
| MW-66   | 07/01/96    | <0.5               | <0.5    | <0.5         | 0.5           |
| MW-66   | 10/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-66   | 02/05/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-66   | 05/06/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-66   | 07/16/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-66   | 10/15/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-66   | 01/29/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-66   | 04/28/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-66   | 06/17/98    | <1                 | 1.6     | <1           | <1            |
| MW-66   | 10/11/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-67   | 09/01/91    | 280                | --      | --           | --            |
| MW-67   | 12/01/91    | 320                | <10     | <10          | <10           |
| MW-67   | 04/01/92    | 5                  | 8       | <3           | 12            |
| MW-67   | 07/01/92    | 69                 | 10      | 20           | 116           |
| MW-67   | 10/01/92    | 3                  | 9       | <3           | 73            |
| MW-67   | 01/01/93    | 8                  | 3       | <3           | 12            |
| MW-67   | 04/13/93    | 7                  | 18      | 7            | 19            |
| MW-67   | 07/13/93    | 7                  | <3      | <3           | <3            |
| MW-67   | 10/13/93    | <0.5               | 0.9     | <0.5         | 1.1           |

## Notes:

Concentrations listed in micrograms per liter (ug/L)

<0.05 Constituent not detected above noted laboratory detection limit

-- Indicates parameter was not analyzed

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Historical BTEX Analytical Data, May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID | Sample Date | Analytical Results |         |              |               |
|---------|-------------|--------------------|---------|--------------|---------------|
|         |             | Benzene            | Toluene | Ethylbenzene | Total Xylenes |
| MW-67   | 01/12/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-67   | 04/07/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-67   | 07/19/94    | <0.5               | 0.6     | <0.5         | 3             |
| MW-67   | 10/05/94    | <0.5               | <0.5    | <0.5         | 4.3           |
| MW-67   | 01/11/95    | 1                  | <0.5    | <0.5         | 1.1           |
| MW-67   | 04/07/95    | 1.8                | <0.5    | <0.5         | 1.3           |
| MW-67   | 07/21/95    | <0.5               | <0.5    | <0.5         | 0.6           |
| MW-67   | 10/11/95    | 6.1                | 1.8     | 0.5          | 4.2           |
| MW-67   | 01/19/96    | 4.8                | 3.6     | 0.6          | 4.7           |
| MW-67   | 04/18/96    | 3.4                | 0.9     | <0.5         | 2.5           |
| MW-67   | 07/01/96    | 95                 | 110     | 28           | 280           |
| MW-67   | 02/10/97    | 15                 | 4.8     | 1.9          | 41            |
| MW-67   | 07/16/97    | 160                | 330     | 110          | 1200          |
| MW-67   | 06/24/98    | 1.3                | 2.7     | 3.5          | 45.3          |
| MW-68   | 09/01/91    | 240                | --      | --           | --            |
| MW-68   | 12/01/91    | 1900               | 4500    | 500          | 4000          |
| MW-68   | 04/01/92    | 2470               | 3370    | 550          | 3866          |
| MW-68   | 07/01/92    | 160                | 267     | 49           | 746           |
| MW-68   | 10/01/92    | 2205               | 3327    | <3           | 4721          |
| MW-68   | 01/01/93    | 376                | 944     | 246          | 2376          |
| MW-68   | 04/13/93    | 650                | 1900    | 330          | 4000          |
| MW-68   | 07/13/93    | 150                | 230     | 110          | 1100          |
| MW-68   | 10/13/93    | 374                | 628     | 286          | 2398          |
| MW-68   | 01/11/94    | 3000               | 820     | 1000         | 7700          |
| MW-68   | 04/05/94    | 120                | 61      | 170          | 1300          |
| MW-68   | 07/19/94    | 260                | 170     | 220          | 2000          |
| MW-68   | 10/17/97    | 740                | 100     | 490          | 3800          |
| MW-68   | 06/26/98    | 390                | 26      | 140          | 990           |
| MW-69   | 09/01/91    | 2400               | --      | --           | --            |
| MW-69   | 12/01/91    | 2100               | 1100    | 150          | 4200          |
| MW-69   | 07/01/92    | 568                | 56      | 1785         | 1966          |
| MW-69   | 10/01/92    | 1598               | 71      | <3           | 2879          |
| MW-69   | 01/01/93    | 1284               | 49      | 309          | 1931          |
| MW-69   | 07/18/97    | 930                | 23      | 410          | 1100          |
| MW-69   | 04/30/98    | 970                | 22      | 500          | 530           |
| MW-69   | 06/29/98    | 1200               | <10     | 520          | 510           |
| MW-70   | 09/01/91    | <1                 | --      | --           | --            |
| MW-70   | 12/01/91    | <1                 | <1      | <1           | <1            |
| MW-70   | 04/01/92    | 3                  | 17      | <3           | 8             |
| MW-70   | 07/01/92    | <1                 | 3       | 1            | 13            |
| MW-70   | 10/01/92    | 11                 | 40      | 63           | 60            |
| MW-70   | 01/01/93    | <3                 | <3      | 8            | 5             |
| MW-70   | 04/14/93    | 9                  | 20      | <3           | 4             |
| MW-70   | 07/13/93    | <1                 | 11      | 3            | <3            |
| MW-70   | 10/12/93    | 25                 | 19      | 19           | 18            |
| MW-70   | 11/10/93    | <4                 | <4      | <4           | 40            |
| MW-70   | 01/11/94    | <0.5               | 0.6     | <0.5         | <0.5          |
| MW-70   | 04/06/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-70   | 07/18/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-70   | 10/04/94    | 1.2                | 4.3     | 1.3          | 12            |
| MW-70   | 01/09/95    | <0.5               | 2.3     | <0.5         | 2.4           |

## Notes:

Concentrations listed in micrograms per liter (ug/L)

<0.05 Constituent not detected above noted laboratory detection limit

-- Indicates parameter was not analyzed

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Historical BTEX Analytical Data, May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID | Sample Date | Analytical Results |         |              |               |
|---------|-------------|--------------------|---------|--------------|---------------|
|         |             | Benzene            | Toluene | Ethylbenzene | Total Xylenes |
| MW-70   | 04/05/95    | <0.5               | <0.5    | <0.5         | 1.1           |
| MW-70   | 07/18/95    | <0.5               | 0.8     | <0.5         | <0.5          |
| MW-70   | 10/10/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-70   | 01/18/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-70   | 04/17/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-70   | 07/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-70   | 10/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-70   | 02/05/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-70   | 10/15/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-70   | 06/16/98    | <1                 | <1      | <1           | <1            |
| MW-71   | 09/01/93    | <4                 | <4      | <4           | <4            |
| MW-71   | 10/12/93    | 8                  | 5       | 4            | 16            |
| MW-71   | 11/10/93    | <4                 | <4      | <4           | <4            |
| MW-71   | 01/11/94    | <0.5               | 1.3     | <0.5         | 0.5           |
| MW-71   | 04/06/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-71   | 07/18/94    | <0.5               | 3       | 0.7          | 6.2           |
| MW-71   | 10/04/94    | 1.1                | 6.8     | 2.7          | 31            |
| MW-71   | 01/10/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-71   | 06/23/95    | <0.5               | 66      | <0.5         | <0.5          |
| MW-71   | 07/18/95    | <0.5               | 1.2     | <0.5         | 1.9           |
| MW-71   | 10/10/95    | <0.5               | <0.5    | <0.5         | 7.3           |
| MW-71   | 01/18/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-71   | 04/17/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-71   | 07/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-71   | 10/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-71   | 02/09/97    | 5.2                | 1.3     | 0.8          | 1.3           |
| MW-71   | 05/06/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-71   | 07/17/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-71   | 10/16/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-71   | 01/29/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-71   | 04/29/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-71   | 06/28/98    | <1                 | <1      | <1           | <1            |
| MW-71   | 10/11/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-72   | 04/05/94    | <2.5               | <2.5    | 4.7          | 15            |
| MW-72   | 07/19/94    | 18                 | <0.5    | 5.1          | 2.8           |
| MW-72   | 06/30/98    | 56                 | <10     | 100          | <10           |
| MW-73   | 06/30/98    | 1.1                | <1      | <1           | <1            |
| MW-74   | 07/18/97    | 180                | 320     | 180          | 1900          |
| MW-74   | 06/24/98    | 220                | <10     | 10           | <10           |
| MW-75   | 06/30/98    | 200                | <10     | 89           | 270           |
| MW-76   | 10/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-76   | 06/29/98    | <1                 | <1      | <1           | <1            |
| MW-77   | 07/21/95    | <0.5               | <0.5    | 1.9          | 2.8           |
| MW-77   | 01/20/96    | <0.5               | 3.1     | <0.5         | 7.1           |
| MW-77   | 04/19/96    | <0.5               | 3.8     | 0.8          | 2.5           |
| MW-77   | 07/01/96    | 8                  | 14      | 19           | 35            |
| MW-77   | 10/01/96    | 160                | 320     | 150          | 1000          |
| MW-77   | 05/07/97    | 8.4                | 70      | 8.3          | 52            |
| MW-77   | 07/18/97    | 14                 | 30      | 11           | 71            |
| MW-78   | 10/01/96    | 32                 | 15      | 9.1          | 35            |
| MW-78   | 02/10/97    | 41                 | 7.9     | 7.4          | 12            |

## Notes:

Concentrations listed in micrograms per liter (ug/L)

<0.05 Constituent not detected above noted laboratory detection limit

-- Indicates parameter was not analyzed

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Historical BTEX Analytical Data, May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID | Sample Date | Analytical Results |         |              |               |
|---------|-------------|--------------------|---------|--------------|---------------|
|         |             | Benzene            | Toluene | Ethylbenzene | Total Xylenes |
| MW-78   | 05/07/97    | 20                 | 42      | 12           | 23            |
| MW-78   | 07/17/97    | 8.2                | 10      | 6.6          | 16            |
| MW-78   | 04/30/98    | 1.4                | 4.9     | 2            | 7.7           |
| MW-78   | 06/28/98    | <1                 | <1      | <1           | <1            |
| MW-79   | 01/11/95    | 110                | <5      | 8.5          | 61            |
| MW-79   | 04/06/95    | 14                 | <0.5    | 10           | 53            |
| MW-79   | 07/21/95    | <5                 | 74      | 7.7          | 62            |
| MW-79   | 10/10/95    | 16                 | 4       | <2.5         | 3.7           |
| MW-79   | 01/18/96    | 10                 | 6.7     | 1.4          | 4.9           |
| MW-79   | 04/19/96    | 2.4                | 7.3     | 1            | 2.7           |
| MW-79   | 07/01/96    | 3.2                | 6.3     | 0.9          | 6.3           |
| MW-79   | 10/01/96    | 1.7                | 5.8     | 1            | 4.2           |
| MW-79   | 02/10/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-79   | 05/07/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-79   | 07/17/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-79   | 04/29/98    | <0.5               | 1.5     | <0.5         | 1.1           |
| MW-79   | 06/28/98    | <1                 | <1      | <1           | <1            |
| MW-81   | 06/29/98    | <1                 | <1      | <1           | 1.5           |
| MW-82   | 10/11/95    | 280                | <50     | 450          | 910           |
| MW-82   | 06/25/98    | 70                 | <5      | 75           | 510           |
| MW-83   | 06/25/98    | <10                | <10     | 16           | 31            |
| MW-84   | 06/23/98    | 93                 | 13      | 55           | 458           |
| MW-85   | 06/23/98    | 280                | <5      | 120          | 6.3           |
| MW-86   | 10/17/97    | 510                | 360     | 580          | 1400          |
| MW-86   | 06/26/98    | 91                 | 10      | 28           | 360           |
| MW-87   | 08/01/96    | <0.5               | 20      | <0.5         | 0.5           |
| MW-87   | 10/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-87   | 02/09/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-87   | 05/06/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-87   | 10/16/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-87   | 01/29/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-87   | 04/28/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-87   | 06/27/98    | <1                 | <1      | <1           | <1            |
| MW-87   | 10/12/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-87A  | 10/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-87A  | 02/09/97    | 0.9                | <0.5    | 0.7          | 1.5           |
| MW-87A  | 05/07/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-87A  | 10/16/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-87A  | 01/29/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-87A  | 04/28/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-87A  | 06/27/98    | <1                 | <1      | <1           | <1            |
| MW-88   | 08/01/96    | <0.5               | 1.1     | 0.5          | 1             |
| MW-88   | 10/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-88   | 02/05/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-88   | 04/30/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-88   | 10/15/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-88   | 01/29/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-88   | 04/28/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-88   | 06/27/98    | <1                 | <1      | <1           | <1            |
| MW-88   | 10/11/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-89   | 08/01/96    | <0.5               | 1.1     | <0.5         | <0.5          |

## Notes:

Concentrations listed in micrograms per liter (ug/L)

<0.05 Constituent not detected above noted laboratory detection limit

-- Indicates parameter was not analyzed

# Appendix C

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Historical BTEX Analytical Data, May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID  | Sample Date | Analytical Results |         |              |               |
|----------|-------------|--------------------|---------|--------------|---------------|
|          |             | Benzene            | Toluene | Ethylbenzene | Total Xylenes |
| MW-89    | 10/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-89    | 02/05/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-89    | 04/30/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-89    | 10/15/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-89    | 01/29/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-89    | 04/28/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-89    | 06/17/98    | <1                 | <1      | <1           | <1            |
| MW-90    | 02/10/97    | 17                 | 0.5     | 15           | 1.4           |
| MW-90    | 05/07/97    | 1.1                | 0.5     | 0.5          | <0.5          |
| MW-90    | 07/17/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-90    | 04/29/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-90    | 06/17/98    | <1                 | <1      | <1           | <1            |
| MW-91    | 02/11/97    | 340                | 14      | 50           | 55            |
| MW-91    | 04/30/98    | 17                 | 32      | 19           | 200           |
| MW-94    | 10/17/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-94    | 06/26/98    | <1                 | <1      | <1           | <1            |
| MW-95    | 04/30/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-95    | 01/30/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-95    | 06/22/98    | <1                 | <1      | <1           | <1            |
| MW-96    | 04/30/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-96    | 10/16/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-96    | 01/30/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-96    | 04/28/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-96    | 07/01/98    | <1                 | <1      | <1           | <1            |
| MW-96    | 10/12/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-97    | 04/30/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-97    | 10/17/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-97    | 01/30/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-97    | 04/28/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-97    | 07/01/98    | <1                 | <1      | <1           | <1            |
| MW-97    | 10/12/98    | <2.5               | <2.5    | <2.5         | <2.5          |
| MW-98    | 04/30/97    | 5.8                | 3.5     | 1.5          | 26            |
| MW-98    | 06/29/98    | <1                 | 7.1     | 20           | 1010          |
| MW-104   | 07/17/97    | <0.5               | 0.5     | <0.5         | 0.7           |
| MW-104   | 07/01/98    | <1                 | <1      | <1           | <1            |
| MW-105   | 06/28/98    | <1                 | <1      | <1           | <1            |
| MW-106   | 02/11/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-106   | 05/07/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-106   | 07/18/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-106   | 04/30/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| MW-106   | 06/28/98    | <1                 | <1      | <1           | <1            |
| MW-108   | 07/17/97    | <0.5               | <0.5    | 0.5          | <0.5          |
| MW-108   | 06/22/98    | <1                 | <1      | <1           | <1            |
| MW-110   | 06/30/98    | 170                | <10     | 150          | 160           |
| MW-111   | 06/29/98    | <1                 | <1      | <1           | <1            |
| MW-111   | 10/11/98    | <0.5               | <0.5    | <0.5         | <0.5          |
| SUMP-16A | 07/01/91    | 560                | --      | --           | --            |
| SUMP-16A | 07/19/91    | --                 | 850     | 100          | --            |
| SUMP-16A | 07/30/91    | --                 | --      | --           | 660           |
| SUMP-16A | 09/01/91    | 240                | --      | --           | --            |
| SUMP-16A | 12/01/91    | 2000               | 1000    | <500         | 3500          |

## Notes:

Concentrations listed in micrograms per liter (ug/L)

<0.05 Constituent not detected above noted laboratory detection limit

-- Indicates parameter was not analyzed

# Appendix C

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Historical BTEX Analytical Data, May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID  | Sample Date | Analytical Results |         |              |               |
|----------|-------------|--------------------|---------|--------------|---------------|
|          |             | Benzene            | Toluene | Ethylbenzene | Total Xylenes |
| SUMP-16A | 04/01/92    | 1332               | 203     | <3           | 3679          |
| SUMP-16A | 07/01/92    | 1495               | 2028    | 280          | 3442          |
| SUMP-16A | 10/01/92    | 632                | 87      | <3           | 1821          |
| SUMP-16A | 01/01/93    | 741                | 40      | 96           | 1355          |
| SUMP-16A | 04/14/93    | 707                | 881     | 298          | 4226          |
| SUMP-16A | 10/05/94    | 170                | <2.5    | 120          | 680           |
| SUMP-16A | 01/11/95    | 2                  | 5.1     | 2.4          | 32            |
| SUMP-16A | 10/12/95    | 130                | <13     | 98           | 780           |
| SUMP-16A | 04/19/96    | 0.8                | 1.5     | 3.8          | 27            |
| SUMP-16A | 07/01/96    | 5.1                | 0.9     | 1.2          | 7.7           |
| SUMP-A10 | 10/12/95    | <0.5               | 2.9     | <0.5         | <0.5          |
| SW-01    | 05/28/91    | --                 | --      | --           | <10           |
| SW-01    | 07/01/91    | <5                 | --      | --           | --            |
| SW-01    | 07/19/91    | --                 | <5      | <5           | --            |
| SW-01    | 09/01/91    | <1                 | --      | --           | --            |
| SW-01    | 12/01/91    | <1                 | --      | --           | --            |
| SW-01    | 04/01/92    | 5                  | 6       | <3           | 14            |
| SW-01    | 07/01/92    | 17.5               | 69      | <3           | 67            |
| SW-01    | 10/01/92    | 16                 | 15      | <3           | 10            |
| SW-01    | 01/01/93    | 6                  | <3      | <3           | <3            |
| SW-01    | 04/15/93    | <1                 | <1      | <1           | <1            |
| SW-01    | 05/12/93    | <1                 | <1      | <1           | <1            |
| SW-01    | 06/28/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 07/15/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 08/03/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 09/21/93    | <0.5               | <0.5    | 1            | 0.6           |
| SW-01    | 10/14/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 11/10/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 12/06/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 01/12/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 02/09/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 03/16/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 04/05/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 05/19/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 06/23/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 07/21/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 08/24/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 09/20/94    | <0.5               | <0.5    | 0.8          | 2.2           |
| SW-01    | 10/06/94    | <0.5               | <0.5    | <0.5         | 0.6           |
| SW-01    | 11/30/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 12/16/94    | <0.5               | <0.5    | 0.7          | 4.8           |
| SW-01    | 01/11/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 03/09/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 04/07/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 05/18/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 07/21/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 10/12/95    | <0.5               | <0.5    | 0.6          | 1.2           |
| SW-01    | 12/27/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 01/19/96    | 0.8                | 4.5     | 1.5          | 8.7           |
| SW-01    | 03/18/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01    | 04/24/96    | <0.5               | <0.5    | <0.5         | <0.5          |

## Notes:

Concentrations listed in micrograms per liter (ug/L)

<0.05 Constituent not detected above noted laboratory detection limit

-- Indicates parameter was not analyzed

# Appendix C

Historical BTEX Analytical Data, May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID     | Sample Date | Analytical Results |         |              |               |
|-------------|-------------|--------------------|---------|--------------|---------------|
|             |             | Benzene            | Toluene | Ethylbenzene | Total Xylenes |
| SW-01       | 07/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01       | 10/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01       | 02/10/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-01       | 12/10/97    | <0.1               | <0.1    | <0.1         | <0.1          |
| SW-01       | 06/30/98    | <1                 | <1      | <1           | <1            |
| SW-02       | 09/01/91    | <1                 | --      | --           | --            |
| SW-02       | 12/01/91    | <1                 | --      | --           | --            |
| SW-02       | 04/01/92    | 11                 | 12      | <3           | 5             |
| SW-02       | 07/01/92    | 7                  | 38      | <1           | 24            |
| SW-02       | 10/01/92    | 69                 | 37      | 25           | 61            |
| SW-02       | 01/01/93    | 47                 | 6       | 7            | 9             |
| SW-02       | 04/15/93    | 4                  | <1      | <1           | <1            |
| SW-02       | 05/12/93    | 3                  | <1      | <1           | <1            |
| SW-02       | 01/11/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-02       | 06/24/98    | <1                 | <1      | <1           | <1            |
| SW-03       | 07/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-03       | 10/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| SW-03       | 06/24/98    | <1                 | <1      | <1           | <1            |
| TH-21A      | 07/01/91    | 1700               | --      | --           | --            |
| TH-21A      | 07/19/91    | --                 | 3400    | 1200         | --            |
| TH-21A      | 07/30/91    | --                 | --      | --           | 2200          |
| TH-A11      | 07/01/91    | 1100               | --      | --           | --            |
| TH-A11      | 07/19/91    | --                 | 1600    | 1100         | --            |
| TH-A11      | 07/30/91    | --                 | --      | --           | 800           |
| TH-A11      | 09/01/91    | 1400               | --      | --           | --            |
| TH-A11      | 12/01/91    | 2900               | 3500    | 300          | 4000          |
| TH-A11      | 04/01/92    | 3465               | 3303    | 306          | 4158          |
| TH-A11      | 07/01/92    | 1258               | 1710    | 423          | 3416          |
| TH-A11      | 10/01/92    | 2742               | 2235    | <3           | 3408          |
| UIHS_ARROYO | 05/28/91    | --                 | --      | --           | <10           |
| UIHS_ARROYO | 07/01/91    | <5                 | --      | --           | --            |
| UIHS_ARROYO | 07/19/91    | --                 | <5      | <5           | --            |
| UIHS_ARROYO | 09/01/91    | <1                 | --      | --           | --            |
| UIHS_ARROYO | 12/01/91    | <1                 | --      | --           | --            |
| UIHS_ARROYO | 04/01/92    | <1                 | <1      | <1           | <1            |
| UIHS_ARROYO | 07/01/92    | <1                 | <1      | <1           | <1            |
| UIHS_ARROYO | 10/01/92    | <1                 | <1      | <1           | <1            |
| UIHS_ARROYO | 01/01/93    | <1                 | <1      | <1           | <1            |
| UIHS_ARROYO | 04/15/93    | <1                 | <1      | --           | <1            |
| UIHS_ARROYO | 05/12/93    | <1                 | <1      | <1           | <1            |
| UIHS_ARROYO | 06/28/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 07/15/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 08/03/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 09/21/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 10/14/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 11/10/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 12/06/93    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 01/13/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 02/09/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 03/16/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 04/05/94    | <0.5               | <0.5    | <0.5         | <0.5          |

## Notes:

Concentrations listed in micrograms per liter (ug/L)

<0.05 Constituent not detected above noted laboratory detection limit

-- Indicates parameter was not analyzed

# Appendix C

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Historical BTEX Analytical Data, May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID     | Sample Date | Analytical Results |         |              |               |
|-------------|-------------|--------------------|---------|--------------|---------------|
|             |             | Benzene            | Toluene | Ethylbenzene | Total Xylenes |
| UIHS_ARROYO | 05/19/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 06/23/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 07/21/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 08/24/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 09/20/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 10/06/94    | <0.5               | <0.5    | <0.5         | 0.6           |
| UIHS_ARROYO | 11/30/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 12/16/94    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 01/11/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 03/09/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 04/07/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 05/18/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 07/21/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 10/12/95    | <0.5               | <0.5    | <0.5         | 1.2           |
| UIHS_ARROYO | 12/27/95    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 01/19/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 03/18/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 04/24/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 07/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 10/01/96    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 02/10/97    | <0.5               | <0.5    | <0.5         | <0.5          |
| UIHS_ARROYO | 06/26/98    | <1                 | <1      | <1           | <1            |

## Notes:

Concentrations listed in micrograms per liter (ug/L)

<0.05 Constituent not detected above noted laboratory detection limit

-- Indicates parameter was not analyzed

Historical VOC Analytical Data  
May 1991 - October 1998

## Appendix C

Historical VOC Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Parameter                     | Well ID<br>Date Sampled | BIEBBLE<br>7/19/91 | LYMAN<br>7/19/91 | LYMAN<br>6/29/98 | MW-010<br>9/21/91 | MW-011<br>4/19/96 | MW-013<br>9/21/91 | MW-013<br>7/1/98 | MW-014<br>6/22/98 | MW-019<br>9/21/91 |
|-------------------------------|-------------------------|--------------------|------------------|------------------|-------------------|-------------------|-------------------|------------------|-------------------|-------------------|
| 1,1,1,2-Tetrachloroethane     |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| 1,1,1-Trichloroethane         |                         | < 5                | < 5              | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| 1,1,2,2-Tetrachloroethane     |                         | < 5                | < 5              | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| 1,1,2-Trichloroethane         |                         | < 5                | < 5              | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| 1,1-Dichloroethane            |                         | < 5                | < 5              | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| 1,1-Dichloroethene            |                         | < 5                | < 5              | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| 1,1-Dichloropropene           |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| 1,2,3-Trichlorobenzene        |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| 1,2,3-Trichloropropane        |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| 1,2,4-Trichlorobenzene        |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| 1,2,4-Trimethylbenzene        |                         | --                 | --               | < 1              | --                | --                | --                | 380              | < 10              | --                |
| 1,2-Dibromo-3-chloropropane   |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| 1,2-Dibromoethane             |                         | --                 | --               | < 0.01           | --                | --                | --                | < 0.01           | < 0.01            | --                |
| 1,2-Dichlorobenzene           |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| 1,2-Dichloroethane            |                         | < 5                | < 5              | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| 1,2-Dichloropropane           |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| 1,3,5-Trimethylbenzene        |                         | --                 | --               | < 1              | --                | --                | --                | 110              | < 10              | --                |
| 1,3-Dichlorobenzene           |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| 1,3-Dichloropropane           |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| 1,4-Dichlorobenzene           |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| 2,2-Dichloropropane           |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| 2-Butanone                    |                         | --                 | --               | < 10             | --                | --                | --                | < 100            | < 100             | --                |
| 2-Chloroethyl Vinyl Ether     |                         | --                 | --               | < 10             | --                | --                | --                | < 100            | < 100             | --                |
| 2-Chlorotoluene               |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| 2-Hexanone                    |                         | --                 | --               | < 10             | --                | --                | --                | < 100            | < 100             | --                |
| 4-Chlorotoluene               |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Acetone                       |                         | --                 | --               | < 10             | --                | --                | --                | < 100            | < 100             | --                |
| Acrolein                      |                         | < 100              | < 100            | < 5              | --                | --                | --                | < 50             | < 50              | --                |
| Acrylonitrile                 |                         | < 100              | < 100            | < 5              | --                | --                | --                | < 50             | < 50              | --                |
| Benzene                       |                         | --                 | --               | < 1              | --                | --                | --                | 800              | 820               | --                |
| Bromobenzene                  |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Bromochloromethane            |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Bromodichloromethane          |                         | < 5                | < 5              | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Bromoform                     |                         | < 5                | < 5              | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Bromomethane                  |                         | < 10               | < 10             | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Carbon disulfide              |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Carbon tetrachloride          |                         | < 5                | < 5              | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Chlorobenzene                 |                         | < 5                | < 5              | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Chloroethane                  |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Chloroform                    |                         | < 5                | < 5              | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Chloromethane                 |                         | < 10               | < 10             | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| cis-1,2-Dichloroethene        |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| cis-1,3-Dichloropropane       |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Dibromochloromethane          |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Dibromomethane                |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Dichlorodifluoromethane       |                         | < 1                | < 1              | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Ethylbenzene                  |                         | --                 | --               | < 1              | --                | --                | --                | 640              | 840               | --                |
| Hexachlorobutadiene           |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Iodomethane                   |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Isopropylbenzene              |                         | --                 | --               | < 1              | --                | --                | --                | 71               | 100               | --                |
| Methyl isobutyl ketone (MIBK) |                         | --                 | --               | < 10             | --                | --                | --                | < 100            | < 100             | --                |
| Methyl t-butyl ether (MTBE)   |                         | --                 | --               | < 1              | --                | < 2.5             | --                | < 10             | < 10              | --                |
| Methylene chloride            |                         | < 5                | < 5              | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| n-Butylbenzene                |                         | --                 | --               | < 1              | --                | --                | --                | 12               | 10                | --                |
| n-Propylbenzene               |                         | --                 | --               | < 1              | --                | --                | --                | 78               | 110               | --                |
| Naphthalene                   |                         | --                 | --               | < 1              | < 50              | --                | < 50              | 12               | 22                | < 50              |
| p-Isopropyltoluene            |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| sec-Butylbenzene              |                         | --                 | --               | < 1              | --                | --                | --                | 11               | 15                | --                |
| Styrene                       |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| tert-Butylbenzene             |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Tetrachloroethene             |                         | < 5                | < 5              | < 0.5            | --                | --                | --                | < 0.5            | < 5               | --                |
| Toluene                       |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| trans-1,2-Dichloroethene      |                         | < 5                | < 5              | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| trans-1,3-Dichloropropene     |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| trans-1,4-Dichloro-2-butene   |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Trichloroethene               |                         | < 5                | < 5              | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Trichlorofluoromethane        |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Trichlorotrifluoroethane      |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Vinyl acetate                 |                         | --                 | --               | < 1              | --                | --                | --                | < 10             | < 10              | --                |
| Vinyl chloride                |                         | < 10               | < 10             | < 0.5            | --                | --                | --                | < 0.5            | < 5               | --                |
| Xylene (total)                |                         | --                 | --               | < 1              | --                | --                | --                | 170              | < 10              | --                |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

VOC Volatile Organic Compound

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

# Appendix C

Historical VOC Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Well ID:<br>Date Sampled      | MW-039<br>7/1/98 | MW-041<br>4/19/96 | MW-041<br>6/28/98 | MW-043<br>9/19/91 | MW-043<br>4/19/96 | MW-043<br>7/18/97 | MW-043<br>6/22/98 | MW-044<br>4/19/96 | MW-044<br>7/18/97 |
|-------------------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Parameter                     |                  |                   |                   |                   |                   |                   |                   |                   |                   |
| 1,1,1,2-Tetrachloroethane     | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| 1,1,1-Trichloroethane         | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| 1,1,2,2-Tetrachloroethane     | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| 1,1,2-Trichloroethane         | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| 1,1-Dichloroethane            | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| 1,1-Dichloroethene            | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| 1,1-Dichloropropene           | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| 1,2,3-Trichlorobenzene        | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| 1,2,3-Trichloropropane        | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| 1,2,4-Trichlorobenzene        | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| 1,2,4-Trimethylbenzene        | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| 1,2-Dibromo-3-chloropropane   | < 1              | --                | --                | --                | --                | --                | < 1               | --                | --                |
| 1,2-Dibromoethane             | < 0.01           | --                | < 0.01            | --                | --                | < 1               | < 0.01            | --                | < 10              |
| 1,2-Dichlorobenzene           | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| 1,2-Dichloroethane            | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| 1,2-Dichloropropane           | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| 1,3,5-Trimethylbenzene        | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| 1,3-Dichlorobenzene           | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| 1,3-Dichloropropane           | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| 1,4-Dichlorobenzene           | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| 2,2-Dichloropropane           | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| 2-Butanone                    | < 10             | --                | < 10              | --                | --                | < 10              | < 10              | --                | < 100             |
| 2-Chloroethyl Vinyl Ether     | < 10             | --                | < 10              | --                | --                | < 1               | < 10              | --                | < 100             |
| 2-Chlorotoluene               | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| 2-Hexanone                    | < 10             | --                | < 10              | --                | --                | < 1               | < 10              | --                | < 100             |
| 4-Chlorotoluene               | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| Acetone                       | < 10             | --                | < 10              | --                | --                | < 1               | 15                | --                | < 100             |
| Acrolein                      | < 5              | --                | < 5               | --                | --                | --                | < 5               | --                | --                |
| Acrylonitrile                 | < 5              | --                | < 5               | --                | --                | --                | 5                 | --                | --                |
| Benzene                       | < 1              | --                | 41                | --                | --                | --                | 7.3               | --                | --                |
| Bromobenzene                  | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| Bromochloromethane            | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| Bromodichloromethane          | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| Bromoform                     | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| Bromomethane                  | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| Carbon disulfide              | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| Carbon tetrachloride          | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| Chlorobenzene                 | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| Chloroethane                  | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| Chloroform                    | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| Chloromethane                 | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| cis-1,2-Dichloroethene        | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| cis-1,3-Dichloropropene       | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| Dibromochloromethane          | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| Dibromomethane                | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| Dichlorodifluoromethane       | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| Ethylbenzene                  | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| Hexachlorobutadiene           | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| Iodomethane                   | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| Isopropylbenzene              | < 1              | --                | 10                | --                | --                | --                | 11                | --                | --                |
| Methyl isobutyl ketone (MIBK) | < 10             | --                | < 10              | --                | --                | < 1               | < 10              | --                | < 100             |
| Methyl t-butyl ether (MTBE)   | < 1              | < 2.5             | < 1               | --                | < 2.5             | --                | < 1               | < 13              | --                |
| Methylene chloride            | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| n-Butylbenzene                | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| n-Propylbenzene               | < 1              | --                | < 1               | --                | --                | --                | 6.6               | --                | --                |
| Naphthalene                   | < 1              | --                | < 1               | < 5               | --                | --                | < 1               | --                | --                |
| p-Isopropyltoluene            | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| sec-Butylbenzene              | < 1              | --                | 2.1               | --                | --                | --                | 2.6               | --                | --                |
| Styrene                       | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| tert-Butylbenzene             | < 1              | --                | 1                 | --                | --                | --                | 1.2               | --                | --                |
| Tetrachloroethene             | < 0.5            | --                | < 0.5             | --                | --                | < 1               | < 0.5             | --                | < 10              |
| Toluene                       | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| trans-1,2-Dichloroethene      | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| trans-1,3-Dichloropropene     | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| trans-1,4-Dichloro-2-butene   | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| Trichloroethene               | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| Trichlorofluoromethane        | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| Trichlorotrifluoroethane      | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |
| Vinyl acetate                 | < 1              | --                | < 1               | --                | --                | < 1               | < 1               | --                | < 10              |
| Vinyl chloride                | < 0.5            | --                | < 0.5             | --                | --                | < 1               | < 0.5             | --                | < 10              |
| Xylene (total)                | < 1              | --                | < 1               | --                | --                | --                | < 1               | --                | --                |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

VOC Volatile Organic Compound

< Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

## Appendix C

Historical VOC Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Well ID<br>Date Sampled       | MW-044<br>6/22/98 | MW-045<br>9/24/91 | MW-046<br>5/29/97 | MW-046<br>7/18/97 | MW-046<br>7/1/98 | MW-049<br>4/19/96 | MW-049<br>7/18/97 | MW-049<br>7/1/98 | MW-050<br>4/19/96 |
|-------------------------------|-------------------|-------------------|-------------------|-------------------|------------------|-------------------|-------------------|------------------|-------------------|
| Parameter                     |                   |                   |                   |                   |                  |                   |                   |                  |                   |
| 1,1,1,2-Tetrachloroethane     | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| 1,1,1-Trichloroethane         | < 5               | --                | < 100             | < 1               | < 5              | --                | < 1               | < 1              | --                |
| 1,1,2,2-Tetrachloroethane     | < 5               | --                | < 100             | < 1               | < 5              | --                | < 1               | < 1              | --                |
| 1,1,2-Trichloroethane         | < 5               | --                | < 100             | < 1               | < 5              | --                | < 1               | < 1              | --                |
| 1,1-Dichloroethane            | < 5               | --                | < 100             | < 1               | < 5              | --                | < 1               | < 1              | --                |
| 1,1-Dichloroethene            | < 5               | --                | < 100             | < 1               | < 5              | --                | < 1               | < 1              | --                |
| 1,1-Dichloropropene           | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| 1,2,3-Trichlorobenzene        | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| 1,2,3-Trichloropropane        | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| 1,2,4-Trichlorobenzene        | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| 1,2,4-Trimethylbenzene        | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| 1,2-Dibromo-3-chloropropane   | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| 1,2-Dibromoethane             | < 0.01            | --                | < 100             | --                | < 0.01           | --                | < 1               | < 0.01           | --                |
| 1,2-Dichlorobenzene           | < 5               | --                | < 100             | --                | < 5              | --                | < 1               | < 1              | --                |
| 1,2-Dichloroethane            | < 5               | --                | < 100             | < 1               | < 5              | --                | < 1               | < 1              | --                |
| 1,2-Dichloropropane           | < 5               | --                | < 100             | --                | < 5              | --                | < 1               | < 1              | --                |
| 1,3,5-Trimethylbenzene        | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| 1,3-Dichlorobenzene           | < 5               | --                | < 100             | --                | < 5              | --                | < 1               | < 1              | --                |
| 1,3-Dichloropropane           | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| 1,4-Dichlorobenzene           | < 5               | --                | < 100             | --                | < 5              | --                | < 1               | < 1              | --                |
| 2,2-Dichloropropane           | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| 2-Butanone                    | < 50              | --                | < 1000            | --                | < 50             | --                | < 10              | < 10             | --                |
| 2-Chloroethyl Vinyl Ether     | < 50              | --                | < 1000            | --                | < 50             | --                | < 10              | < 10             | --                |
| 2-Chlorotoluene               | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| 2-Hexanone                    | < 50              | --                | < 1000            | --                | < 50             | --                | < 1               | < 10             | --                |
| 4-Chlorotoluene               | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| Acetone                       | < 50              | --                | < 1000            | --                | < 50             | --                | < 10              | < 10             | --                |
| Acrolein                      | < 25              | --                | --                | --                | < 25             | --                | --                | < 5              | --                |
| Acrylonitrile                 | < 25              | --                | --                | --                | < 25             | --                | --                | < 5              | --                |
| Benzene                       | 440               | --                | --                | --                | 1700             | --                | --                | 78               | --                |
| Bromobenzene                  | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| Bromochloromethane            | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| Bromodichloromethane          | < 5               | --                | < 100             | < 1               | < 5              | --                | < 1               | < 1              | --                |
| Bromoform                     | < 5               | --                | < 100             | < 1               | < 5              | --                | < 1               | < 1              | --                |
| Bromomethane                  | < 5               | --                | < 100             | < 1               | < 5              | --                | < 1               | < 1              | --                |
| Carbon disulfide              | < 5               | --                | < 100             | --                | < 5              | --                | < 1               | < 1              | --                |
| Carbon tetrachloride          | < 5               | --                | < 100             | < 1               | < 5              | --                | < 1               | < 1              | --                |
| Chlorobenzene                 | < 5               | --                | < 100             | < 1               | < 5              | --                | < 1               | < 1              | --                |
| Chloroethane                  | < 5               | --                | < 100             | --                | < 5              | --                | < 1               | < 1              | --                |
| Chloroform                    | < 5               | --                | < 100             | < 1               | < 5              | --                | < 1               | < 1              | --                |
| Chloromethane                 | < 5               | --                | < 100             | < 1               | < 5              | --                | < 1               | < 1              | --                |
| cis-1,2-Dichloroethene        | < 5               | --                | < 100             | < 1               | < 5              | --                | < 1               | < 1              | --                |
| cis-1,3-Dichloropropene       | < 5               | --                | < 100             | --                | < 5              | --                | < 1               | < 1              | --                |
| Dibromochloromethane          | < 5               | --                | < 100             | --                | < 5              | --                | < 1               | < 1              | --                |
| Dibromomethane                | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| Dichlorodifluoromethane       | < 5               | --                | < 100             | < 1               | < 5              | --                | < 1               | < 1              | --                |
| Ethylbenzene                  | 9.2               | --                | --                | --                | 97               | --                | --                | 15               | --                |
| Hexachlorobutadiene           | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| Iodomethane                   | < 5               | --                | < 100             | --                | < 5              | --                | < 1               | < 1              | --                |
| Isopropylbenzene              | 49                | --                | --                | --                | 72               | --                | --                | 8.2              | --                |
| Methyl isobutyl ketone (MIBK) | < 50              | --                | < 1000            | --                | < 50             | --                | < 10              | < 10             | --                |
| Methyl t-butyl ether (MTBE)   | < 5               | --                | --                | --                | < 5              | < 13              | < 1               | < 1              | < 2.5             |
| Methylene chloride            | < 5               | --                | < 100             | < 1               | < 5              | --                | < 1               | < 1              | --                |
| n-Butylbenzene                | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| n-Propylbenzene               | 21                | --                | --                | --                | 70               | --                | --                | 8                | --                |
| Naphthalene                   | < 5               | < 5               | --                | --                | < 5              | --                | --                | < 1              | --                |
| p-Isopropyltoluene            | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| sec-Butylbenzene              | 7.4               | --                | --                | --                | 7.8              | --                | --                | < 1              | --                |
| Styrene                       | < 5               | --                | < 100             | --                | < 5              | --                | < 1               | < 1              | --                |
| tert-Butylbenzene             | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| Tetrachloroethene             | < 2.5             | --                | < 100             | < 1               | < 0.5            | --                | < 1               | < 0.5            | --                |
| Toluene                       | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| trans-1,2-Dichloroethene      | < 5               | --                | < 100             | < 1               | < 5              | --                | < 1               | < 1              | --                |
| trans-1,3-Dichloropropene     | < 5               | --                | < 100             | --                | < 5              | --                | < 1               | < 1              | --                |
| trans-1,4-Dichloro-2-butene   | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| Trichloroethene               | < 5               | --                | < 100             | < 1               | < 5              | --                | < 1               | < 1              | --                |
| Trichlorofluoromethane        | < 5               | --                | < 100             | --                | < 5              | --                | < 1               | < 1              | --                |
| Trichlorotrifluoroethane      | < 5               | --                | --                | --                | < 5              | --                | --                | < 1              | --                |
| Vinyl acetate                 | < 5               | --                | < 100             | --                | < 5              | --                | < 1               | < 1              | --                |
| Vinyl chloride                | < 2.5             | --                | < 100             | < 1               | < 0.5            | --                | < 1               | < 0.5            | --                |
| Xylene (total)                | < 5               | --                | --                | --                | 120              | --                | --                | < 1              | --                |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

VOC Volatile Organic Compound

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

# Appendix C

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Historical VOC Analytical Data  
May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID<br>Date Sampled       | MW-050<br>7/18/97 | MW-050<br>6/28/98 | MW-054<br>4/18/96 | MW-054<br>6/25/98 | MW-055<br>4/18/96 | MW-055<br>6/25/98 | MW-056<br>9/25/91 | MW-057<br>7/19/91 | MW-057<br>4/18/96 |
|-------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Parameter                     |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| 1,1,1,2-Tetrachloroethane     | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| 1,1,1-Trichloroethane         | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | < 5               | --                |
| 1,1,2,2-Tetrachloroethane     | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | < 5               | --                |
| 1,1,2-Trichloroethane         | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | < 5               | --                |
| 1,1-Dichloroethane            | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | < 5               | --                |
| 1,1-Dichloroethene            | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | < 5               | --                |
| 1,1-Dichloropropene           | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| 1,2,3-Trichlorobenzene        | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| 1,2,3-Trichloropropane        | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| 1,2,4-Trichlorobenzene        | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| 1,2,4-Trimethylbenzene        | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| 1,2-Dibromo-3-chloropropane   | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| 1,2-Dibromoethane             | < 1               | < 0.01            | --                | < 0.01            | --                | < 0.01            | --                | --                | --                |
| 1,2-Dichlorobenzene           | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| 1,2-Dichloroethane            | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | < 5               | --                |
| 1,2-Dichloropropane           | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| 1,3,5-Trimethylbenzene        | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| 1,3-Dichlorobenzene           | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| 1,3-Dichloropropane           | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| 1,4-Dichlorobenzene           | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| 2,2-Dichloropropane           | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| 2-Butanone                    | < 10              | < 10              | --                | < 10              | --                | < 10              | --                | --                | --                |
| 2-Chloroethyl Vinyl Ether     | < 10              | < 10              | --                | < 10              | --                | < 10              | --                | --                | --                |
| 2-Chlorotoluene               | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| 2-Hexanone                    | < 1               | < 10              | --                | < 10              | --                | < 10              | --                | --                | --                |
| 4-Chlorotoluene               | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| Acetone                       | < 10              | < 10              | --                | < 10              | --                | < 10              | --                | --                | --                |
| Acrolein                      | --                | < 5               | --                | < 5               | --                | < 5               | --                | < 100             | --                |
| Acrylonitrile                 | --                | < 5               | --                | < 5               | --                | < 5               | --                | < 100             | --                |
| Benzene                       | --                | < 1               | --                | < 1               | --                | 180               | --                | --                | --                |
| Bromobenzene                  | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| Bromochloromethane            | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| Bromodichloromethane          | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | < 5               | --                |
| Bromoform                     | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | < 5               | --                |
| Bromomethane                  | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | < 10              | --                |
| Carbon disulfide              | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| Carbon tetrachloride          | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | < 5               | --                |
| Chlorobenzene                 | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | < 5               | --                |
| Chloroethane                  | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| Chloroform                    | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | < 5               | --                |
| Chloromethane                 | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | < 10              | --                |
| cis-1,2-Dichloroethene        | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| cis-1,3-Dichloropropene       | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| Dibromochloromethane          | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| Dibromomethane                | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| Dichlorodifluoromethane       | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | < 1               | --                |
| Ethylbenzene                  | --                | < 1               | --                | < 1               | --                | 31                | --                | --                | --                |
| Hexachlorobutadiene           | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| Iodomethane                   | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| Isopropylbenzene              | --                | < 1               | --                | < 1               | --                | 71                | --                | --                | --                |
| Methyl isobutyl ketone (MIBK) | < 10              | < 10              | --                | < 10              | --                | < 10              | --                | --                | --                |
| Methyl t-butyl ether (MTBE)   | --                | < 1               | < 2.5             | < 1               | < 13              | < 1               | --                | --                | < 2.5             |
| Methylene chloride            | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | < 5               | --                |
| n-Butylbenzene                | --                | < 1               | --                | < 1               | --                | 3.9               | --                | --                | --                |
| n-Propylbenzene               | --                | < 1               | --                | < 1               | --                | 66                | --                | --                | --                |
| Naphthalene                   | --                | < 1               | --                | < 1               | --                | 5.6               | < 25              | --                | --                |
| p-Isopropyltoluene            | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| sec-Butylbenzene              | --                | < 1               | --                | < 1               | --                | 7.5               | --                | --                | --                |
| Styrene                       | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| tert-Butylbenzene             | --                | < 1               | --                | < 1               | --                | 1.6               | --                | --                | --                |
| Tetrachloroethane             | < 1               | < 0.5             | --                | < 0.5             | --                | < 0.5             | --                | < 5               | --                |
| Toluene                       | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| trans-1,2-Dichloroethene      | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | < 5               | --                |
| trans-1,3-Dichloropropene     | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| trans-1,4-Dichloro-2-butene   | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| Trichloroethene               | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | < 5               | --                |
| Trichlorofluoromethane        | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| Trichlorotrifluoroethane      | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| Vinyl acetate                 | < 1               | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |
| Vinyl chloride                | < 1               | < 0.5             | --                | < 0.5             | --                | < 0.5             | --                | < 10              | --                |
| Xylene (total)                | --                | < 1               | --                | < 1               | --                | < 1               | --                | --                | --                |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

VOC Volatile Organic Compound

< Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

# Appendix C

Historical VOC Analytical Data  
May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID<br>Date Sampled       | MW-057<br>6/24/98 | MW-057<br>6/25/98 | MW-058<br>6/22/98 | MW-059<br>6/24/98 | MW-060<br>7/19/91 | MW-060<br>4/18/96 | MW-060<br>7/1/98 | MW-061<br>4/18/96 | MW-061<br>6/28/98 |
|-------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|-------------------|-------------------|
| Parameter                     |                   |                   |                   |                   |                   |                   |                  |                   |                   |
| 1,1,1,2-Tetrachloroethane     | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| 1,1,1-Trichloroethane         | < 1               | --                | < 1               | < 5               | < 5               | --                | < 1              | --                | < 1               |
| 1,1,2,2-Tetrachloroethane     | < 1               | --                | < 1               | < 5               | < 5               | --                | < 1              | --                | < 1               |
| 1,1,2-Trichloroethane         | < 1               | --                | < 1               | < 5               | < 5               | --                | < 1              | --                | < 1               |
| 1,1-Dichloroethane            | < 1               | --                | < 1               | < 5               | < 5               | --                | < 1              | --                | < 1               |
| 1,1-Dichloroethene            | < 1               | --                | < 1               | < 5               | < 5               | --                | < 1              | --                | < 1               |
| 1,1-Dichloropropene           | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| 1,2,3-Trichlorobenzene        | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| 1,2,3-Trichloropropane        | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| 1,2,4-Trichlorobenzene        | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| 1,2,4-Trimethylbenzene        | < 1               | --                | 130               | 320               | --                | --                | < 1              | --                | < 1               |
| 1,2-Dibromo-3-chloropropane   | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| 1,2-Dibromoethane             | --                | < 0.01            | < 0.01            | < 0.01            | --                | --                | < 0.01           | --                | < 0.01            |
| 1,2-Dichlorobenzene           | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| 1,2-Dichloroethane            | < 1               | --                | < 1               | < 5               | < 5               | --                | < 1              | --                | < 1               |
| 1,2-Dichloropropane           | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| 1,3,5-Trimethylbenzene        | < 1               | --                | 51                | 58                | --                | --                | < 1              | --                | < 1               |
| 1,3-Dichlorobenzene           | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| 1,3-Dichloropropane           | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| 1,4-Dichlorobenzene           | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| 2,2-Dichloropropane           | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| 2-Butanone                    | < 10              | --                | < 10              | < 50              | --                | --                | < 10             | --                | < 10              |
| 2-Chloroethyl Vinyl Ether     | < 10              | --                | < 10              | < 50              | --                | --                | < 10             | --                | < 10              |
| 2-Chlorotoluene               | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| 2-Hexanone                    | < 10              | --                | < 10              | < 50              | --                | --                | < 10             | --                | < 10              |
| 4-Chlorotoluene               | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| Acetone                       | < 10              | --                | 11                | < 50              | --                | --                | < 10             | --                | < 10              |
| Acrolein                      | < 5               | --                | < 5               | < 25              | < 100             | --                | < 5              | --                | < 5               |
| Acrylonitrile                 | < 5               | --                | < 5               | < 25              | < 100             | --                | < 5              | --                | < 5               |
| Benzene                       | < 1               | --                | 22                | < 5               | --                | --                | < 1              | --                | < 1               |
| Bromobenzene                  | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| Bromochloromethane            | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| Bromodichloromethane          | < 1               | --                | < 1               | < 5               | < 5               | --                | < 1              | --                | < 1               |
| Bromoforn                     | < 1               | --                | < 1               | < 5               | < 5               | --                | < 1              | --                | < 1               |
| Bromomethane                  | < 1               | --                | < 1               | < 5               | < 10              | --                | < 1              | --                | < 1               |
| Carbon disulfide              | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| Carbon tetrachloride          | < 1               | --                | < 1               | < 5               | < 5               | --                | < 1              | --                | < 1               |
| Chlorobenzene                 | < 1               | --                | < 1               | < 5               | < 5               | --                | < 1              | --                | < 1               |
| Chloroethane                  | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| Chloroform                    | < 1               | --                | < 1               | < 5               | < 5               | --                | < 1              | --                | < 1               |
| Chloromethane                 | < 1               | --                | < 1               | < 5               | < 10              | --                | < 1              | --                | < 1               |
| cis-1,2-Dichloroethane        | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| cis-1,3-Dichloropropene       | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| Dibromochloromethane          | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| Dibromomethane                | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| Dichlorodifluoromethane       | < 1               | --                | < 1               | < 5               | < 1               | --                | < 1              | --                | < 1               |
| Ethylbenzene                  | < 1               | --                | 28                | 79                | --                | --                | < 1              | --                | < 1               |
| Hexachlorobutadiene           | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| Iodomethane                   | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| Isopropylbenzene              | < 1               | --                | 11                | 36                | --                | --                | < 1              | --                | < 1               |
| Methyl isobutyl ketone (MIBK) | < 10              | --                | < 10              | < 50              | --                | --                | < 10             | --                | < 10              |
| Methyl t-butyl ether (MTBE)   | < 1               | --                | < 1               | < 5               | --                | < 2.5             | < 1              | < 2.5             | < 1               |
| Methylene chloride            | < 1               | --                | < 1               | < 5               | < 5               | --                | < 1              | --                | < 1               |
| n-Butylbenzene                | < 1               | --                | 5.1               | 13                | --                | --                | < 1              | --                | < 1               |
| n-Propylbenzene               | < 1               | --                | 7.2               | 44                | --                | --                | < 1              | --                | < 1               |
| Naphthalene                   | < 1               | --                | 1.5               | 5                 | --                | --                | < 1              | --                | < 1               |
| p-Isopropyltoluene            | < 1               | --                | 4.7               | 10                | --                | --                | < 1              | --                | < 1               |
| sec-Butylbenzene              | < 1               | --                | 5                 | 12                | --                | --                | < 1              | --                | < 1               |
| Styrene                       | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| tert-Butylbenzene             | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| Tetrachloroethene             | NAR               | < 0.5             | < 0.5             | < 2.5             | < 5               | --                | < 0.5            | --                | < 0.5             |
| Toluene                       | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| trans-1,2-Dichloroethene      | < 1               | --                | < 1               | < 5               | < 5               | --                | < 1              | --                | < 1               |
| trans-1,3-Dichloropropene     | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| trans-1,4-Dichloro-2-butene   | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| Trichloroethene               | < 1               | --                | < 1               | < 5               | < 5               | --                | < 1              | --                | < 1               |
| Trichlorofluoromethane        | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| Trichlorotrifluoroethane      | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| Vinyl acetate                 | < 1               | --                | < 1               | < 5               | --                | --                | < 1              | --                | < 1               |
| Vinyl chloride                | NAR               | < 0.5             | < 0.5             | < 2.5             | < 10              | --                | < 0.5            | --                | < 0.5             |
| Xylene (total)                | < 1               | --                | 35                | 42                | --                | --                | < 1              | --                | < 1               |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

VOC Volatile Organic Compound

< Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

## Appendix C

Historical VOC Analytical Data  
May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID<br>Date Sampled       | MW-061A<br>7/19/91 | MW-061A<br>9/27/91 | MW-061A<br>6/28/98 | MW-062<br>9/26/91 | MW-062<br>6/26/98 | MW-063<br>4/17/96 | MW-063<br>6/25/98 | MW-064<br>4/18/96 | MW-064<br>6/23/98 |
|-------------------------------|--------------------|--------------------|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Parameter                     |                    |                    |                    |                   |                   |                   |                   |                   |                   |
| 1,1,1,2-Tetrachloroethane     | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| 1,1,1-Trichloroethane         | < 5                | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| 1,1,2,2-Tetrachloroethane     | < 5                | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| 1,1,2-Trichloroethane         | < 5                | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| 1,1-Dichloroethane            | < 5                | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| 1,1-Dichloroethene            | < 5                | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| 1,1-Dichloropropene           | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| 1,2,3-Trichlorobenzene        | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| 1,2,3-Trichloropropane        | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| 1,2,4-Trichlorobenzene        | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| 1,2,4-Trimethylbenzene        | --                 | --                 | 80                 | --                | 120               | --                | < 1               | --                | < 1               |
| 1,2-Dibromo-3-chloropropane   | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| 1,2-Dibromoethane             | --                 | --                 | < 0.01             | --                | < 0.01            | --                | < 0.01            | --                | < 0.01            |
| 1,2-Dichlorobenzene           | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| 1,2-Dichloroethane            | < 5                | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| 1,2-Dichloropropane           | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| 1,3,5-Trimethylbenzene        | --                 | --                 | 36                 | --                | 49                | --                | < 1               | --                | < 1               |
| 1,3-Dichlorobenzene           | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| 1,3-Dichloropropane           | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| 1,4-Dichlorobenzene           | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| 2,2-Dichloropropane           | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| 2-Butanone                    | --                 | --                 | < 10               | --                | < 100             | --                | < 10              | --                | < 10              |
| 2-Chloroethyl Vinyl Ether     | --                 | --                 | < 10               | --                | < 100             | --                | < 10              | --                | < 10              |
| 2-Chlorotoluene               | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| 2-Hexanone                    | --                 | --                 | < 10               | --                | < 100             | --                | < 10              | --                | < 10              |
| 4-Chlorotoluene               | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Acetone                       | --                 | --                 | < 10               | --                | < 100             | --                | < 10              | --                | 59                |
| Acrolein                      | < 100              | --                 | < 5                | --                | < 50              | --                | < 5               | --                | < 5               |
| Acrylonitrile                 | < 100              | --                 | < 5                | --                | < 50              | --                | < 5               | --                | < 5               |
| Benzene                       | --                 | --                 | 1.5                | --                | < 10              | --                | < 1               | --                | < 1               |
| Bromobenzene                  | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Bromochloromethane            | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Bromodichloromethane          | < 5                | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Bromofom                      | < 5                | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Bromomethane                  | < 10               | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Carbon disulfide              | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Carbon tetrachloride          | < 5                | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Chlorobenzene                 | < 5                | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Chloroethane                  | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Chloroform                    | < 5                | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Chloromethane                 | < 10               | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| cis-1,2-Dichloroethene        | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| cis-1,3-Dichloropropene       | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Dibromochloromethane          | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Dibromomethane                | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Dichlorodifluoromethane       | < 1                | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Ethylbenzene                  | --                 | --                 | 7.9                | --                | 41                | --                | < 1               | --                | < 1               |
| Hexachlorobutadiene           | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Iodomethane                   | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Isopropylbenzene              | --                 | --                 | 3.7                | --                | 20                | --                | < 1               | --                | < 1               |
| Methyl isobutyl ketone (MIBK) | --                 | --                 | < 10               | --                | < 100             | --                | < 10              | --                | < 10              |
| Methyl t-butyl ether (MTBE)   | --                 | --                 | < 1                | --                | < 10              | < 2.5             | < 1               | < 2.5             | < 1               |
| Methylene chloride            | < 5                | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| n-Butylbenzene                | --                 | --                 | 2.3                | --                | < 10              | --                | < 1               | --                | < 1               |
| n-Propylbenzene               | --                 | --                 | 3.2                | --                | 20                | --                | < 1               | --                | < 1               |
| Naphthalene                   | --                 | < 5                | < 1                | < 25              | < 10              | --                | < 1               | --                | < 1               |
| p-Isopropyltoluene            | --                 | --                 | 3.9                | --                | < 10              | --                | < 1               | --                | < 1               |
| sec-Butylbenzene              | --                 | --                 | 2.7                | --                | < 10              | --                | < 1               | --                | < 1               |
| Styrene                       | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| tert-Butylbenzene             | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Tetrachloroethene             | < 5                | --                 | < 0.5              | --                | < 0.5             | --                | < 0.5             | --                | < 0.5             |
| Toluene                       | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| trans-1,2-Dichloroethene      | < 5                | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| trans-1,3-Dichloropropene     | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| trans-1,4-Dichloro-2-butene   | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Trichloroethane               | < 5                | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Trichlorofluoromethane        | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Trichlorotrifluoroethane      | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Vinyl acetate                 | --                 | --                 | < 1                | --                | < 10              | --                | < 1               | --                | < 1               |
| Vinyl chloride                | < 10               | --                 | < 0.5              | --                | < 0.5             | --                | < 0.5             | --                | < 0.5             |
| Xylene (total)                | --                 | --                 | 20                 | --                | 56                | --                | < 1               | --                | < 1               |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

VOC Volatile Organic Compound

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

## Appendix C

Historical VOC Analytical Data  
May 1991 - October 1998

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Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID<br>Date Sampled       | MW-065A<br>4/18/96 | MW-065A<br>6/25/98 | MW-066<br>4/17/96 | MW-066<br>6/17/98 | MW-067<br>4/18/96 | MW-067<br>6/24/98 | MW-068<br>6/26/98 | MW-069<br>6/29/98 | MW-070<br>4/17/96 |
|-------------------------------|--------------------|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Parameter                     |                    |                    |                   |                   |                   |                   |                   |                   |                   |
| 1,1,1,2-Tetrachloroethane     | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| 1,1,1-Trichloroethane         | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| 1,1,2,2-Tetrachloroethane     | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| 1,1,2-Trichloroethane         | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| 1,1-Dichloroethane            | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| 1,1-Dichloroethene            | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| 1,1-Dichloropropene           | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| 1,2,3-Trichlorobenzene        | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| 1,2,3-Trichloropropane        | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| 1,2,4-Trichlorobenzene        | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| 1,2,4-Trimethylbenzene        | --                 | 130                | --                | < 1               | --                | 14                | 490               | 610               | --                |
| 1,2-Dibromo-3-chloropropane   | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| 1,2-Dibromoethane             | --                 | < 0.01             | --                | < 0.01            | --                | < 0.01            | < 0.01            | < 0.01            | --                |
| 1,2-Dichlorobenzene           | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| 1,2-Dichloroethane            | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| 1,2-Dichloropropane           | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| 1,3,5-Trimethylbenzene        | --                 | 80                 | --                | < 1               | --                | 9.2               | 290               | 160               | --                |
| 1,3-Dichlorobenzene           | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| 1,3-Dichloropropane           | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| 1,4-Dichlorobenzene           | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| 2,2-Dichloropropane           | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| 2-Butanone                    | --                 | < 10               | --                | < 10              | --                | < 10              | < 100             | < 100             | --                |
| 2-Chloroethyl Vinyl Ether     | --                 | < 10               | --                | < 10              | --                | < 10              | < 100             | < 100             | --                |
| 2-Chlorotoluene               | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| 2-Hexanone                    | --                 | < 10               | --                | < 10              | --                | < 10              | < 100             | < 100             | --                |
| 4-Chlorotoluene               | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Acetone                       | --                 | < 10               | --                | 11                | --                | < 10              | < 100             | < 100             | --                |
| Acrolein                      | --                 | < 5                | --                | < 5               | --                | < 5               | < 50              | < 50              | --                |
| Acrylonitrile                 | --                 | < 5                | --                | < 5               | --                | < 5               | < 50              | < 50              | --                |
| Benzene                       | --                 | < 1                | --                | < 1               | --                | 1.3               | 390               | 4200              | --                |
| Bromobenzene                  | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Bromochloromethane            | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Bromodichloromethane          | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Bromoform                     | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Bromomethane                  | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Carbon disulfide              | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Carbon tetrachloride          | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Chlorobenzene                 | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Chloroethane                  | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Chloroform                    | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Chloromethane                 | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| cis-1,2-Dichloroethene        | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| cis-1,3-Dichloropropene       | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Dibromochloromethane          | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Dibromomethane                | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Dichlorodifluoromethane       | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Ethylbenzene                  | --                 | 16                 | --                | < 1               | --                | 3.5               | 140               | 520               | --                |
| Hexachlorobutadiene           | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Iodomethane                   | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Isopropylbenzene              | --                 | 7.9                | --                | < 1               | --                | 1.1               | 35                | 73                | --                |
| Methyl isobutyl ketone (MIBK) | --                 | < 10               | --                | < 10              | --                | < 10              | < 100             | < 100             | --                |
| Methyl t-butyl ether (MTBE)   | < 2.5              | < 1                | < 2.5             | < 1               | < 2.5             | < 1               | < 10              | < 10              | < 2.5             |
| Methylene chloride            | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| n-Butylbenzene                | --                 | 4.1                | --                | < 1               | --                | < 1               | 27                | 17                | --                |
| n-Propylbenzene               | --                 | 5.8                | --                | < 1               | --                | 1.3               | 34                | 77                | --                |
| Naphthalene                   | --                 | 1.6                | --                | < 1               | --                | < 1               | < 10              | 13                | --                |
| p-Isopropyltoluene            | --                 | 3                  | --                | < 1               | --                | < 1               | 20                | 12                | --                |
| sec-Butylbenzene              | --                 | < 1                | --                | < 1               | --                | < 1               | 18                | < 10              | --                |
| Styrene                       | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| tert-Butylbenzene             | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Tetrachloroethane             | --                 | < 2.5              | --                | < 0.5             | --                | < 0.5             | < 5               | < 0.5             | --                |
| Toluene                       | --                 | < 1                | --                | 1.6               | --                | 2.7               | 26                | < 10              | --                |
| trans-1,2-Dichloroethene      | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| trans-1,3-Dichloropropene     | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| trans-1,4-Dichloro-2-butene   | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Trichloroethene               | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Trichlorofluoromethane        | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Trichlorotrifluoroethane      | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Vinyl acetate                 | --                 | < 1                | --                | < 1               | --                | < 1               | < 10              | < 10              | --                |
| Vinyl chloride                | --                 | < 2.5              | --                | < 0.5             | --                | < 0.5             | < 5               | < 0.5             | --                |
| Xylene (total)                | --                 | 415                | --                | < 1               | --                | 45.3              | 990               | 510               | --                |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

VOC Volatile Organic Compound

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

# Appendix C

Historical VOC Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Well ID<br>Date Sampled       | MW-070<br>6/16/98 | MW-071<br>4/17/96 | MW-071<br>6/28/98 | MW-072<br>6/30/98 | MW-073<br>6/30/98 | MW-074<br>6/24/98 | MW-075<br>6/30/98 | MW-076<br>6/29/98 | MW-077<br>4/19/96 |
|-------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Parameter                     |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| 1,1,1,2-Tetrachloroethane     | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| 1,1,1-Trichloroethane         | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| 1,1,2,2-Tetrachloroethane     | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| 1,1,2-Trichloroethane         | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| 1,1-Dichloroethane            | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| 1,1-Dichloroethene            | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| 1,1-Dichloropropene           | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| 1,2,3-Trichlorobenzene        | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| 1,2,3-Trichloropropane        | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| 1,2,4-Trichlorobenzene        | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| 1,2,4-Trimethylbenzene        | < 1               | --                | < 1               | 120               | < 1               | < 10              | 350               | < 1               | --                |
| 1,2-Dibromo-3-chloropropane   | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| 1,2-Dibromoethane             | < 0.01            | --                | < 0.01            | < 0.01            | < 0.01            | < 0.01            | < 0.01            | < 0.01            | --                |
| 1,2-Dichlorobenzene           | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| 1,2-Dichloroethane            | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| 1,2-Dichloropropane           | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| 1,3,5-Trimethylbenzene        | < 1               | --                | < 1               | 28                | 2.7               | < 10              | 120               | < 1               | --                |
| 1,3-Dichlorobenzene           | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| 1,3-Dichloropropane           | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| 1,4-Dichlorobenzene           | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| 2,2-Dichloropropane           | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| 2-Butanone                    | < 10              | --                | < 10              | < 100             | < 10              | < 100             | < 100             | < 10              | --                |
| 2-Chloroethyl Vinyl Ether     | < 10              | --                | < 10              | < 100             | < 10              | < 100             | < 100             | < 10              | --                |
| 2-Chlorotoluene               | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| 2-Hexanone                    | < 10              | --                | < 10              | < 100             | < 10              | < 100             | < 100             | < 10              | --                |
| 4-Chlorotoluene               | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Acetone                       | < 10              | --                | < 10              | < 100             | < 10              | < 100             | < 100             | < 10              | --                |
| Acrolein                      | < 5               | --                | < 5               | < 50              | < 5               | < 50              | < 50              | < 5               | --                |
| Acrylonitrile                 | < 5               | --                | < 5               | < 50              | < 5               | < 50              | < 50              | < 5               | --                |
| Benzene                       | < 1               | --                | < 1               | 56                | 1.1               | 220               | 200               | < 1               | --                |
| Bromobenzene                  | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Bromochloromethane            | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Bromodichloromethane          | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Bromoform                     | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Bromomethane                  | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Carbon disulfide              | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Carbon tetrachloride          | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Chlorobenzene                 | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Chloroethane                  | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Chloroform                    | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Chloromethane                 | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| cis-1,2-Dichloroethene        | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| cis-1,3-Dichloropropene       | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Dibromochloromethane          | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Dibromomethane                | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Dichlorodifluoromethane       | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Ethylbenzene                  | < 1               | --                | < 1               | 100               | < 1               | < 10              | 89                | < 1               | --                |
| Hexachlorobutadiene           | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Iodomethane                   | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Isopropylbenzene              | < 1               | --                | < 1               | 24                | < 1               | 21                | 17                | < 1               | --                |
| Methyl isobutyl ketone (MIBK) | < 10              | --                | < 10              | < 100             | < 10              | < 100             | < 100             | < 10              | --                |
| Methyl t-butyl ether (MTBE)   | < 1               | < 2.5             | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | < 2.5             |
| Methylene chloride            | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| n-Butylbenzene                | < 1               | --                | < 1               | 11                | < 1               | < 10              | < 10              | < 1               | --                |
| n-Propylbenzene               | < 1               | --                | < 1               | 25                | < 1               | 17                | < 10              | < 1               | --                |
| Naphthalene                   | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| p-Isopropyltoluene            | < 1               | --                | < 1               | < 10              | 1.1               | < 10              | < 10              | < 1               | --                |
| sec-Butylbenzene              | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Styrene                       | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| tert-Butylbenzene             | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Tetrachloroethene             | < 0.5             | --                | < 0.5             | < 0.5             | < 0.5             | < 2.5             | < 0.5             | < 0.5             | --                |
| Toluene                       | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| trans-1,2-Dichloroethene      | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| trans-1,3-Dichloropropene     | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| trans-1,4-Dichloro-2-butene   | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Trichloroethene               | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Trichlorofluoromethane        | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Trichlorotrifluoroethane      | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Vinyl acetate                 | < 1               | --                | < 1               | < 10              | < 1               | < 10              | < 10              | < 1               | --                |
| Vinyl chloride                | < 0.5             | --                | < 0.5             | < 0.5             | < 0.5             | < 2.5             | < 0.5             | < 0.5             | --                |
| Xylene (total)                | < 1               | --                | < 1               | < 10              | < 1               | < 10              | 270               | < 1               | --                |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

VOC Volatile Organic Compound

< Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

## Appendix C

Historical VOC Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Well ID                       | MW-078  | MW-079  | MW-079  | MW-081  | MW-082  | MW-083  | MW-084  | MW-085  | MW-086  |
|-------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Date Sampled                  | 6/28/98 | 4/19/96 | 6/28/98 | 6/29/98 | 6/25/98 | 6/25/98 | 6/23/98 | 6/23/98 | 6/26/98 |
| Parameter                     |         |         |         |         |         |         |         |         |         |
| 1,1,1,2-Tetrachloroethane     | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| 1,1,1-Trichloroethane         | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| 1,1,2,2-Tetrachloroethane     | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| 1,1,2-Trichloroethane         | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| 1,1-Dichloroethane            | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| 1,1-Dichloroethene            | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| 1,1-Dichloropropene           | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| 1,2,3-Trichlorobenzene        | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| 1,2,3-Trichloropropane        | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| 1,2,4-Trichlorobenzene        | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| 1,2,4-Trimethylbenzene        | < 1     | --      | < 1     | 6.1     | 210     | 320     | 80      | 130     | 190     |
| 1,2-Dibromo-3-chloropropane   | < 0.01  | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| 1,2-Dibromoethane             | < 0.01  | --      | < 0.01  | < 0.01  | < 0.01  | < 0.01  | < 0.01  | < 0.01  | < 0.01  |
| 1,2-Dichlorobenzene           | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| 1,2-Dichloroethane            | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| 1,2-Dichloropropane           | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| 1,3,5-Trimethylbenzene        | < 1     | --      | < 1     | 24      | 110     | 57      | 48      | 25      | 140     |
| 1,3-Dichlorobenzene           | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| 1,3-Dichloropropane           | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| 1,4-Dichlorobenzene           | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| 2,2-Dichloropropane           | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| 2-Butanone                    | < 10    | --      | < 10    | < 10    | < 50    | < 100   | < 100   | < 50    | < 100   |
| 2-Chloroethyl Vinyl Ether     | < 10    | --      | < 10    | < 10    | < 50    | < 100   | < 100   | < 50    | < 100   |
| 2-Chlorotoluene               | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| 2-Hexanone                    | < 10    | --      | < 10    | < 10    | < 50    | < 100   | < 100   | < 50    | < 100   |
| 4-Chlorotoluene               | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Acetone                       | < 10    | --      | < 10    | < 10    | < 50    | < 100   | < 100   | < 50    | < 100   |
| Acrolein                      | < 5     | --      | < 5     | < 5     | < 25    | < 50    | < 50    | < 25    | < 50    |
| Acrylonitrile                 | < 5     | --      | < 5     | < 5     | < 25    | < 50    | < 50    | < 25    | < 50    |
| Benzene                       | < 1     | --      | < 1     | < 1     | 70      | < 10    | 93      | 280     | 91      |
| Bromobenzene                  | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Bromochloromethane            | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Bromodichloromethane          | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Bromoform                     | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Bromomethane                  | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Carbon disulfide              | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Carbon tetrachloride          | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Chlorobenzene                 | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Chloroethane                  | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Chloroform                    | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Chloromethane                 | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| cis-1,2-Dichloroethene        | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| cis-1,3-Dichloropropane       | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Dibromochloromethane          | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Dibromomethane                | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Dichlorodifluoromethane       | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Ethylbenzene                  | < 1     | --      | < 1     | < 1     | 75      | 16      | 55      | 120     | 28      |
| Hexachlorobutadiene           | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Iodomethane                   | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Isopropylbenzene              | < 1     | --      | < 1     | < 1     | 18      | 31      | < 10    | 21      | 23      |
| Methyl isobutyl ketone (MIBK) | < 10    | --      | < 10    | < 10    | < 50    | < 100   | < 100   | < 50    | < 100   |
| Methyl t-butyl ether (MTBE)   | < 1     | 6.2     | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Methylene chloride            | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| n-Butylbenzene                | < 1     | --      | < 1     | 2.3     | 7.2     | 11      | < 10    | < 5     | 17      |
| n-Propylbenzene               | < 1     | --      | < 1     | < 1     | 17      | 17      | 10      | 13      | 21      |
| Naphthalene                   | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | 5.2     | 45      |
| p-Isopropyltoluene            | < 1     | --      | < 1     | 2.5     | 5.3     | 11      | < 10    | < 5     | 12      |
| sec-Butylbenzene              | < 1     | --      | < 1     | 1.1     | 5.3     | 13      | < 10    | 5.6     | 15      |
| Styrene                       | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| tert-Butylbenzene             | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Tetrachloroethene             | < 0.5   | --      | < 0.5   | < 0.5   | < 2.5   | < 2.5   | < 2.5   | < 2.5   | < 5     |
| Toluene                       | < 1     | --      | < 1     | < 1     | < 5     | < 10    | 13      | < 5     | < 10    |
| trans-1,2-Dichloroethene      | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| trans-1,3-Dichloropropane     | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| trans-1,4-Dichloro-2-butene   | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Trichloroethene               | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Trichlorofluoromethane        | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Trichlorotrifluoroethane      | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | 6.1     | < 10    |
| Vinyl acetate                 | < 1     | --      | < 1     | < 1     | < 5     | < 10    | < 10    | < 5     | < 10    |
| Vinyl chloride                | < 0.5   | --      | < 0.5   | < 0.5   | < 2.5   | < 2.5   | < 2.5   | < 2.5   | < 5     |
| Xylene (total)                | < 1     | --      | < 1     | 1.5     | 510     | 31      | 458     | 6.3     | 360     |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

VOC Volatile Organic Compound

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

## Appendix C

Historical VOC Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID<br>Date Sampled:      | MW-087<br>6/27/98 | MW-087A<br>6/27/98 | MW-088<br>6/27/98 | MW-089<br>6/17/98 | MW-090<br>6/17/98 | MW-094<br>6/26/98 | MW-095<br>6/22/98 | MW-096<br>7/1/98 | MW-097<br>7/1/98 |
|-------------------------------|-------------------|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|
| Parameter                     |                   |                    |                   |                   |                   |                   |                   |                  |                  |
| 1,1,1,2-Tetrachloroethane     | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 1,1,1-Trichloroethane         | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 1,1,2,2-Tetrachloroethane     | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 1,1,2-Trichloroethane         | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 1,1-Dichloroethane            | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 1,1-Dichloroethene            | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 1,1-Dichloropropene           | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 1,2,3-Trichlorobenzene        | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 1,2,3-Trichloropropane        | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 1,2,4-Trichlorobenzene        | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 1,2,4-Trimethylbenzene        | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 1,2-Dibromo-3-chloropropane   | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 1,2-Dibromoethane             | < 0.01            | < 0.01             | < 0.01            | < 0.01            | < 0.01            | < 0.01            | < 0.01            | < 0.01           | < 0.01           |
| 1,2-Dichlorobenzene           | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 1,2-Dichloroethane            | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 1,2-Dichloropropane           | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 1,3,5-Trimethylbenzene        | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 1,3-Dichlorobenzene           | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 1,3-Dichloropropane           | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 1,4-Dichlorobenzene           | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 2,2-Dichloropropane           | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 2-Butanone                    | < 10              | < 10               | < 10              | < 10              | < 10              | < 10              | < 10              | < 10             | < 10             |
| 2-Chloroethyl Vinyl Ether     | < 10              | < 10               | < 10              | < 10              | < 10              | < 10              | < 10              | < 10             | < 10             |
| 2-Chlorotoluene               | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| 2-Hexanone                    | < 10              | < 10               | < 10              | < 10              | < 10              | < 10              | < 10              | < 10             | < 10             |
| 4-Chlorotoluene               | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Acetone                       | < 10              | < 10               | < 10              | < 10              | < 10              | < 10              | < 10              | < 10             | < 10             |
| Acrolein                      | < 5               | < 5                | < 5               | < 5               | < 5               | < 5               | < 5               | < 5              | < 5              |
| Acrylonitrile                 | < 5               | < 5                | < 5               | < 5               | < 5               | < 5               | < 5               | < 5              | < 5              |
| Benzene                       | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Bromobenzene                  | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Bromochloromethane            | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Bromodichloromethane          | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Bromoform                     | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Bromomethane                  | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Carbon disulfide              | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Carbon tetrachloride          | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Chlorobenzene                 | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Chloroethane                  | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Chloroform                    | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Chloromethane                 | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| cis-1,2-Dichloroethene        | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| cis-1,3-Dichloropropene       | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Dibromochloromethane          | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Dibromomethane                | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Dichlorodifluoromethane       | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Ethylbenzene                  | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Hexachlorobutadiene           | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Iodomethane                   | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Isopropylbenzene              | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Methyl isobutyl ketone (MIBK) | < 10              | < 10               | < 10              | < 10              | < 10              | < 10              | < 10              | < 10             | < 10             |
| Methyl t-butyl ether (MTBE)   | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Methylene chloride            | < 1               | < 1                | < 1               | 1.5               | < 1               | < 1               | < 1               | < 1              | < 1              |
| n-Butylbenzene                | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| n-Propylbenzene               | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Naphthalene                   | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| p-Isopropyltoluene            | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| sec-Butylbenzene              | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Styrene                       | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| tert-Butylbenzene             | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Tetrachloroethene             | < 0.5             | < 0.5              | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5            | < 0.5            |
| Toluene                       | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| trans-1,2-Dichloroethene      | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| trans-1,3-Dichloropropene     | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| trans-1,4-Dichloro-2-butene   | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Trichloroethene               | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Trichlorofluoromethane        | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Trichlorotrifluoroethane      | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Vinyl acetate                 | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |
| Vinyl chloride                | < 0.5             | < 0.5              | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5            | < 0.5            |
| Xylene (total)                | < 1               | < 1                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1              | < 1              |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

VOC Volatile Organic Compound

< Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

# Appendix C

Historical VOC Analytical Data  
May 1991 - October 1998

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Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID<br>Date Sampled       | MW-098<br>6/29/98 | MW-104<br>7/1/98 | MW-105<br>6/28/98 | MW-106<br>6/28/98 | MW-108<br>6/22/98 | MW-110<br>6/30/98 | MW-111<br>6/29/98 | SUMP-16A<br>9/21/91 | SUMP-16A<br>4/19/96 |
|-------------------------------|-------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------------|---------------------|
| Parameter                     |                   |                  |                   |                   |                   |                   |                   |                     |                     |
| 1,1,1,2-Tetrachloroethane     | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| 1,1,1-Trichloroethane         | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| 1,1,2,2-Tetrachloroethane     | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| 1,1,2-Trichloroethane         | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| 1,1-Dichloroethane            | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| 1,1-Dichloroethene            | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| 1,1-Dichloropropene           | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| 1,2,3-Trichlorobenzene        | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| 1,2,3-Trichloropropane        | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| 1,2,4-Trichlorobenzene        | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| 1,2,4-Trimethylbenzene        | 290               | < 1              | < 1               | < 1               | < 1               | 440               | < 1               | --                  | --                  |
| 1,2-Dibromo-3-chloropropane   | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| 1,2-Dibromoethane             | < 0.01            | < 0.01           | < 1               | < 0.01            | < 0.01            | < 0.01            | < 0.01            | --                  | --                  |
| 1,2-Dichlorobenzene           | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| 1,2-Dichloroethane            | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| 1,2-Dichloropropane           | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| 1,3,5-Trimethylbenzene        | 170               | < 1              | < 1               | < 1               | < 1               | 88                | < 1               | --                  | --                  |
| 1,3-Dichlorobenzene           | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| 1,3-Dichloropropane           | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| 1,4-Dichlorobenzene           | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| 2,2-Dichloropropane           | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| 2-Butanone                    | < 10              | < 10             | < 10              | < 10              | < 10              | < 100             | < 10              | --                  | --                  |
| 2-Chloroethyl Vinyl Ether     | < 10              | < 10             | < 10              | < 10              | < 10              | < 100             | < 10              | --                  | --                  |
| 2-Chlorotoluene               | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| 2-Hexanone                    | < 10              | < 10             | < 10              | < 10              | < 10              | < 100             | < 10              | --                  | --                  |
| 4-Chlorotoluene               | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Acetone                       | < 10              | < 10             | < 10              | < 10              | < 10              | < 100             | 28                | --                  | --                  |
| Acrolein                      | < 5               | < 5              | < 5               | < 5               | < 5               | < 50              | < 5               | --                  | --                  |
| Acrylonitrile                 | < 5               | < 5              | < 5               | < 5               | < 5               | < 50              | < 5               | --                  | --                  |
| Benzene                       | < 1               | < 1              | < 1               | < 1               | < 1               | 170               | < 1               | --                  | --                  |
| Bromobenzene                  | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Bromochloromethane            | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Bromodichloromethane          | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Bromoform                     | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Bromomethane                  | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Carbon disulfide              | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Carbon tetrachloride          | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Chlorobenzene                 | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Chloroethane                  | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Chloroform                    | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Chloromethane                 | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| cis-1,2-Dichloroethene        | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| cis-1,3-Dichloropropene       | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Dibromochloromethane          | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Dibromomethane                | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Dichlorodifluoromethane       | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Ethylbenzene                  | 20                | < 1              | < 1               | < 1               | < 1               | 150               | < 1               | --                  | --                  |
| Hexachlorobutadiene           | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Iodomethane                   | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Isopropylbenzene              | 11                | < 1              | < 1               | < 1               | < 1               | 36                | < 1               | --                  | --                  |
| Methyl isobutyl ketone (MIBK) | < 10              | < 10             | < 10              | < 10              | < 10              | < 100             | < 10              | --                  | --                  |
| Methyl t-butyl ether (MTBE)   | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | < 2.5               |
| Methylene chloride            | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| n-Butylbenzene                | 9.7               | < 1              | < 1               | < 1               | < 1               | 18                | < 1               | --                  | --                  |
| n-Propylbenzene               | 13                | < 1              | < 1               | < 1               | < 1               | 51                | < 1               | --                  | --                  |
| Naphthalene                   | 2.9               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | 5                   | --                  |
| p-Isopropyltoluene            | 7.4               | < 1              | < 1               | < 1               | < 1               | 13                | < 1               | --                  | --                  |
| sec-Butylbenzene              | < 1               | < 1              | < 1               | < 1               | < 1               | 13                | < 1               | --                  | --                  |
| Styrene                       | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| tert-Butylbenzene             | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Tetrachloroethene             | 0.5               | < 0.5            | < 1               | < 0.5             | < 0.5             | < 0.5             | < 0.5             | --                  | --                  |
| Toluene                       | 7.1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| trans-1,2-Dichloroethene      | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| trans-1,3-Dichloropropene     | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| trans-1,4-Dichloro-2-butene   | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Trichloroethene               | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Trichlorofluoromethane        | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Trichlorotrifluoroethane      | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Vinyl acetate                 | < 1               | < 1              | < 1               | < 1               | < 1               | < 10              | < 1               | --                  | --                  |
| Vinyl chloride                | < 0.5             | < 0.5            | < 1               | < 0.5             | < 0.5             | < 0.5             | < 0.5             | --                  | --                  |
| Xylene (total)                | 1010              | < 1              | < 1               | < 1               | < 1               | 160               | < 1               | --                  | --                  |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

VOC Volatile Organic Compound

< Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

# Appendix C

Historical VOC Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Well ID<br>Date Sampled       | SW-01<br>7/19/91 | SW-01<br>12/10/97 | SW-01<br>6/30/98 | SW-02<br>6/24/98 | SW-03<br>6/24/98 | TH-A11<br>9/21/91 | UIHS_ARROYO<br>7/19/91 | UIHS_ARROYO<br>6/26/98 |
|-------------------------------|------------------|-------------------|------------------|------------------|------------------|-------------------|------------------------|------------------------|
| Parameter                     |                  |                   |                  |                  |                  |                   |                        |                        |
| 1,1,1,2-Tetrachloroethane     | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| 1,1,1-Trichloroethane         | < 5              | < 1               | < 1              | < 1              | < 1              | --                | < 5                    | < 1                    |
| 1,1,2,2-Tetrachloroethane     | < 5              | < 1               | < 1              | < 1              | < 1              | --                | < 5                    | < 1                    |
| 1,1,2-Trichloroethane         | < 5              | < 1               | < 1              | < 1              | < 1              | --                | < 5                    | < 1                    |
| 1,1-Dichloroethane            | < 5              | < 1               | < 1              | < 1              | < 1              | --                | < 5                    | < 1                    |
| 1,1-Dichloroethene            | < 5              | < 1               | < 1              | < 1              | < 1              | --                | < 5                    | < 1                    |
| 1,1-Dichloropropene           | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| 1,2,3-Trichlorobenzene        | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| 1,2,3-Trichloropropane        | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| 1,2,4-Trichlorobenzene        | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| 1,2,4-Trimethylbenzene        | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| 1,2-Dibromo-3-chloropropane   | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| 1,2-Dibromoethane             | --               | < 0.01            | < 0.01           | < 0.01           | < 0.01           | --                | --                     | < 0.01                 |
| 1,2-Dichlorobenzene           | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| 1,2-Dichloroethane            | < 5              | < 1               | < 1              | < 1              | < 1              | --                | < 5                    | < 1                    |
| 1,2-Dichloropropane           | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| 1,3,5-Trimethylbenzene        | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| 1,3-Dichlorobenzene           | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| 1,3-Dichloropropane           | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| 1,4-Dichlorobenzene           | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| 2,2-Dichloropropane           | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| 2-Butanone                    | --               | --                | < 10             | < 10             | < 10             | --                | --                     | < 10                   |
| 2-Chloroethyl Vinyl Ether     | --               | --                | < 10             | < 10             | < 10             | --                | --                     | < 10                   |
| 2-Chlorotoluene               | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| 2-Hexanone                    | --               | --                | < 10             | < 10             | < 10             | --                | --                     | < 10                   |
| 4-Chlorotoluene               | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Acetone                       | --               | --                | < 10             | < 10             | < 10             | --                | --                     | < 10                   |
| Acrolein                      | < 100            | --                | < 5              | < 5              | < 5              | --                | < 100                  | < 5                    |
| Acrylonitrile                 | < 100            | < 10              | < 5              | < 5              | < 5              | --                | < 100                  | < 5                    |
| Benzene                       | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Bromobenzene                  | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Bromochloromethane            | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Bromodichloromethane          | < 5              | < 1               | < 1              | < 1              | < 1              | --                | < 5                    | < 1                    |
| Bromoform                     | < 5              | < 1               | < 1              | < 1              | < 1              | --                | < 5                    | < 1                    |
| Bromomethane                  | < 10             | < 1               | < 1              | < 1              | < 1              | --                | < 10                   | < 1                    |
| Carbon disulfide              | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Carbon tetrachloride          | < 5              | < 1               | < 1              | < 1              | < 1              | --                | < 5                    | < 1                    |
| Chlorobenzene                 | < 5              | < 1               | < 1              | < 1              | < 1              | --                | < 5                    | < 1                    |
| Chloroethane                  | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Chloroform                    | < 5              | < 1               | < 1              | < 1              | < 1              | --                | < 5                    | < 1                    |
| Chloromethane                 | < 10             | < 1               | < 1              | < 1              | < 1              | --                | < 10                   | < 1                    |
| cis-1,2-Dichloroethene        | --               | < 1               | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| cis-1,3-Dichloropropene       | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Dibromochloromethane          | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Dibromomethane                | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Dichlorodifluoromethane       | < 1              | < 1               | < 1              | < 1              | < 1              | --                | < 1                    | < 1                    |
| Ethylbenzene                  | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Hexachlorobutadiene           | --               | < 1               | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Iodomethane                   | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Isopropylbenzene              | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Methyl isobutyl ketone (MIBK) | --               | --                | < 10             | < 10             | < 10             | --                | --                     | < 10                   |
| Methyl t-butyl ether (MTBE)   | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Methylene chloride            | < 5              | < 2               | < 1              | < 1              | < 1              | --                | < 5                    | < 1                    |
| n-Butylbenzene                | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| n-Propylbenzene               | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Naphthalene                   | --               | --                | < 1              | < 1              | < 1              | < 10              | --                     | < 1                    |
| p-Isopropyltoluene            | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| sec-Butylbenzene              | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Styrene                       | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| tert-Butylbenzene             | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Tetrachloroethene             | < 5              | < 0.5             | < 0.5            | < 0.5            | < 0.5            | --                | < 5                    | < 0.5                  |
| Toluene                       | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| trans-1,2-Dichloroethene      | < 5              | < 1               | < 1              | < 1              | < 1              | --                | < 5                    | < 1                    |
| trans-1,3-Dichloropropene     | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| trans-1,4-Dichloro-2-butene   | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Trichloroethene               | < 5              | < 1               | < 1              | < 1              | < 1              | --                | < 5                    | < 1                    |
| Trichlorofluoromethane        | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Trichlorotrifluoroethane      | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Vinyl acetate                 | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |
| Vinyl chloride                | < 10             | < 1               | < 0.5            | < 0.5            | < 0.5            | --                | < 10                   | < 0.5                  |
| Xylene (total)                | --               | --                | < 1              | < 1              | < 1              | --                | --                     | < 1                    |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

VOC Volatile Organic Compound

< Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

Historical SVOC Analytical Data  
May 1991 - October 1998

## Appendix C

Historical SVOC Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Well ID<br>Date Sampled             | IW-02<br>8/22/96 | LYMAN<br>6/29/98 | MW-010<br>9/21/91 | MW-010<br>9/25/91 | MW-013<br>9/21/91 | MW-013<br>9/25/91 | MW-013<br>3/21/97 | MW-013<br>6/21/98 | MW-014<br>6/22/98 | MW-019<br>9/21/91 |
|-------------------------------------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Parameter                           |                  |                  |                   |                   |                   |                   |                   |                   |                   |                   |
| Benzoic acid                        | --               | < 1.7            | --                | --                | --                | --                | --                | < 1.7             | < 1.7             | --                |
| 4-Chloro-3-methylphenol             | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| 2-Chlorophenol                      | --               | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| 2,4-Dichlorophenol                  | --               | < 3.9            | --                | --                | --                | --                | --                | < 3.9             | < 3.9             | --                |
| 2,6-Dichlorophenol                  | --               | < 0.1            | --                | --                | --                | --                | --                | < 0.1             | < 0.1             | --                |
| 2,4-Dimethylphenol                  | --               | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| 4,6-Dinitro-2-methylphenol          | --               | < 1.6            | --                | --                | --                | --                | --                | < 1.6             | < 1.6             | --                |
| 2,4-Dinitrophenol                   | --               | < 3.3            | --                | --                | --                | --                | --                | < 3.3             | < 3.3             | --                |
| 2-Methylphenol                      | --               | < 0.3            | --                | --                | --                | --                | --                | < 0.3             | < 0.3             | --                |
| 4-Methylphenol                      | --               | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| 2-Nitrophenol                       | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| 4-Nitrophenol                       | --               | < 0.7            | --                | --                | --                | --                | --                | < 0.7             | < 0.7             | --                |
| Pentachlorophenol                   | --               | < 0.7            | --                | --                | --                | --                | --                | < 0.7             | < 0.7             | --                |
| Phenol                              | --               | < 0.5            | 70.3              | 480.4             | 60.3              | 120.3             | < 6               | < 0.5             | < 0.5             | < 50              |
| 2,3,4,5-Tetrachlorophenol           | --               | < 0.6            | --                | --                | --                | --                | --                | < 0.6             | < 0.6             | --                |
| 2,4,5-Trichlorophenol               | --               | < 3              | --                | --                | --                | --                | --                | < 3               | < 3               | --                |
| 2,4,6-Trichlorophenol               | --               | < 0.3            | --                | --                | --                | --                | --                | < 0.3             | < 0.3             | --                |
| Acenaphthene                        | < 1              | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| Acenaphthylene                      | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| Acetophenone                        | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| 4-Aminobiphenyl                     | --               | < 0.7            | --                | --                | --                | --                | --                | < 0.7             | < 0.7             | --                |
| Aniline                             | --               | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| Anthracene                          | < 1              | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| Benzidine                           | --               | < 2.7            | --                | --                | --                | --                | --                | < 2.7             | < 2.7             | --                |
| Benzo(a)anthracene                  | < 1              | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| Benzo(a)pyrene                      | < 1              | < 0.1            | --                | --                | --                | --                | --                | 1.5               | < 0.1             | --                |
| Benzo(b)fluoranthene                | < 1              | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| Benzo(g,h,i)perylene                | < 1              | < 0.3            | --                | --                | --                | --                | --                | < 0.3             | < 0.3             | --                |
| Benzo(k)fluoranthene                | < 1              | < 0.7            | --                | --                | --                | --                | --                | < 0.7             | < 0.7             | --                |
| Benzyl alcohol                      | --               | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| Bis(2-chloroethoxy)methane          | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| bis(2-Chloroethyl)ether             | --               | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| bis(2-Chloroisopropyl)ether         | --               | < 1.9            | --                | --                | --                | --                | --                | < 1.9             | < 1.9             | --                |
| bis(2-Ethylhexyl) phthalate         | --               | 1.4              | --                | --                | --                | --                | --                | 64                | 110               | --                |
| 4-Bromophenyl phenyl ether          | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| Butyl benzyl phthalate              | --               | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| 4-Chloroaniline                     | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| 1-Chloronaphthalene                 | --               | < 0.6            | --                | --                | --                | --                | --                | < 0.6             | < 0.6             | --                |
| 2-Chloronaphthalene                 | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| 4-Chlorophenyl phenyl ether         | --               | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| Chrysene                            | < 1              | < 0.7            | --                | --                | --                | --                | --                | < 0.7             | < 0.7             | --                |
| Dibenz(a,j)acridine                 | --               | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| Dibenzo(a,h)anthracene              | < 1              | < 0.3            | --                | --                | --                | --                | --                | < 0.3             | < 0.3             | --                |
| Dibenzofuran                        | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| 1,2-Dichlorobenzene                 | --               | < 0.3            | --                | --                | --                | --                | --                | < 0.3             | < 0.3             | --                |
| 1,3-Dichlorobenzene                 | --               | < 0.3            | --                | --                | --                | --                | --                | < 0.3             | < 0.3             | --                |
| 1,4-Dichlorobenzene                 | --               | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| 3,3'-Dichlorobenzidine              | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| Diethylphthalate                    | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| p-Dimethylaminoazobenzene           | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| 7,12-Dimethylbenz(a)anthracene      | --               | < 1.8            | --                | --                | --                | --                | --                | < 1.8             | < 1.8             | --                |
| alpha, alpha-Dimethylphenethylamine | --               | < 0.1            | --                | --                | --                | --                | --                | < 0.1             | < 0.1             | --                |
| Dimethyl phthalate                  | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| Di-n-butylphthalate                 | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| 2,4-Dinitrotoluene                  | --               | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| 2,6-Dinitrotoluene                  | --               | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| Di-n-octylphthalate                 | --               | < 0.7            | --                | --                | --                | --                | --                | < 0.7             | < 0.7             | --                |
| Diphenylamine                       | --               | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| 1,2-Diphenylhydrazine               | --               | < 0.3            | --                | --                | --                | --                | --                | < 0.3             | < 0.3             | --                |
| Fluoranthene                        | < 1              | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| Fluorene                            | < 1              | < 0.6            | --                | --                | --                | --                | --                | 8.1               | 6.8               | --                |
| Hexachlorobenzene                   | --               | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| Hexachlorobutadiene                 | --               | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| Hexachlorocyclopentadiene           | --               | < 0.6            | --                | --                | --                | --                | --                | < 0.6             | < 0.6             | --                |
| Hexachloroethane                    | --               | < 0.6            | --                | --                | --                | --                | --                | < 0.6             | < 0.6             | --                |
| Indeno(1,2,3-cd)pyrene              | < 1              | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| Isophorone                          | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| 3-Methylcholanthrene                | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| 2-Methylnaphthalene                 | < 1              | < 0.5            | --                | --                | --                | --                | --                | 85                | 56                | --                |
| Naphthalene                         | < 1              | < 0.4            | --                | --                | --                | --                | --                | 29                | 32                | --                |
| 1-Naphthylamine                     | --               | < 1.5            | --                | --                | --                | --                | --                | < 1.5             | < 1.5             | --                |
| 2-Naphthylamine                     | --               | < 1              | --                | --                | --                | --                | --                | < 1               | < 1               | --                |
| 2-Nitroaniline                      | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| 3-Nitroaniline                      | --               | < 0.9            | --                | --                | --                | --                | --                | < 0.9             | < 0.9             | --                |
| 4-Nitroaniline                      | --               | < 0.8            | --                | --                | --                | --                | --                | < 0.8             | < 0.8             | --                |
| Nitrobenzene                        | --               | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| N-Nitrosodimethylamine              | --               | < 1.2            | --                | --                | --                | --                | --                | < 1.2             | < 1.2             | --                |
| N-Nitroso-di-n-butylamine           | --               | < 1.1            | --                | --                | --                | --                | --                | < 1.1             | < 1.1             | --                |
| N-Nitrosodiethylamine               | --               | < 10             | --                | --                | --                | --                | --                | < 10              | < 10              | --                |
| N-Nitrosodiphenylamine              | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| N-Nitroso-di-n-propylamine          | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| N-Nitrosopiperidine                 | --               | < 0.8            | --                | --                | --                | --                | --                | < 0.8             | < 0.8             | --                |
| N-Nitrosopyrrolidine                | --               | < 10             | --                | --                | --                | --                | --                | < 10              | < 10              | --                |
| Pentachlorobenzene                  | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| Pentachloronitrobenzene             | --               | < 5              | --                | --                | --                | --                | --                | < 5               | < 5               | --                |
| Phenacetin                          | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| Phenanthrene                        | < 1              | < 0.4            | --                | --                | --                | --                | --                | 4                 | 3.8               | --                |
| 2-Picoline                          | --               | < 7.7            | --                | --                | --                | --                | --                | < 7.7             | < 7.7             | --                |
| Pronamide                           | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| Pyrene                              | < 1              | < 0.5            | --                | --                | --                | --                | --                | < 0.5             | < 0.5             | --                |
| 1,2,4,5-Tetrachlorobenzene          | --               | < 0.4            | --                | --                | --                | --                | --                | < 0.4             | < 0.4             | --                |
| 1,2,4-Trichlorobenzene              | --               | < 0.6            | --                | --                | --                | --                | --                | < 0.6             | < 0.6             | --                |
| 1-Methylnaphthalene                 | < 1              | < 0.3            | --                | --                | --                | --                | --                | 2603              | 2503              | --                |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

SVOC Semi-Volatile Organic Compound

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

## Appendix C

Historical SVOC Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Well ID<br>Date Sampled             | MW-019<br>9/25/91 | MW-039<br>7/18/97 | MW-041<br>3/20/97 | MW-041<br>7/18/97 | MW-041<br>6/19/98 | MW-043<br>9/19/91 | MW-043<br>9/25/91 | MW-043<br>7/18/97 | MW-043<br>6/22/98 | MW-044<br>6/22/98 |
|-------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Parameter                           |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| Benzoic acid                        | --                | --                | --                | --                | < 1.7             | --                | --                | --                | < 1.7             | < 1.7             |
| 4-Chloro-3-methylphenol             | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| 2-Chlorophenol                      | --                | --                | --                | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             |
| 2,4-Dichlorophenol                  | --                | --                | --                | --                | < 3.9             | --                | --                | --                | < 3.9             | < 3.9             |
| 2,6-Dichlorophenol                  | --                | --                | --                | --                | < 0.1             | --                | --                | --                | < 0.1             | < 0.1             |
| 2,4-Dimethylphenol                  | --                | --                | --                | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             |
| 4,6-Dinitro-2-methylphenol          | --                | --                | --                | --                | < 1.6             | --                | --                | --                | < 1.6             | < 1.6             |
| 2,4-Dinitrophenol                   | --                | --                | --                | --                | < 3.3             | --                | --                | --                | < 3.3             | < 3.3             |
| 2-Methylphenol                      | --                | --                | --                | --                | < 0.3             | --                | --                | --                | < 0.3             | < 0.3             |
| 4-Methylphenol                      | --                | --                | --                | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             |
| 2-Nitrophenol                       | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| 4-Nitrophenol                       | --                | --                | --                | --                | < 0.7             | --                | --                | --                | < 0.7             | < 0.7             |
| Pentachlorophenol<br>(Phenol)       | 550               | --                | < 3               | --                | 0.7<br>16         | < 50              | < 50              | --                | < 0.5             | < 0.5             |
| 2,3,4,6-Tetrachlorophenol           | --                | --                | --                | --                | < 0.6             | --                | --                | --                | < 0.6             | < 0.6             |
| 2,4,5-Trichlorophenol               | --                | --                | --                | --                | < 3               | --                | --                | --                | < 3               | < 3               |
| 2,4,6-Trichlorophenol               | --                | --                | --                | --                | < 0.3             | --                | --                | --                | < 0.3             | < 0.3             |
| Acenaphthene                        | --                | < 1               | --                | < 1               | < 0.4             | --                | --                | < 1               | < 0.4             | < 0.4             |
| Acenaphthylene                      | --                | < 1               | --                | < 1               | < 0.4             | --                | --                | < 1               | < 0.4             | < 0.4             |
| Acetophenone                        | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| 4-Aminobiphenyl                     | --                | --                | --                | --                | < 0.7             | --                | --                | --                | < 0.7             | < 0.7             |
| Aniline                             | --                | --                | --                | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             |
| Anthracene                          | --                | < 1               | --                | < 1               | < 0.4             | --                | --                | < 1               | < 0.4             | < 0.4             |
| Benidine                            | --                | --                | --                | NAR               | < 2.7             | --                | --                | --                | < 2.7             | < 2.7             |
| Benzo(a)anthracene                  | --                | < 1               | --                | < 1               | < 0.5             | --                | --                | < 1               | < 0.5             | < 0.5             |
| Benzo(a)pyrene                      | --                | < 1               | --                | < 1               | < 0.1             | --                | --                | < 1               | < 0.1             | < 0.1             |
| Benzo(b)fluoranthene                | --                | < 1               | --                | < 1               | < 0.5             | --                | --                | < 1               | < 0.5             | < 0.5             |
| Benzo(g,h,i)perylene                | --                | < 1               | --                | < 1               | < 0.3             | --                | --                | < 1               | < 0.3             | < 0.3             |
| Benzo(k)fluoranthene                | --                | < 1               | --                | < 1               | < 0.7             | --                | --                | < 1               | < 0.7             | < 0.7             |
| Benzyl alcohol                      | --                | --                | --                | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             |
| Bis(2-chloroethoxy)methane          | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| bis(2-Chloroethoxy)ether            | --                | --                | --                | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             |
| bis(2-Chloroisopropoxy)ether        | --                | --                | --                | --                | < 1.9             | --                | --                | --                | < 1.9             | < 1.9             |
| bis(2-Ethylhexyl) phthalate         | --                | --                | --                | --                | 2.7               | --                | --                | --                | < 0.6             | < 0.6             |
| 4-Bromophenyl phenyl ether          | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| Butyl benzyl phthalate              | --                | --                | --                | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             |
| 4-Chloroaniline                     | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| 1-Chloronaphthalene                 | --                | --                | --                | --                | < 0.6             | --                | --                | --                | < 0.6             | < 0.6             |
| 2-Chloronaphthalene                 | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| 4-Chlorophenyl phenyl ether         | --                | --                | --                | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             |
| Chrysene                            | --                | < 1               | --                | < 1               | < 0.7             | --                | --                | < 1               | < 0.7             | < 0.7             |
| Dibenz(a,j)acridine                 | --                | --                | --                | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             |
| Dibenzo(a,h)anthracene              | --                | < 1               | --                | < 1               | < 0.3             | --                | --                | < 1               | < 0.3             | < 0.3             |
| Dibenzofuran                        | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| 1,2-Dichlorobenzene                 | --                | --                | --                | --                | < 0.3             | --                | --                | --                | < 0.3             | < 0.3             |
| 1,3-Dichlorobenzene                 | --                | --                | --                | --                | < 0.3             | --                | --                | --                | < 0.3             | < 0.3             |
| 1,4-Dichlorobenzene                 | --                | --                | --                | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             |
| 3,3'-Dichlorobenzidine              | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| Diethylphthalate                    | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| p-Dimethylaminoazobenzene           | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| 7,12-Dimethylbenz(a)anthracene      | --                | --                | --                | --                | < 1.8             | --                | --                | --                | < 1.8             | < 1.8             |
| alpha, alpha-Dimethylphenethylamine | --                | --                | --                | --                | < 0.1             | --                | --                | --                | < 0.1             | < 0.1             |
| Dimethyl phthalate                  | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| Di-n-butylphthalate                 | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| 2,4-Dinitrotoluene                  | --                | --                | --                | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             |
| 2,6-Dinitrotoluene                  | --                | --                | --                | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             |
| Di-n-octylphthalate                 | --                | --                | --                | --                | < 0.7             | --                | --                | --                | < 0.7             | < 0.7             |
| Diphenylamine                       | --                | --                | --                | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             |
| 1,2-Diphenylhydrazine               | --                | --                | --                | --                | < 0.3             | --                | --                | --                | < 0.3             | < 0.3             |
| Fluoranthene                        | --                | < 1               | --                | < 1               | < 0.5             | --                | --                | < 1               | < 0.5             | < 0.5             |
| Fluorene                            | --                | < 1               | --                | < 1               | < 0.6             | --                | --                | < 1               | < 0.6             | < 0.6             |
| Hexachlorobenzene                   | --                | --                | --                | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             |
| Hexachlorobutadiene                 | --                | --                | --                | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             |
| Hexachlorocyclopentadiene           | --                | --                | --                | --                | < 0.6             | --                | --                | --                | < 0.6             | < 0.6             |
| Hexachloroethane                    | --                | --                | --                | --                | < 0.6             | --                | --                | --                | < 0.6             | < 0.6             |
| Indeno(1,2,3-cd)pyrene              | --                | < 1               | --                | < 1               | < 0.5             | --                | --                | < 1               | < 0.5             | < 0.5             |
| Isophorone                          | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| 3-Methylcholanthrene                | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| 2-Methylnaphthalene                 | --                | < 1               | --                | < 1               | < 0.5             | --                | --                | < 1               | < 0.5             | < 0.5             |
| Naphthalene                         | --                | < 1               | --                | < 1               | < 0.4             | --                | --                | < 1               | < 0.4             | < 0.4             |
| 1-Naphthylamine                     | --                | --                | --                | --                | < 1.5             | --                | --                | --                | < 1.5             | < 1.5             |
| 2-Naphthylamine                     | --                | --                | --                | --                | < 1               | --                | --                | --                | < 1               | < 1               |
| 2-Nitroaniline                      | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| 3-Nitroaniline                      | --                | --                | --                | --                | < 0.9             | --                | --                | --                | < 0.9             | < 0.9             |
| 4-Nitroaniline                      | --                | --                | --                | --                | < 0.8             | --                | --                | --                | < 0.8             | < 0.8             |
| Nitrobenzene                        | --                | --                | --                | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             |
| N-Nitrosodimethylamine              | --                | --                | --                | --                | < 1.2             | --                | --                | --                | < 1.2             | < 1.2             |
| N-Nitroso-di-n-butylamine           | --                | --                | --                | --                | < 1.1             | --                | --                | --                | < 1.1             | < 1.1             |
| N-Nitrosodiethylamine               | --                | --                | --                | --                | < 10              | --                | --                | --                | < 10              | < 10              |
| N-Nitrosodiphenylamine              | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| N-Nitroso-di-n-propylamine          | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| N-Nitrosopiperidine                 | --                | --                | --                | --                | < 0.8             | --                | --                | --                | < 0.8             | < 0.8             |
| N-Nitrosopyrrolidine                | --                | --                | --                | --                | < 10              | --                | --                | --                | < 10              | < 10              |
| Pentachlorobenzene                  | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| Pentachloronitrobenzene             | --                | --                | --                | --                | < 5               | --                | --                | --                | < 5               | < 5               |
| Phenacetin                          | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| Phenanthrene                        | --                | < 1               | --                | < 1               | < 0.4             | --                | --                | < 1               | < 0.4             | < 0.4             |
| 2-Picoline                          | --                | --                | --                | --                | < 7.7             | --                | --                | --                | < 7.7             | < 7.7             |
| Pronamide                           | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| Pyrene                              | --                | < 1               | --                | < 1               | < 0.5             | --                | --                | < 1               | < 0.5             | < 0.5             |
| 1,2,4,5-Tetrachlorobenzene          | --                | --                | --                | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             |
| 1,2,4-Trichlorobenzene              | --                | --                | --                | --                | < 0.6             | --                | --                | --                | < 0.6             | < 0.6             |
| 1-Methylnaphthalene                 | --                | < 1               | --                | < 1               | < 0.3             | --                | --                | < 1               | < 0.3             | 2                 |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

SVOC Semi-Volatile Organic Compound

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

## Appendix C

Historical SVOC Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Well ID<br>Date Sampled             | MW-045<br>9/21/91 | MW-045<br>9/24/91 | MW-046<br>5/29/97 | MW-046<br>6/21/98 | MW-049<br>3/20/97 | MW-049<br>7/18/97 | MW-049<br>6/21/98 | MW-050<br>3/20/97 | MW-050<br>7/18/97 | MW-050<br>6/19/98 |
|-------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Parameter                           |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| Benzoic acid                        | --                | --                | --                | < 1.7             | --                | --                | < 1.7             | --                | --                | < 1.7             |
| 4-Chloro-3-methylphenol             | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| 2-Chlorophenol                      | --                | --                | --                | < 0.5             | --                | --                | < 0.5             | --                | --                | < 0.5             |
| 2,4-Dichlorophenol                  | --                | --                | --                | < 3.9             | --                | --                | < 3.9             | --                | --                | < 3.9             |
| 2,6-Dichlorophenol                  | --                | --                | --                | < 0.1             | --                | --                | < 0.1             | --                | --                | < 0.1             |
| 2,4-Dimethylphenol                  | --                | --                | --                | < 0.5             | --                | --                | < 0.5             | --                | --                | < 0.5             |
| 4,6-Dinitro-2-methylphenol          | --                | --                | --                | < 1.6             | --                | --                | < 1.6             | --                | --                | < 1.6             |
| 2,4-Dinitrophenol                   | --                | --                | --                | < 3.3             | --                | --                | < 3.3             | --                | --                | < 3.3             |
| 2-Methylphenol                      | --                | --                | --                | < 0.3             | --                | --                | < 0.3             | --                | --                | < 0.3             |
| 4-Methylphenol                      | --                | --                | --                | < 0.5             | --                | --                | < 0.5             | --                | --                | < 0.5             |
| 2-Nitrophenol                       | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| 4-Nitrophenol                       | --                | --                | --                | < 0.7             | --                | --                | < 0.7             | --                | --                | < 0.7             |
| Pentachlorophenol                   | --                | --                | --                | < 0.7             | --                | --                | < 0.7             | --                | --                | < 0.7             |
| Phenol                              | < 50              | < 50              | --                | 52                | < 3               | --                | < 0.5             | < 3               | --                | < 0.5             |
| 2,3,4,6-Tetrachlorophenol           | --                | --                | --                | < 0.6             | --                | --                | < 0.6             | --                | --                | < 0.6             |
| 2,4,5-Trichlorophenol               | --                | --                | --                | < 3               | --                | --                | < 3               | --                | --                | < 3               |
| 2,4,6-Trichlorophenol               | --                | --                | --                | < 0.3             | --                | --                | < 0.3             | --                | --                | < 0.3             |
| Acenaphthene                        | --                | --                | 58                | < 0.4             | --                | < 1               | < 0.4             | --                | < 1               | < 0.4             |
| Acenaphthylene                      | --                | --                | < 1               | < 0.4             | --                | < 1               | < 0.4             | --                | < 1               | < 0.4             |
| Acetophenone                        | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| 4-Aminobiphenyl                     | --                | --                | --                | < 0.7             | --                | --                | < 0.7             | --                | --                | < 0.7             |
| Aniline                             | --                | --                | --                | < 0.5             | --                | --                | < 0.5             | --                | --                | < 0.5             |
| Anthracene                          | --                | --                | < 1               | < 0.4             | --                | < 1               | < 0.4             | --                | < 1               | < 0.4             |
| Benzidine                           | --                | --                | --                | < 2.7             | --                | --                | < 2.7             | --                | --                | < 2.7             |
| Benzo(a)anthracene                  | --                | --                | 13                | < 0.5             | --                | < 1               | < 0.5             | --                | < 1               | < 0.5             |
| Benzo(a)pyrene                      | --                | --                | 53                | 0.4               | --                | < 1               | < 0.1             | --                | < 1               | < 0.1             |
| Benzo(b)fluoranthene                | --                | --                | 6                 | < 0.5             | --                | < 1               | < 0.5             | --                | < 1               | < 0.5             |
| Benzo(g,h,i)perylene                | --                | --                | < 1               | < 0.3             | --                | < 1               | < 0.3             | --                | < 1               | < 0.3             |
| Benzo(k)fluoranthene                | --                | --                | 8                 | < 0.7             | --                | < 1               | < 0.7             | --                | < 1               | < 0.7             |
| Benzyl alcohol                      | --                | --                | --                | < 0.5             | --                | --                | < 0.5             | --                | --                | < 0.5             |
| Bis(2-chloroethoxy)methane          | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| bis(2-Chloroethyl)ether             | --                | --                | --                | < 0.5             | --                | --                | < 0.5             | --                | --                | < 0.5             |
| bis(2-Chloroisopropyl)ether         | --                | --                | --                | < 1.9             | --                | --                | < 1.9             | --                | --                | < 1.9             |
| bis(2-Ethylhexyl) phthalate         | --                | --                | --                | < 0.6             | --                | --                | < 0.6             | --                | --                | < 0.6             |
| 4-Bromophenyl phenyl ether          | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| Butyl benzyl phthalate              | --                | --                | --                | < 0.5             | --                | --                | < 0.5             | --                | --                | < 0.5             |
| 4-Chloroaniline                     | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| 1-Chloronaphthalene                 | --                | --                | --                | < 0.6             | --                | --                | < 0.6             | --                | --                | < 0.6             |
| 2-Chloronaphthalene                 | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| 4-Chlorophenyl phenyl ether         | --                | --                | --                | < 0.5             | --                | --                | < 0.5             | --                | --                | < 0.5             |
| Chrysene                            | --                | --                | 22                | < 0.7             | --                | < 1               | < 0.7             | --                | < 1               | < 0.7             |
| Dibenz(a,j)acridine                 | --                | --                | 16                | < 0.5             | --                | --                | < 0.5             | --                | --                | < 0.5             |
| Dibenzo(a,h)anthracene              | --                | --                | --                | < 0.3             | --                | < 1               | < 0.3             | --                | < 1               | < 0.3             |
| Dibenzofuran                        | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| 1,2-Dichlorobenzene                 | --                | --                | --                | < 0.3             | --                | --                | < 0.3             | --                | --                | < 0.3             |
| 1,3-Dichlorobenzene                 | --                | --                | --                | < 0.3             | --                | --                | < 0.3             | --                | --                | < 0.3             |
| 1,4-Dichlorobenzene                 | --                | --                | --                | < 0.5             | --                | --                | < 0.5             | --                | --                | < 0.5             |
| 3,3'-Dichlorobenzidine              | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| Diethylphthalate                    | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| p-Dimethylaminobenzene              | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| 7,12-Dimethylbenzo(a)anthracene     | --                | --                | --                | < 1.8             | --                | --                | < 1.8             | --                | --                | < 1.8             |
| alpha, alpha-Dimethylphenethylamine | --                | --                | --                | < 0.1             | --                | --                | < 0.1             | --                | --                | < 0.1             |
| Dimethyl phthalate                  | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| Di-n-butylphthalate                 | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| 2,4-Dinitrotoluene                  | --                | --                | --                | < 0.5             | --                | --                | < 0.5             | --                | --                | < 0.5             |
| 2,6-Dinitrotoluene                  | --                | --                | --                | < 0.5             | --                | --                | < 0.5             | --                | --                | < 0.5             |
| Di-n-octylphthalate                 | --                | --                | --                | < 0.7             | --                | --                | < 0.7             | --                | --                | < 0.7             |
| Diphenylamine                       | --                | --                | --                | < 0.5             | --                | --                | < 0.5             | --                | --                | < 0.5             |
| 1,2-Diphenylhydrazine               | --                | --                | --                | < 0.3             | --                | --                | < 0.3             | --                | --                | < 0.3             |
| Fluoranthene                        | --                | --                | < 1               | < 0.5             | --                | < 1               | < 0.5             | --                | < 1               | < 0.5             |
| Fluorene                            | --                | --                | < 1               | < 0.6             | --                | < 1               | < 0.6             | --                | < 1               | < 0.6             |
| Hexachlorobenzene                   | --                | --                | --                | < 0.5             | --                | --                | < 0.5             | --                | --                | < 0.5             |
| Hexachlorobutadiene                 | --                | --                | --                | < 0.5             | --                | --                | < 0.5             | --                | --                | < 0.5             |
| Hexachlorocyclopentadiene           | --                | --                | --                | < 0.6             | --                | --                | < 0.6             | --                | --                | < 0.6             |
| Hexachloroethane                    | --                | --                | --                | < 0.6             | --                | --                | < 0.6             | --                | --                | < 0.6             |
| Indeno(1,2,3-cd)pyrene              | --                | --                | 2                 | < 0.5             | --                | < 1               | < 0.5             | --                | < 1               | < 0.5             |
| Isophorone                          | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| 3-Methylcholanthrene                | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| 2-Methylnaphthalene                 | --                | --                | 29                | < 0.5             | --                | < 1               | < 0.5             | --                | < 1               | < 0.5             |
| Naphthalene                         | --                | --                | 5                 | < 0.4             | --                | < 1               | < 0.4             | --                | < 1               | < 0.4             |
| 1-Naphthylamine                     | --                | --                | --                | < 1.5             | --                | --                | < 1.5             | --                | --                | < 1.5             |
| 2-Naphthylamine                     | --                | --                | --                | < 1               | --                | --                | < 1               | --                | --                | < 1               |
| 2-Nitroaniline                      | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| 3-Nitroaniline                      | --                | --                | --                | < 0.9             | --                | --                | < 0.9             | --                | --                | < 0.9             |
| 4-Nitroaniline                      | --                | --                | --                | < 0.8             | --                | --                | < 0.8             | --                | --                | < 0.8             |
| Nitrobenzene                        | --                | --                | --                | < 0.5             | --                | --                | < 0.5             | --                | --                | < 0.5             |
| N-Nitrosodimethylamine              | --                | --                | --                | < 1.2             | --                | --                | < 1.2             | --                | --                | < 1.2             |
| N-Nitroso-di-n-butylamine           | --                | --                | --                | < 1.1             | --                | --                | < 1.1             | --                | --                | < 1.1             |
| N-Nitrosodiethylamine               | --                | --                | --                | < 10              | --                | --                | < 10              | --                | --                | < 10              |
| N-Nitrosodiphenylamine              | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| N-Nitroso-di-n-propylamine          | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| N-Nitrosopiperidine                 | --                | --                | --                | < 0.8             | --                | --                | < 0.8             | --                | --                | < 0.8             |
| N-Nitrosopyrrolidine                | --                | --                | --                | < 10              | --                | --                | < 10              | --                | --                | < 10              |
| Pentachlorobenzene                  | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| Pentachloronitrobenzene             | --                | --                | --                | < 5               | --                | --                | < 5               | --                | --                | < 5               |
| Phenacetin                          | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| Phenanthrene                        | --                | --                | 3                 | < 0.4             | --                | < 1               | < 0.4             | --                | < 1               | < 0.4             |
| 2-Picoline                          | --                | --                | --                | < 7.7             | --                | --                | < 7.7             | --                | --                | < 7.7             |
| Pronamide                           | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| Pyrene                              | --                | --                | < 1               | < 0.5             | --                | < 1               | < 0.5             | --                | < 1               | < 0.5             |
| 1,2,4,5-Tetrachlorobenzene          | --                | --                | --                | < 0.4             | --                | --                | < 0.4             | --                | --                | < 0.4             |
| 1,2,4-Trichlorobenzene              | --                | --                | 31                | < 0.6             | --                | < 1               | < 0.6             | --                | < 1               | < 0.6             |
| 1-Methylnaphthalene                 | --                | --                | --                | 24                | --                | < 1               | 9                 | --                | < 1               | < 0.3             |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

SVOC Semi-Volatile Organic Compound

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

## Appendix C

Historical SVOC Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Well ID<br>Date Sampled             | MW-054<br>7/16/97 | MW-054<br>6/25/98 | MW-055<br>7/16/97 | MW-055<br>6/25/98 | MW-056<br>9/21/91 | MW-056<br>9/25/91 | MW-056<br>3/20/97 | MW-057<br>6/25/98 | MW-058<br>6/22/98 | MW-059<br>6/24/98 |
|-------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Parameter                           |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| Benzoic acid                        | --                | < 1.7             | --                | < 1.7             | --                | --                | --                | < 1.7             | < 1.7             | < 8.5             |
| 4-Chloro-3-methylphenol             | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| 2-Chlorophenol                      | --                | < 0.5             | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| 2,4-Dichlorophenol                  | --                | < 3.9             | --                | < 3.9             | --                | --                | --                | < 3.9             | < 3.9             | < 20              |
| 2,6-Dichlorophenol                  | --                | < 0.1             | --                | < 0.1             | --                | --                | --                | < 0.1             | < 0.1             | < 0.5             |
| 2,4-Dimethylphenol                  | --                | < 0.5             | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| 4,6-Dinitro-2-methylphenol          | --                | < 1.6             | --                | < 1.6             | --                | --                | --                | < 1.6             | < 1.6             | < 8               |
| 2,4-Dinitrophenol                   | --                | < 3.3             | --                | < 3.3             | --                | --                | --                | < 3.3             | < 3.3             | < 17              |
| 2-Methylphenol                      | --                | < 0.3             | --                | < 0.3             | --                | --                | --                | < 0.3             | < 0.3             | < 2               |
| 4-Methylphenol                      | --                | < 0.5             | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| 2-Nitrophenol                       | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| 4-Nitrophenol                       | --                | < 0.7             | --                | < 0.7             | --                | --                | --                | < 0.7             | < 0.7             | < 4               |
| Pentachlorophenol                   | --                | < 0.7             | --                | < 0.7             | --                | --                | --                | < 0.7             | < 0.7             | < 4               |
| Phenol                              | --                | < 0.5             | --                | < 0.5             | < 50              | < 50              | < 3               | < 0.5             | < 0.5             | < 3               |
| 2,3,4,6-Tetrachlorophenol           | --                | < 0.6             | --                | < 0.6             | --                | --                | --                | < 0.6             | < 0.6             | < 3               |
| 2,4,5-Trichlorophenol               | --                | < 3               | --                | < 3               | --                | --                | --                | < 3               | < 3               | < 15              |
| 2,4,6-Trichlorophenol               | --                | < 0.3             | --                | < 0.3             | --                | --                | --                | < 0.3             | < 0.3             | < 2               |
| Acenaphthene                        | < 1               | < 0.4             | < 1               | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| Acenaphthylene                      | < 1               | < 0.4             | < 1               | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| Acetophenone                        | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| 4-Aminobiphenyl                     | --                | < 0.7             | --                | < 0.7             | --                | --                | --                | < 0.7             | < 0.7             | < 4               |
| Aniline                             | --                | < 0.5             | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| Anthracene                          | < 1               | < 0.4             | < 1               | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| Benzidine                           | --                | < 2.7             | --                | < 2.7             | --                | --                | --                | < 2.7             | < 2.7             | < 14              |
| Benzo(a)anthracene                  | < 1               | < 0.5             | < 1               | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| Benzo(a)pyrene                      | < 1               | < 0.1             | < 1               | < 0.1             | --                | --                | --                | < 0.1             | < 0.1             | < 3               |
| Benzo(b)fluoranthene                | < 1               | < 0.5             | < 1               | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| Benzo(g,h,i)perylene                | < 1               | < 0.3             | < 1               | < 0.3             | --                | --                | --                | < 0.3             | < 0.3             | < 2               |
| Benzo(k)fluoranthene                | < 1               | < 0.7             | < 1               | < 0.7             | --                | --                | --                | < 0.7             | < 0.7             | < 4               |
| Benzyl alcohol                      | --                | < 0.5             | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| Bis(2-chloroethoxy)methane          | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| bis(2-Chloroethyl)ether             | --                | < 0.5             | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| bis(2-Chloroisopropyl)ether         | --                | < 1.9             | --                | < 1.9             | --                | --                | --                | < 1.9             | < 1.9             | < 9.5             |
| bis(2-Ethylhexyl) phthalate         | --                | < 0.6             | --                | < 0.6             | --                | --                | --                | < 0.6             | < 0.6             | < 54              |
| 4-Bromophenyl phenyl ether          | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| Butyl benzyl phthalate              | --                | < 0.5             | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| 4-Chloroaniline                     | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| 1-Chloronaphthalene                 | --                | < 0.6             | --                | < 0.6             | --                | --                | --                | < 0.6             | < 0.6             | < 3               |
| 2-Chloronaphthalene                 | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| 4-Chlorophenyl phenyl ether         | --                | < 0.5             | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| Chrysene                            | < 1               | < 0.7             | < 1               | < 0.7             | --                | --                | --                | < 0.7             | < 0.7             | < 4               |
| Dibenz(a,j)acridine                 | --                | < 0.5             | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| Dibenzo(a,h)anthracene              | < 1               | < 0.3             | < 1               | < 0.3             | --                | --                | --                | < 0.3             | < 0.3             | < 2               |
| Dibenzofuran                        | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| 1,2-Dichlorobenzene                 | --                | < 0.3             | --                | < 0.3             | --                | --                | --                | < 0.3             | < 0.3             | < 2               |
| 1,3-Dichlorobenzene                 | --                | < 0.3             | --                | < 0.3             | --                | --                | --                | < 0.3             | < 0.3             | < 2               |
| 1,4-Dichlorobenzene                 | --                | < 0.5             | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| 3,3'-Dichlorobenzidine              | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| Diethylphthalate                    | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| p-Dimethylaminoazobenzene           | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| 7,12-Dimethylbenz(a)anthracene      | --                | < 1.8             | --                | < 1.8             | --                | --                | --                | < 1.8             | < 1.8             | < 9               |
| alpha, alpha-Dimethylphenethylamine | --                | < 0.1             | --                | < 0.1             | --                | --                | --                | < 0.1             | < 0.1             | < 0.5             |
| Dimethyl phthalate                  | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| Di-n-butylphthalate                 | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| 2,4-Dinitrotoluene                  | --                | < 0.5             | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| 2,6-Dinitrotoluene                  | --                | < 0.5             | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| Di-n-octylphthalate                 | --                | < 0.7             | --                | < 0.7             | --                | --                | --                | < 0.7             | < 0.7             | < 4               |
| Diphenylamine                       | --                | < 0.5             | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| 1,2-Diphenylhydrazine               | --                | < 0.3             | --                | < 0.3             | --                | --                | --                | < 0.3             | < 0.3             | < 2               |
| Fluoranthene                        | < 1               | < 0.5             | < 1               | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| Fluorene                            | < 1               | < 0.6             | < 1               | < 0.6             | --                | --                | --                | < 0.6             | < 0.6             | < 3               |
| Hexachlorobenzene                   | --                | < 0.5             | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| Hexachlorobutadiene                 | --                | < 0.5             | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| Hexachlorocyclopentadiene           | --                | < 0.6             | --                | < 0.6             | --                | --                | --                | < 0.6             | < 0.6             | < 3               |
| Hexachloroethane                    | --                | < 0.6             | --                | < 0.6             | --                | --                | --                | < 0.6             | < 0.6             | < 3               |
| Indeno(1,2,3-cd)pyrene              | < 1               | < 0.5             | < 1               | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| Isophorone                          | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| 3-Methylcholanthrene                | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| 2-Methylnaphthalene                 | < 1               | < 0.5             | < 1               | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| Naphthalene                         | < 1               | < 0.4             | 12                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| 1-Naphthylamine                     | --                | < 1.5             | --                | < 1.5             | --                | --                | --                | < 1.5             | < 1.5             | < 7.5             |
| 2-Naphthylamine                     | --                | < 1               | --                | < 1               | --                | --                | --                | < 1               | < 1               | < 5               |
| 2-Nitroaniline                      | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| 3-Nitroaniline                      | --                | < 0.9             | --                | < 0.9             | --                | --                | --                | < 0.9             | < 0.9             | < 5               |
| 4-Nitroaniline                      | --                | < 0.8             | --                | < 0.8             | --                | --                | --                | < 0.8             | < 0.8             | < 4               |
| Nitrobenzene                        | --                | < 0.5             | --                | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| N-Nitrosodimethylamine              | --                | < 1.2             | --                | < 1.2             | --                | --                | --                | < 1.2             | < 1.2             | < 6               |
| N-Nitroso-di-n-butylamine           | --                | < 1.1             | --                | < 1.1             | --                | --                | --                | < 1.1             | < 1.1             | < 5.5             |
| N-Nitrosodiethylamine               | --                | < 10              | --                | < 10              | --                | --                | --                | < 10              | < 10              | < 50              |
| N-Nitrosodiphenylamine              | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| N-Nitroso-di-n-propylamine          | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| N-Nitrosopiperidine                 | --                | < 0.8             | --                | < 0.8             | --                | --                | --                | < 0.8             | < 0.8             | < 4               |
| N-Nitrosopyrrolidine                | --                | < 10              | --                | < 10              | --                | --                | --                | < 10              | < 10              | < 50              |
| Pentachlorobenzene                  | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| Pentachloronitrobenzene             | --                | < 5               | --                | < 5               | --                | --                | --                | < 5               | < 5               | < 25              |
| Phenacetin                          | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| Phenanthrene                        | < 1               | < 0.4             | < 1               | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| 2-Picoline                          | --                | < 7.7             | --                | < 7.7             | --                | --                | --                | < 7.7             | < 7.7             | < 39              |
| Pronamide                           | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| Pyrene                              | < 1               | < 0.5             | < 1               | < 0.5             | --                | --                | --                | < 0.5             | < 0.5             | < 3               |
| 1,2,4,5-Tetrachlorobenzene          | --                | < 0.4             | --                | < 0.4             | --                | --                | --                | < 0.4             | < 0.4             | < 2               |
| 1,2,4-Trichlorobenzene              | --                | < 0.6             | --                | < 0.6             | --                | --                | --                | < 0.6             | < 0.6             | < 3               |
| 1-Methylnaphthalene                 | < 1               | < 0.3             | < 1               | < 0.3             | --                | --                | --                | < 0.3             | < 0.3             | < 500             |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

SVOC Semi-Volatile Organic Compound

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

## Appendix C

Historical SVOC Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Well ID:<br>Date Sampled:           | MW-060<br>7/1/91 | MW-060<br>7/19/91 | MW-060<br>7/7/92 | MW-060<br>3/19/97 | MW-060<br>6/21/98 | MW-061<br>6/18/98 | MW-061A<br>9/27/91 | MW-061A<br>7/7/92 | MW-061A<br>2/6/97 | MW-061A<br>6/18/98 |
|-------------------------------------|------------------|-------------------|------------------|-------------------|-------------------|-------------------|--------------------|-------------------|-------------------|--------------------|
| Parameter                           |                  |                   |                  |                   |                   |                   |                    |                   |                   |                    |
| Benzoic acid                        | --               | --                | --               | --                | < 1.7             | < 1.7             | --                 | --                | --                | < 1.7              |
| 4-Chloro-3-methylphenol             | --               | --                | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| 2-Chlorophenol                      | --               | --                | --               | --                | < 0.5             | < 0.5             | --                 | --                | --                | < 0.5              |
| 2,4-Dichlorophenol                  | --               | < 14              | --               | --                | < 3.9             | < 3.9             | --                 | --                | --                | < 3.9              |
| 2,6-Dichlorophenol                  | --               | --                | --               | --                | < 0.1             | < 0.1             | --                 | --                | --                | < 0.1              |
| 2,4-Dimethylphenol                  | --               | --                | --               | --                | < 0.5             | < 0.5             | --                 | --                | --                | < 0.5              |
| 4,6-Dinitro-2-methylphenol          | --               | --                | --               | --                | < 1.6             | < 1.6             | --                 | --                | --                | < 1.6              |
| 2,4-Dinitrophenol                   | --               | --                | --               | --                | < 3.3             | < 3.3             | --                 | --                | --                | < 3.3              |
| 2-Methylphenol                      | --               | --                | --               | --                | < 0.3             | < 0.3             | --                 | --                | --                | < 0.3              |
| 4-Methylphenol                      | --               | --                | --               | --                | < 0.5             | < 0.5             | --                 | --                | --                | < 0.5              |
| 2-Nitrophenol                       | --               | < 71              | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| 4-Nitrophenol                       | --               | --                | --               | --                | < 0.7             | < 0.7             | --                 | --                | --                | < 0.7              |
| Pentachlorophenol                   | --               | < 71              | --               | --                | < 0.7             | < 0.7             | --                 | --                | --                | < 0.7              |
| Phenol                              | < 14             | --                | --               | < 4               | < 0.5             | < 0.5             | < 50               | --                | --                | < 0.5              |
| 2,3,4,6-Tetrachlorophenol           | --               | --                | --               | --                | < 0.6             | < 0.6             | --                 | --                | --                | < 0.6              |
| 2,4,5-Trichlorophenol               | --               | --                | --               | --                | < 3               | < 3               | --                 | --                | --                | < 3                |
| 2,4,6-Trichlorophenol               | --               | < 14              | --               | --                | < 0.3             | < 0.3             | --                 | --                | --                | < 0.3              |
| Acenaphthene                        | --               | < 10              | --               | --                | < 0.4             | < 0.4             | --                 | --                | < 1               | < 0.4              |
| Acenaphthylene                      | --               | --                | --               | --                | < 0.4             | < 0.4             | --                 | --                | < 1               | < 0.4              |
| Acetophenone                        | --               | --                | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| 4-Aminobiphenyl                     | --               | --                | --               | --                | < 0.7             | < 0.7             | --                 | --                | --                | < 0.7              |
| Aniline                             | --               | --                | --               | --                | < 0.5             | < 0.5             | --                 | --                | --                | < 0.5              |
| Anthracene                          | --               | < 10              | --               | --                | < 0.4             | < 0.4             | --                 | --                | < 1               | < 0.4              |
| Benzidine                           | --               | < 14              | --               | --                | < 2.7             | < 2.7             | --                 | --                | --                | < 2.7              |
| Benzo(a)anthracene                  | --               | < 10              | --               | --                | < 0.5             | < 0.5             | --                 | --                | < 1               | < 0.5              |
| Benzo(a)pyrene                      | --               | < 10              | --               | --                | < 0.1             | < 0.1             | --                 | --                | < 1               | < 0.1              |
| Benzo(b)fluoranthene                | --               | < 10              | --               | --                | < 0.5             | < 0.5             | --                 | --                | < 1               | < 0.5              |
| Benzo(g,h,i)perylene                | --               | < 10              | --               | --                | < 0.3             | < 0.3             | --                 | --                | < 1               | < 0.3              |
| Benzo(k)fluoranthene                | --               | < 10              | --               | --                | < 0.7             | < 0.7             | --                 | --                | < 1               | < 0.7              |
| Benzyl alcohol                      | --               | --                | --               | --                | < 0.5             | < 0.5             | --                 | --                | --                | < 0.5              |
| Bis(2-chloroethoxy)methane          | --               | --                | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| bis(2-Chloroethyl)ether             | --               | < 14              | --               | --                | < 0.5             | < 0.5             | --                 | --                | --                | < 0.5              |
| bis(2-Chloroisopropyl)ether         | --               | < 14              | --               | --                | < 1.9             | < 1.9             | --                 | --                | --                | < 1.9              |
| bis(2-Ethylhexyl) phthalate         | --               | < 14              | --               | --                | < 0.6             | < 0.6             | --                 | --                | --                | < 0.6              |
| 4-Bromophenyl phenyl ether          | --               | --                | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| Butyl benzyl phthalate              | --               | --                | --               | --                | < 0.5             | < 0.5             | --                 | --                | --                | < 0.5              |
| 4-Chloroaniline                     | --               | --                | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| 1-Chloronaphthalene                 | --               | --                | --               | --                | < 0.6             | < 0.6             | --                 | --                | --                | < 0.6              |
| 2-Chloronaphthalene                 | --               | --                | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| 4-Chlorophenyl phenyl ether         | --               | --                | --               | --                | < 0.5             | < 0.5             | --                 | --                | --                | < 0.5              |
| Chrysene                            | --               | < 10              | --               | --                | < 0.7             | < 0.7             | --                 | --                | < 1               | < 0.7              |
| Dibenz(a,j)acridine                 | --               | --                | --               | --                | < 0.5             | < 0.5             | --                 | --                | --                | < 0.5              |
| Dibenzo(a,h)anthracene              | --               | < 10              | --               | --                | < 0.3             | < 0.3             | --                 | --                | < 1               | < 0.3              |
| Dibenzofuran                        | --               | --                | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| 1,2-Dichlorobenzene                 | --               | --                | --               | --                | < 0.3             | < 0.3             | --                 | --                | --                | < 0.3              |
| 1,3-Dichlorobenzene                 | --               | --                | --               | --                | < 0.3             | < 0.3             | --                 | --                | --                | < 0.3              |
| 1,4-Dichlorobenzene                 | --               | --                | --               | --                | < 0.5             | < 0.5             | --                 | --                | --                | < 0.5              |
| 3,3'-Dichlorobenzidine              | --               | < 29              | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| Diethylphthalate                    | --               | < 14              | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| p-Dimethylaminoazobenzene           | --               | --                | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| 7,12-Dimethylbenz(a)anthracene      | --               | --                | --               | --                | < 1.8             | < 1.8             | --                 | --                | --                | < 1.8              |
| alpha, alpha-Dimethylphenethylamine | --               | --                | --               | --                | < 0.1             | < 0.1             | --                 | --                | --                | < 0.1              |
| Dimethyl phthalate                  | --               | < 14              | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| Di-n-butylphthalate                 | --               | < 14              | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| 2,4-Dinitrotoluene                  | --               | < 71              | --               | --                | < 0.5             | < 0.5             | --                 | --                | --                | < 0.5              |
| 2,6-Dinitrotoluene                  | --               | --                | --               | --                | < 0.5             | < 0.5             | --                 | --                | --                | < 0.5              |
| Di-n-octylphthalate                 | --               | --                | --               | --                | < 0.7             | < 0.7             | --                 | --                | --                | < 0.7              |
| Diphenylamine                       | --               | --                | --               | --                | < 0.5             | < 0.5             | --                 | --                | --                | < 0.5              |
| 1,2-Diphenylhydrazine               | --               | --                | --               | --                | < 0.3             | < 0.3             | --                 | --                | --                | < 0.3              |
| Fluoranthene                        | --               | < 10              | --               | --                | < 0.5             | < 0.5             | --                 | --                | < 1               | < 0.5              |
| Fluorene                            | --               | < 10              | --               | --                | < 0.6             | < 0.6             | --                 | --                | 1                 | < 0.6              |
| Hexachlorobenzene                   | --               | < 14              | --               | --                | < 0.5             | < 0.5             | --                 | --                | --                | < 0.5              |
| Hexachlorobutadiene                 | --               | --                | < 1              | --                | < 0.5             | < 0.5             | --                 | < 10              | --                | < 0.5              |
| Hexachlorocyclopentadiene           | --               | < 14              | --               | --                | < 0.6             | < 0.6             | --                 | --                | --                | < 0.6              |
| Hexachloroethane                    | --               | --                | --               | --                | < 0.6             | < 0.6             | --                 | --                | --                | < 0.6              |
| Indeno(1,2,3-cd)pyrene              | --               | < 10              | --               | --                | < 0.5             | < 0.5             | --                 | --                | < 1               | < 0.5              |
| Isophorone                          | --               | < 14              | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| 3-Methylcholanthrene                | --               | --                | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| 2-Methylnaphthalene                 | --               | --                | < 1              | --                | < 0.5             | < 0.5             | --                 | < 10              | < 1               | < 0.5              |
| Naphthalene                         | --               | < 10              | 1.8              | --                | < 0.4             | < 0.4             | --                 | 27.3              | < 1               | < 0.4              |
| 1-Naphthylamine                     | --               | --                | --               | --                | < 1.5             | < 1.5             | --                 | --                | --                | < 1.5              |
| 2-Naphthylamine                     | --               | --                | --               | --                | < 1               | < 1               | --                 | --                | --                | < 1                |
| 2-Nitroaniline                      | --               | --                | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| 3-Nitroaniline                      | --               | --                | --               | --                | < 0.9             | < 0.9             | --                 | --                | --                | < 0.9              |
| 4-Nitroaniline                      | --               | --                | --               | --                | < 0.8             | < 0.8             | --                 | --                | --                | < 0.8              |
| Nitrobenzene                        | --               | < 14              | --               | --                | < 0.5             | < 0.5             | --                 | --                | --                | < 0.5              |
| N-Nitrosodimethylamine              | --               | < 14              | --               | --                | < 1.2             | < 1.2             | --                 | --                | --                | < 1.2              |
| N-Nitroso-di-n-butylamine           | --               | --                | --               | --                | < 1.1             | < 1.1             | --                 | --                | --                | < 1.1              |
| N-Nitrosodiethylamine               | --               | --                | --               | --                | < 10              | < 10              | --                 | --                | --                | < 10               |
| N-Nitrosodiphenylamine              | --               | < 14              | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| N-Nitroso-di-n-propylamine          | --               | --                | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| N-Nitrosopiperidine                 | --               | --                | --               | --                | < 0.8             | < 0.8             | --                 | --                | --                | < 0.8              |
| N-Nitrosopyrrolidine                | --               | --                | --               | --                | < 10              | < 10              | --                 | --                | --                | < 10               |
| Pentachlorobenzene                  | --               | --                | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| Pentachloronitrobenzene             | --               | --                | --               | --                | < 5               | < 5               | --                 | --                | --                | < 5                |
| Phenacetin                          | --               | --                | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| Phenanthrene                        | --               | < 10              | --               | --                | < 0.4             | < 0.4             | --                 | --                | < 1               | < 0.4              |
| 2-Picoline                          | --               | --                | --               | --                | < 7.7             | < 7.7             | --                 | --                | --                | < 7.7              |
| Pronamide                           | --               | --                | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| Pyrene                              | --               | < 10              | --               | --                | < 0.5             | < 0.5             | --                 | --                | < 1               | < 0.5              |
| 1,2,4,5-Tetrachlorobenzene          | --               | --                | --               | --                | < 0.4             | < 0.4             | --                 | --                | --                | < 0.4              |
| 1,2,4-Trichlorobenzene              | --               | --                | --               | --                | < 0.6             | < 0.6             | --                 | --                | --                | < 0.6              |
| 1-Methylnaphthalene                 | --               | --                | < 1              | --                | < 0.3             | < 0.3             | --                 | < 10              | < 1               | 20                 |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

SVOC Semi-Volatile Organic Compound

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

## Appendix C

Historical SVOC Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Parameter                           | Well ID<br>Date Sampled | MW-062<br>9/26/91 | MW-062<br>6/26/98 | MW-063<br>6/25/98 | MW-064<br>6/23/98 | MW-065A<br>6/25/98 | MW-066<br>6/17/98 | MW-067<br>7/7/92 | MW-067<br>6/24/98 | MW-068<br>6/26/98 | MW-069<br>7/18/97 |
|-------------------------------------|-------------------------|-------------------|-------------------|-------------------|-------------------|--------------------|-------------------|------------------|-------------------|-------------------|-------------------|
| Benzoic acid                        | --                      | < 8.5             | < 1.7             | < 1.7             | < 1.7             | < 1.7              | --                | < 1.7            | < 8.5             | --                | --                |
| 4-Chloro-3-methylphenol             | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| 2-Chlorophenol                      | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | --                | < 0.5            | < 3               | --                | --                |
| 2,4-Dichlorophenol                  | --                      | < 20              | < 3.9             | < 3.9             | < 3.9             | < 3.9              | --                | < 3.9            | < 20              | --                | --                |
| 2,6-Dichlorophenol                  | --                      | < 0.5             | < 0.1             | < 0.1             | < 0.1             | < 0.1              | --                | < 0.1            | < 0.5             | --                | --                |
| 2,4-Dimethylphenol                  | --                      | < 3               | < 0.5             | < 0.5             | < 3.1             | < 0.5              | --                | < 0.5            | < 3               | --                | --                |
| 4,6-Dinitro-2-methylphenol          | --                      | < 8               | < 1.6             | < 1.6             | < 1.6             | < 1.6              | --                | < 1.6            | < 8               | --                | --                |
| 2,4-Dinitrophenol                   | --                      | < 17              | < 3.3             | < 3.3             | < 3.3             | < 3.3              | --                | < 3.3            | < 17              | --                | --                |
| 2-Methylphenol                      | --                      | < 2               | < 0.3             | < 0.3             | < 0.3             | < 0.3              | --                | < 0.3            | < 2               | --                | --                |
| 4-Methylphenol                      | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | --                | < 0.5            | < 3               | --                | --                |
| 2-Nitrophenol                       | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| 4-Nitrophenol                       | --                      | < 4               | < 0.7             | < 0.7             | < 0.7             | < 0.7              | --                | < 0.7            | < 4               | --                | --                |
| Pentachlorophenol                   | --                      | < 4               | < 0.7             | < 0.7             | < 0.7             | < 0.7              | --                | < 0.7            | < 4               | --                | --                |
| Phenol                              | < 50                    | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | --                | < 0.5            | < 16.3            | --                | --                |
| 2,3,4,6-Tetrachlorophenol           | --                      | < 3               | < 0.6             | < 0.6             | < 0.6             | < 0.6              | --                | < 0.6            | < 3               | --                | --                |
| 2,4,5-Trichlorophenol               | --                      | < 15              | < 3               | < 3               | < 3               | < 3                | --                | < 3              | < 15              | --                | --                |
| 2,4,6-Trichlorophenol               | --                      | < 2               | < 0.3             | < 0.3             | < 0.3             | < 0.3              | --                | < 0.3            | < 2               | --                | --                |
| Acenaphthene                        | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | < 1               | --                |
| Acenaphthylene                      | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | < 1               | --                |
| Acetophenone                        | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| 4-Aminobiphenyl                     | --                      | < 4               | < 0.7             | < 0.7             | < 0.7             | < 0.7              | --                | < 0.7            | < 4               | --                | --                |
| Aniline                             | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | --                | < 0.5            | < 3               | --                | --                |
| Anthracene                          | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | < 1               | --                |
| Benzidine                           | --                      | < 14              | < 2.7             | < 2.7             | < 2.7             | < 2.7              | --                | < 2.7            | < 14              | --                | --                |
| Benzo(a)anthracene                  | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | --                | < 0.5            | < 3               | < 1               | --                |
| Benzo(a)pyrene                      | --                      | < 0.1             | < 0.1             | < 0.1             | < 0.1             | < 0.1              | --                | < 0.6            | < 9.9             | < 1               | --                |
| Benzo(b)fluoranthene                | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | --                | < 0.5            | < 3               | < 1               | --                |
| Benzo(g,h,i)perylene                | --                      | < 2               | < 0.3             | < 0.3             | < 0.3             | < 0.3              | --                | < 0.3            | < 2               | < 1               | --                |
| Benzo(k)fluoranthene                | --                      | < 4               | < 0.7             | < 0.7             | < 0.7             | < 0.7              | --                | < 0.7            | < 4               | < 1               | --                |
| Benzyl alcohol                      | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | --                | < 0.5            | < 3               | --                | --                |
| Bis(2-chloroethoxy)methane          | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| bis(2-Chloroethyl)ether             | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | --                | < 0.5            | < 3               | --                | --                |
| bis(2-Chloroisopropyl)ether         | --                      | < 9.5             | < 1.9             | < 1.9             | < 1.9             | < 1.9              | --                | < 1.9            | < 9.5             | --                | --                |
| bis(2-Ethylhexyl) phthalate         | --                      | < 3               | < 0.6             | < 4.4             | < 0.8             | < 0.6              | --                | < 41             | < 140             | --                | --                |
| 4-Bromophenyl phenyl ether          | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| Butyl benzyl phthalate              | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | --                | < 0.5            | < 3               | --                | --                |
| 4-Chloroaniline                     | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| 1-Chloronaphthalene                 | --                      | < 3               | < 0.6             | < 0.6             | < 0.6             | < 0.6              | --                | < 0.6            | < 3               | --                | --                |
| 2-Chloronaphthalene                 | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| 4-Chlorophenyl phenyl ether         | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | --                | < 0.5            | < 3               | --                | --                |
| Chrysene                            | --                      | < 4               | < 0.7             | < 0.7             | < 0.7             | < 0.7              | --                | < 0.7            | < 4               | < 1               | --                |
| Dibenz(a,j)acridine                 | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | --                | < 0.5            | < 3               | --                | --                |
| Dibenzo(a,h)anthracene              | --                      | < 2               | < 0.3             | < 0.3             | < 0.3             | < 0.3              | --                | < 0.3            | < 2               | < 1               | --                |
| Dibenzofuran                        | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| 1,2-Dichlorobenzene                 | --                      | < 2               | < 0.3             | < 0.3             | < 0.3             | < 0.3              | --                | < 0.3            | < 2               | --                | --                |
| 1,3-Dichlorobenzene                 | --                      | < 2               | < 0.3             | < 0.3             | < 0.3             | < 0.3              | --                | < 0.3            | < 2               | --                | --                |
| 1,4-Dichlorobenzene                 | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | --                | < 0.5            | < 3               | --                | --                |
| 3,3'-Dichlorobenzidine              | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| Diethylphthalate                    | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| p-Dimethylaminosobenzene            | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| 7,12-Dimethylbenz(a)anthracene      | --                      | < 9               | < 1.8             | < 1.8             | < 1.8             | < 1.8              | --                | < 1.8            | < 9               | --                | --                |
| alpha, alpha-Dimethylphenethylamine | --                      | < 0.5             | < 0.1             | < 0.1             | < 0.1             | < 0.1              | --                | < 0.1            | < 0.5             | --                | --                |
| Dimethyl phthalate                  | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 16             | < 80              | --                | --                |
| Di-n-butylphthalate                 | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| 2,4-Dinitrotoluene                  | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | --                | < 0.5            | < 3               | --                | --                |
| 2,6-Dinitrotoluene                  | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | --                | < 0.5            | < 3               | --                | --                |
| Di-n-octylphthalate                 | --                      | < 4               | < 0.7             | < 0.7             | < 0.7             | < 0.7              | --                | < 0.7            | < 4               | --                | --                |
| Diphenylamine                       | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | --                | < 0.5            | < 3               | --                | --                |
| 1,2-Diphenylhydrazine               | --                      | < 2               | < 0.3             | < 0.3             | < 0.3             | < 0.3              | --                | < 0.3            | < 2               | --                | --                |
| Fluoranthene                        | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | --                | < 0.5            | < 3               | < 1               | --                |
| Fluorene                            | --                      | < 3               | < 0.6             | < 0.6             | < 0.6             | < 0.6              | --                | < 0.6            | < 3               | < 1               | --                |
| Hexachlorobenzene                   | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | --                | < 0.5            | < 3               | --                | --                |
| Hexachlorobutadiene                 | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | < 10              | < 0.5            | < 3               | --                | --                |
| Hexachlorocyclopentadiene           | --                      | < 3               | < 0.6             | < 0.6             | < 0.6             | < 0.6              | --                | < 0.6            | < 3               | --                | --                |
| Hexachloroethane                    | --                      | < 3               | < 0.6             | < 0.6             | < 0.6             | < 0.6              | --                | < 0.6            | < 3               | --                | --                |
| Indeno(1,2,3-cd)pyrene              | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | --                | < 0.5            | < 3               | < 1               | --                |
| Isophorone                          | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| 3-Methylcholanthrene                | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| 2-Methylnaphthalene                 | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | < 10              | < 0.5            | < 3               | < 1               | --                |
| Naphthalene                         | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | < 10              | < 0.4            | < 2               | < 1               | --                |
| 1-Naphthylamine                     | --                      | < 7.5             | < 1.5             | < 1.5             | < 1.5             | < 1.5              | --                | < 1.5            | < 7.5             | --                | --                |
| 2-Naphthylamine                     | --                      | < 5               | < 1               | < 1               | < 1               | < 1                | --                | < 1              | < 5               | --                | --                |
| 2-Nitroaniline                      | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| 3-Nitroaniline                      | --                      | < 5               | < 0.9             | < 0.9             | < 0.9             | < 0.9              | --                | < 0.9            | < 5               | --                | --                |
| 4-Nitroaniline                      | --                      | < 4               | < 0.8             | < 0.8             | < 0.8             | < 0.8              | --                | < 0.8            | < 4               | --                | --                |
| Nitrobenzene                        | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | --                | < 0.5            | < 3               | --                | --                |
| N-Nitrosodimethylamine              | --                      | < 6               | < 1.2             | < 1.2             | < 1.2             | < 1.2              | --                | < 1.2            | < 6               | --                | --                |
| N-Nitroso-di-n-butylamine           | --                      | < 5.5             | < 1.1             | < 1.1             | < 1.1             | < 1.1              | --                | < 1.1            | < 5.5             | --                | --                |
| N-Nitrosodiethylamine               | --                      | < 50              | < 10              | < 10              | < 10              | < 10               | --                | < 10             | < 50              | --                | --                |
| N-Nitrosodiphenylamine              | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| N-Nitroso-di-n-propylamine          | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| N-Nitrosopiperidine                 | --                      | < 4               | < 0.8             | < 0.8             | < 0.8             | < 0.8              | --                | < 0.8            | < 4               | --                | --                |
| N-Nitrosopyrrolidine                | --                      | < 50              | < 10              | < 10              | < 10              | < 10               | --                | < 10             | < 50              | --                | --                |
| Pentachlorobenzene                  | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| Pentachloronitrobenzene             | --                      | < 25              | < 5               | < 5               | < 5               | < 5                | --                | < 5              | < 25              | --                | --                |
| Phenacetin                          | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| Phenanthrene                        | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | < 1               | --                |
| 2-Picoline                          | --                      | < 39              | < 7.7             | < 7.7             | < 7.7             | < 7.7              | --                | < 7.7            | < 39              | --                | --                |
| Pronamide                           | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| Pyrene                              | --                      | < 3               | < 0.5             | < 0.5             | < 0.5             | < 0.5              | --                | < 0.5            | < 3               | < 1               | --                |
| 1,2,4,5-Tetrachlorobenzene          | --                      | < 2               | < 0.4             | < 0.4             | < 0.4             | < 0.4              | --                | < 0.4            | < 2               | --                | --                |
| 1,2,4-Trichlorobenzene              | --                      | < 3               | < 0.6             | < 0.6             | < 0.6             | < 0.6              | --                | < 0.6            | < 3               | --                | --                |
| 1-Methylnaphthalene                 | --                      | < 41              | < 0.3             | < 0.3             | < 0.3             | < 0.3              | < 10              | < 0.3            | < 120             | < 1               | --                |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

SVOC Semi-Volatile Organic Compound

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

## Appendix C

Historical SVOC Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Well ID<br>Date Sampled             | MW-069<br>6/29/98 | MW-070<br>6/16/98 | MW-071<br>6/19/98 | MW-072<br>6/30/98 | MW-073<br>6/30/98 | MW-074<br>7/18/97 | MW-074<br>6/24/98 | MW-075<br>6/30/98 | MW-076<br>6/29/98 | MW-078<br>6/19/98 |
|-------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Parameter                           |                   |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| Benzoic acid                        | < 8.5             | < 1.7             | < 1.7             | < 3.4             | < 1.7             | --                | < 8.5             | < 8.5             | < 8.5             | < 1.7             |
| 4-Chloro-3-methylphenol             | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| 2-Chlorophenol                      | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | --                | < 3               | < 3               | < 3               | < 0.5             |
| 2,4-Dichlorophenol                  | < 20              | < 3.9             | < 3.9             | < 7.8             | < 3.9             | --                | < 20              | < 20              | < 20              | < 3.9             |
| 2,6-Dichlorophenol                  | < 0.5             | < 0.1             | < 0.1             | < 0.2             | < 0.1             | --                | < 0.5             | < 0.5             | < 0.5             | < 0.1             |
| 2,4-Dimethylphenol                  | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | --                | < 3               | 10                | < 3               | < 0.5             |
| 4,6-Dinitro-2-methylphenol          | < 8               | < 1.6             | < 1.6             | < 3.2             | < 1.6             | --                | < 8               | < 8               | < 8               | < 1.6             |
| 2,4-Dinitrophenol                   | < 17              | < 3.3             | < 3.3             | < 6.6             | < 3.3             | --                | < 17              | < 17              | < 17              | < 3.3             |
| 2-Methylphenol                      | < 2               | < 0.3             | < 0.3             | < 0.6             | < 0.3             | --                | < 2               | < 2               | < 2               | < 0.3             |
| 4-Methylphenol                      | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | --                | < 3               | < 3               | < 3               | < 0.5             |
| 2-Nitrophenol                       | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| 4-Nitrophenol                       | < 4               | < 0.7             | < 0.7             | < 1               | < 0.7             | --                | < 4               | < 4               | < 4               | < 0.7             |
| Pentachlorophenol                   | < 4               | < 0.7             | < 0.7             | < 1               | < 0.7             | --                | < 4               | < 4               | < 4               | < 0.7             |
| Phenol                              | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | --                | < 3               | 51                | < 3               | < 0.5             |
| 2,3,4,5-Tetrachlorophenol           | < 3               | < 0.6             | < 0.6             | < 1               | < 0.6             | --                | < 3               | < 3               | < 3               | < 0.6             |
| 2,4,5-Trichlorophenol               | < 15              | < 3               | < 3               | < 6               | < 3               | --                | < 15              | < 15              | < 15              | < 3               |
| 2,4,6-Trichlorophenol               | < 2               | < 0.3             | < 0.3             | < 0.6             | < 0.3             | --                | < 2               | < 2               | < 2               | < 0.3             |
| Acenaphthene                        | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | < 1               | < 2               | < 2               | < 2               | < 0.4             |
| Acenaphthylene                      | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | 2.5               | < 2               | < 2               | < 2               | < 0.4             |
| Acetophenone                        | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| 4-Aminobiphenyl                     | < 4               | < 0.7             | < 0.7             | < 1               | < 0.7             | --                | < 4               | < 4               | < 4               | < 0.7             |
| Aniline                             | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | --                | < 3               | < 3               | < 3               | < 0.5             |
| Anthracene                          | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | < 1               | < 2               | < 2               | < 2               | < 0.4             |
| Benidine                            | < 14              | < 2.7             | < 2.7             | < 5.4             | < 2.7             | --                | < 14              | < 14              | < 14              | < 2.7             |
| Benzo(a)anthracene                  | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | 1.5               | < 3               | < 3               | < 3               | < 0.5             |
| Benzo(a)pyrene                      | < 0.1             | < 0.1             | < 0.1             | 0.7               | 0.3               | < 1               | < 0.7             | 1.2               | 7.6               | < 0.1             |
| Benzo(b)fluoranthene                | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | < 1               | < 3               | < 3               | < 3               | < 0.5             |
| Benzo(g,h,i)perylene                | < 2               | < 0.3             | < 0.3             | < 0.6             | < 0.3             | < 1               | < 2               | < 2               | < 2               | < 0.3             |
| Benzo(k)fluoranthene                | < 4               | < 0.7             | < 0.7             | < 1               | < 0.7             | < 1               | < 4               | < 4               | < 4               | < 0.7             |
| Benzyl alcohol                      | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | --                | < 3               | < 3               | < 3               | < 0.5             |
| Bis(2-chloroethoxy)methane          | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| bis(2-Chloroethyl)ether             | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | --                | < 3               | < 3               | < 3               | < 0.5             |
| bis(2-Chloroisopropyl)ether         | 9.5               | < 1.9             | < 1.9             | 3.8               | 1.9               | --                | 9.5               | 9.5               | 9.5               | < 1.9             |
| bis(2-Ethylhexyl) phthalate         | 9.2               | < 0.6             | < 0.6             | 11                | 1.7               | --                | 3                 | 26                | 3                 | < 0.6             |
| 4-Bromophenyl phenyl ether          | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| Butyl benzyl phthalate              | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | --                | < 3               | < 3               | < 3               | < 0.5             |
| 4-Chloroaniline                     | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| 1-Chloronaphthalene                 | < 3               | < 0.6             | < 0.6             | < 1               | < 0.6             | --                | < 3               | < 3               | < 3               | < 0.6             |
| 2-Chloronaphthalene                 | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| 4-Chlorophenyl phenyl ether         | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | --                | < 3               | < 3               | < 3               | < 0.5             |
| Chrysene                            | < 4               | < 0.7             | < 0.7             | < 1               | < 0.7             | < 1               | < 4               | < 4               | < 4               | < 0.7             |
| Dibenz(a,j)acridine                 | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | --                | < 3               | < 3               | < 3               | < 0.5             |
| Dibenzo(a,h)anthracene              | < 2               | < 0.3             | < 0.3             | < 0.6             | < 0.3             | < 1               | < 2               | < 2               | < 2               | < 0.3             |
| Dibenzofuran                        | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| 1,2-Dichlorobenzene                 | < 2               | < 0.3             | < 0.3             | < 0.6             | < 0.3             | --                | < 2               | < 2               | < 2               | < 0.3             |
| 1,3-Dichlorobenzene                 | < 2               | < 0.3             | < 0.3             | < 0.6             | < 0.3             | --                | < 2               | < 2               | < 2               | < 0.3             |
| 1,4-Dichlorobenzene                 | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | --                | < 3               | < 3               | < 3               | < 0.5             |
| 3,3'-Dichlorobenzidine              | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| Diethylphthalate                    | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| p-Dimethylaminoazobenzene           | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| 7,12-Dimethylbenz(a)anthracene      | < 9               | < 1.8             | < 1.8             | < 3.6             | < 1.8             | --                | < 9               | < 9               | < 9               | < 1.8             |
| alpha, alpha-Dimethylphenethylamine | 0.5               | < 0.1             | < 0.1             | < 0.2             | < 0.1             | --                | < 0.5             | < 0.5             | < 0.5             | < 0.1             |
| Dimethyl phthalate                  | < 2               | < 0.4             | < 0.4             | 3.2               | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| Di-n-butylphthalate                 | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| 2,4-Dinitrotoluene                  | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | --                | < 3               | < 3               | < 3               | < 0.5             |
| 2,6-Dinitrotoluene                  | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | --                | < 3               | < 3               | < 3               | < 0.5             |
| Di-n-octylphthalate                 | < 4               | < 0.7             | < 0.7             | < 1               | < 0.7             | --                | < 4               | < 4               | < 4               | < 0.7             |
| Diphenylamine                       | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | --                | < 3               | < 3               | < 3               | < 0.5             |
| 1,2-Diphenylhydrazine               | < 2               | < 0.3             | < 0.3             | < 0.6             | < 0.3             | --                | < 2               | < 2               | < 2               | < 0.3             |
| Fluoranthene                        | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | 23                | < 3               | < 3               | < 3               | < 0.5             |
| Fluorene                            | < 3               | < 0.6             | < 0.6             | < 1               | 2.8               | 3.8               | < 3               | 3                 | < 3               | < 0.6             |
| Hexachlorobenzene                   | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | --                | < 3               | < 3               | < 3               | < 0.5             |
| Hexachlorobutadiene                 | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | --                | < 3               | < 3               | < 3               | < 0.5             |
| Hexachlorocyclopentadiene           | < 3               | < 0.6             | < 0.6             | < 1               | < 0.6             | --                | < 3               | < 3               | < 3               | < 0.6             |
| Hexachloroethane                    | < 3               | < 0.6             | < 0.6             | < 1               | < 0.6             | --                | < 3               | < 3               | < 3               | < 0.6             |
| Indeno(1,2,3-cd)pyrene              | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | < 1               | < 3               | < 3               | < 3               | < 0.5             |
| Isophorone                          | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| 3-Methylanthracene                  | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| 2-Methylnaphthalene                 | 30                | < 0.5             | < 0.5             | 11                | < 0.5             | < 1               | 18                | 34                | < 3               | < 0.5             |
| Naphthalene                         | 12                | < 0.4             | < 0.4             | 5.3               | < 0.4             | 8.4               | < 2               | 12                | < 2               | < 0.4             |
| 1-Naphthylamine                     | 7.5               | < 1.5             | < 1.5             | < 3               | < 1.5             | --                | < 7.5             | < 7.5             | < 7.5             | < 1.5             |
| 2-Naphthylamine                     | < 5               | < 1               | < 1               | < 2               | < 1               | --                | < 5               | < 5               | < 5               | < 1               |
| 2-Nitroaniline                      | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| 3-Nitroaniline                      | < 5               | < 0.9             | < 0.9             | < 2               | < 0.9             | --                | < 5               | < 5               | < 5               | < 0.9             |
| 4-Nitroaniline                      | < 4               | < 0.8             | < 0.8             | < 2               | < 0.8             | --                | < 4               | < 4               | < 4               | < 0.8             |
| Nitrobenzene                        | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | --                | < 3               | < 3               | < 3               | < 0.5             |
| N-Nitrosodimethylamine              | < 6               | < 1.2             | < 1.2             | < 2.4             | < 1.2             | --                | < 6               | < 6               | < 6               | < 1.2             |
| N-Nitroso-di-n-butylamine           | < 5.5             | < 1.1             | < 1.1             | < 2.2             | < 1.1             | --                | < 5.5             | < 5.5             | < 5.5             | < 1.1             |
| N-Nitrosodiethylamine               | < 50              | < 10              | < 10              | < 20              | < 10              | --                | < 50              | < 50              | < 50              | < 10              |
| N-Nitrosodiphenylamine              | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| N-Nitroso-di-n-propylamine          | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| N-Nitrosopiperidine                 | < 4               | < 0.8             | < 0.8             | < 2               | < 0.8             | --                | < 4               | < 4               | < 4               | < 0.8             |
| N-Nitrosopyrrolidine                | < 50              | < 10              | < 10              | < 20              | < 10              | --                | < 50              | < 50              | < 50              | < 10              |
| Pentachlorobenzene                  | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| Pentachloronitrobenzene             | < 25              | < 5               | < 5               | < 10              | < 5               | --                | < 25              | < 25              | < 25              | < 5               |
| Phenacetin                          | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| Phenanthrene                        | < 2               | < 0.4             | < 0.4             | < 0.8             | 1.3               | 5.6               | < 2               | < 2               | < 2               | < 0.4             |
| 2-Picoline                          | < 39              | < 7.7             | < 7.7             | < 15              | < 7.7             | --                | < 39              | < 39              | < 39              | < 7.7             |
| Pronamide                           | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| Pyrene                              | < 3               | < 0.5             | < 0.5             | < 1               | < 0.5             | 12                | < 3               | < 3               | < 3               | < 0.5             |
| 1,2,4,5-Tetrachlorobenzene          | < 2               | < 0.4             | < 0.4             | < 0.8             | < 0.4             | --                | < 2               | < 2               | < 2               | < 0.4             |
| 1,2,4-Trichlorobenzene              | < 3               | < 0.6             | < 0.6             | < 1               | < 0.6             | --                | < 3               | < 3               | < 3               | < 0.6             |
| 1-Methylnaphthalene                 | 300               | < 0.3             | < 0.3             | 57                | 23                | < 1               | 140               | 150               | < 0.3             | < 0.3             |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

SVOC Semi-Volatile Organic Compound

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

## Appendix C

Historical SVOC Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Well ID<br>Date Sampled             | MW-079<br>7/17/97 | MW-079<br>6/18/98 | MW-081<br>6/29/98 | MW-082<br>6/25/98 | MW-083<br>6/25/98 | MW-084<br>6/23/98 | MW-085<br>6/23/98 | MW-086<br>6/26/98 | MW-087<br>8/22/96 | MW-087<br>2/9/97 |
|-------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|
| Parameter                           |                   |                   |                   |                   |                   |                   |                   |                   |                   |                  |
| Benzoic acid                        | --                | < 1.7             | < 1.7             | < 1.7             | < 1.7             | < 1.7             | < 1.7             | < 8.5             | --                | --               |
| 4-Chloro-3-methylphenol             | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| 2-Chlorophenol                      | --                | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | --                | --               |
| 2,4-Dichlorophenol                  | --                | < 3.9             | < 3.9             | < 3.9             | < 3.9             | < 3.9             | < 3.9             | < 20              | --                | --               |
| 2,6-Dichlorophenol                  | --                | < 0.1             | < 0.1             | < 0.1             | < 0.1             | < 0.1             | < 0.1             | < 0.5             | --                | --               |
| 2,4-Dimethylphenol                  | --                | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 57              | --                | --               |
| 4,6-Dinitro-2-methylphenol          | --                | < 1.6             | < 1.6             | < 1.6             | < 1.6             | < 1.6             | < 1.6             | < 8               | --                | --               |
| 2,4-Dinitrophenol                   | --                | < 3.3             | < 3.3             | < 3.3             | < 3.3             | < 3.3             | < 3.3             | < 17              | --                | --               |
| 2-Methylphenol                      | --                | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 2               | --                | --               |
| 4-Methylphenol                      | --                | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | --                | --               |
| 2-Nitrophenol                       | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| 4-Nitrophenol                       | --                | < 0.7             | < 0.7             | < 0.7             | < 0.7             | < 0.7             | < 0.7             | < 4               | --                | --               |
| Pentachlorophenol                   | --                | < 0.7             | < 0.7             | < 0.7             | < 0.7             | < 0.7             | < 0.7             | < 4               | --                | --               |
| Phenol                              | --                | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | --                | --               |
| 2,3,4,6-Tetrachlorophenol           | --                | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 3               | --                | --               |
| 2,4,5-Trichlorophenol               | --                | < 3               | < 3               | < 3               | < 3               | < 3               | < 3               | < 15              | --                | --               |
| 2,4,6-Trichlorophenol               | --                | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 2               | --                | --               |
| Acenaphthene                        | < 1               | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | < 1               | < 1              |
| Acenaphthylene                      | < 1               | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | < 1              |
| Acetophenone                        | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| 4-Aminobiphenyl                     | --                | < 0.7             | < 0.7             | < 0.7             | < 0.7             | < 0.7             | < 0.7             | < 4               | --                | --               |
| Aniline                             | --                | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | --                | --               |
| Anthracene                          | < 1               | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | < 1               | < 1              |
| Benidine                            | --                | < 2.7             | < 2.7             | < 2.7             | < 2.7             | < 2.7             | < 2.7             | < 14              | --                | --               |
| Benzo(a)anthracene                  | < 1               | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | < 1               | < 1              |
| Benzo(a)pyrene                      | < 1               | < 0.1             | < 0.1             | < 0.1             | < 0.1             | < 0.1             | < 0.1             | < 0.1             | < 1               | < 1              |
| Benzo(b)fluoranthene                | < 1               | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | < 1               | < 1              |
| Benzo(g,h,i)perylene                | < 1               | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 2               | < 1               | < 1              |
| Benzo(k)fluoranthene                | < 1               | < 0.7             | < 0.7             | < 0.7             | < 0.7             | < 0.7             | < 0.7             | < 4               | < 1               | < 1              |
| Benzyl alcohol                      | --                | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | --                | --               |
| Bis(2-chloroethoxy)methane          | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| bis(2-Chloroethyl)ether             | --                | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | --                | --               |
| bis(2-Chloroisopropyl)ether         | --                | < 1.9             | < 1.9             | < 1.9             | < 1.9             | < 1.9             | < 1.9             | < 9.5             | --                | --               |
| bis(2-Ethylhexyl) phthalate         | --                | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 3               | --                | --               |
| 4-Bromophenyl phenyl ether          | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| Butyl benzyl phthalate              | --                | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | --                | --               |
| 4-Chloroaniline                     | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| 1-Chloronaphthalene                 | --                | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 3               | --                | --               |
| 2-Chloronaphthalene                 | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| 4-Chlorophenyl phenyl ether         | --                | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | --                | --               |
| Chrysene                            | < 1               | < 0.7             | < 0.7             | < 0.7             | < 0.7             | < 0.7             | < 0.7             | < 4               | < 1               | < 1              |
| Dibenz(a,j)acridine                 | --                | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | --                | --               |
| Dibenzo(a,h)anthracene              | < 1               | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 2               | < 1               | < 1              |
| Dibenzofuran                        | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| 1,2-Dichlorobenzene                 | --                | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 2               | --                | --               |
| 1,3-Dichlorobenzene                 | --                | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 2               | --                | --               |
| 1,4-Dichlorobenzene                 | --                | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | --                | --               |
| 3,3'-Dichlorobenzidine              | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| Diethylphthalate                    | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| p-Dimethylaminobenzene              | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| 7,12-Dimethylbenz(a)anthracene      | --                | < 1.8             | < 1.8             | < 1.8             | < 1.8             | < 1.8             | < 1.8             | < 9               | --                | --               |
| alpha, alpha-Dimethylphenethylamine | --                | < 0.1             | < 0.1             | < 0.1             | < 0.1             | < 0.1             | < 0.1             | < 0.5             | --                | --               |
| Dimethyl phthalate                  | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| Di-n-butylphthalate                 | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| 2,4-Dinitrotoluene                  | --                | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | --                | --               |
| 2,6-Dinitrotoluene                  | --                | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | --                | --               |
| Di-n-octylphthalate                 | --                | < 0.7             | < 0.7             | < 0.7             | < 0.7             | < 0.7             | < 0.7             | < 4               | --                | --               |
| Diphenylamine                       | --                | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | --                | --               |
| 1,2-Diphenylhydrazine               | --                | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 2               | --                | --               |
| Fluoranthene                        | < 1               | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | < 1               | < 1              |
| Fluorene                            | < 1               | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 3               | < 1               | < 1              |
| Hexachlorobenzene                   | --                | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | --                | --               |
| Hexachlorobutadiene                 | --                | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | --                | --               |
| Hexachlorocyclopentadiene           | --                | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 3               | --                | --               |
| Hexachloroethane                    | --                | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 3               | --                | --               |
| Indeno(1,2,3-cd)pyrene              | < 1               | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | < 1               | < 1              |
| Isophorone                          | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| 3-Methylcholanthrene                | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| 2-Methylnaphthalene                 | < 1               | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 2               | < 1               | < 1              |
| Naphthalene                         | < 1               | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | < 1               | < 1              |
| 1-Naphthylamine                     | --                | < 1.5             | < 1.5             | < 1.5             | < 1.5             | < 1.5             | < 1.5             | < 7.5             | --                | --               |
| 2-Naphthylamine                     | --                | < 1               | < 1               | < 1               | < 1               | < 1               | < 1               | < 5               | --                | --               |
| 2-Nitroaniline                      | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| 3-Nitroaniline                      | --                | < 0.9             | < 0.9             | < 0.9             | < 0.9             | < 0.9             | < 0.9             | < 5               | --                | --               |
| 4-Nitroaniline                      | --                | < 0.8             | < 0.8             | < 0.8             | < 0.8             | < 0.8             | < 0.8             | < 4               | --                | --               |
| Nitrobenzene                        | --                | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | --                | --               |
| N-Nitrosodimethylamine              | --                | < 1.2             | < 1.2             | < 1.2             | < 1.2             | < 1.2             | < 1.2             | < 6               | --                | --               |
| N-Nitroso-di-n-butylamine           | --                | < 1.1             | < 1.1             | < 1.1             | < 1.1             | < 1.1             | < 1.1             | < 5.5             | --                | --               |
| N-Nitrosodiethylamine               | --                | < 10              | < 10              | < 10              | < 10              | < 10              | < 10              | < 50              | --                | --               |
| N-Nitrosodiphenylamine              | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| N-Nitroso-di-n-propylamine          | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| N-Nitrosopiperidine                 | --                | < 0.8             | < 0.8             | < 0.8             | < 0.8             | < 0.8             | < 0.8             | < 4               | --                | --               |
| N-Nitrosopyrrolidine                | --                | < 10              | < 10              | < 10              | < 10              | < 10              | < 10              | < 50              | --                | --               |
| Pentachlorobenzene                  | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| Pentachloronitrobenzene             | --                | < 5               | < 5               | < 5               | < 5               | < 5               | < 5               | < 25              | --                | --               |
| Phenacetin                          | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| Phenanthrene                        | < 1               | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | < 1               | < 1              |
| 2-Picoline                          | --                | < 7.7             | < 7.7             | < 7.7             | < 7.7             | < 7.7             | < 7.7             | < 39              | --                | --               |
| Pronamide                           | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| Pyrene                              | < 1               | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 0.5             | < 3               | < 1               | < 1              |
| 1,2,4,5-Tetrachlorobenzene          | --                | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 0.4             | < 2               | --                | --               |
| 1,2,4-Trichlorobenzene              | < 1               | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 0.6             | < 3               | < 1               | < 1              |
| 1-Methylnaphthalene                 | < 1               | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 0.3             | < 2               | < 1               | < 1              |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

SVOC Semi-Volatile Organic Compound

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

## Appendix C

Historical SVOC Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Parameter                           | Well ID<br>Date Sampled | MW-087<br>6/19/98 | MW-087A<br>2/9/97 | MW-087A<br>6/19/98 | MW-088<br>8/22/96 | MW-088<br>2/5/97 | MW-088<br>6/18/98 | MW-089<br>8/22/96 | MW-089<br>2/5/97 | MW-089<br>6/17/98 | MW-090<br>2/10/97 |
|-------------------------------------|-------------------------|-------------------|-------------------|--------------------|-------------------|------------------|-------------------|-------------------|------------------|-------------------|-------------------|
| Benzoic acid                        |                         | < 1.7             | --                | < 1.7              | --                | --               | < 1.7             | --                | --               | < 1.7             | --                |
| 4-Chloro-3-methylphenol             |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| 2-Chlorophenol                      |                         | < 0.5             | --                | < 0.5              | --                | --               | < 0.5             | --                | --               | < 0.5             | --                |
| 2,4-Dichlorophenol                  |                         | < 3.9             | --                | < 3.9              | --                | --               | < 3.9             | --                | --               | < 3.9             | --                |
| 2,6-Dichlorophenol                  |                         | < 0.1             | --                | < 0.1              | --                | --               | < 0.1             | --                | --               | < 0.1             | --                |
| 2,4-Dimethylphenol                  |                         | < 0.5             | --                | < 0.5              | --                | --               | < 0.5             | --                | --               | < 0.5             | --                |
| 4,6-Dinitro-2-methylphenol          |                         | < 1.6             | --                | < 1.6              | --                | --               | < 1.6             | --                | --               | < 1.6             | --                |
| 2,4-Dinitrophenol                   |                         | < 3.3             | --                | < 3.3              | --                | --               | < 3.3             | --                | --               | < 3.3             | --                |
| 2-Methylphenol                      |                         | < 0.3             | --                | < 0.3              | --                | --               | < 0.3             | --                | --               | < 0.3             | --                |
| 4-Methylphenol                      |                         | < 0.5             | --                | < 0.5              | --                | --               | < 0.5             | --                | --               | < 0.5             | --                |
| 2-Nitrophenol                       |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| 4-Nitrophenol                       |                         | < 0.7             | --                | < 0.7              | --                | --               | < 0.7             | --                | --               | < 0.7             | --                |
| Pentachlorophenol                   |                         | < 0.7             | --                | < 0.7              | --                | --               | < 0.7             | --                | --               | < 0.7             | --                |
| Phenol                              |                         | < 0.5             | --                | < 0.5              | --                | --               | < 0.5             | --                | --               | < 0.5             | --                |
| 2,3,4,6-Tetrachlorophenol           |                         | < 0.6             | --                | < 0.6              | --                | --               | < 0.6             | --                | --               | < 0.6             | --                |
| 2,4,5-Trichlorophenol               |                         | < 3               | --                | < 3                | --                | --               | < 3               | --                | --               | < 3               | --                |
| 2,4,6-Trichlorophenol               |                         | < 0.3             | --                | < 0.3              | --                | --               | < 0.3             | --                | --               | < 0.3             | --                |
| Acenaphthene                        |                         | < 0.4             | 19                | < 0.4              | < 1               | < 1              | < 0.4             | < 1               | < 1              | < 0.4             | < 1               |
| Acenaphthylene                      |                         | < 0.4             | --                | < 0.4              | --                | < 1              | < 0.4             | --                | < 1              | < 0.4             | < 1               |
| Acetophenone                        |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| 4-Aminobiphenyl                     |                         | < 0.7             | --                | < 0.7              | --                | --               | < 0.7             | --                | --               | < 0.7             | --                |
| Aniline                             |                         | < 0.5             | --                | < 0.5              | --                | --               | < 0.5             | --                | --               | < 0.5             | --                |
| Anthracene                          |                         | < 0.4             | < 1               | < 0.4              | < 1               | < 1              | < 0.4             | < 1               | < 1              | < 0.4             | < 1               |
| Benidine                            |                         | < 2.7             | --                | < 2.7              | --                | --               | < 2.7             | --                | --               | < 2.7             | --                |
| Benzo(a)anthracene                  |                         | < 0.5             | < 1               | < 0.5              | < 1               | < 1              | < 0.5             | < 1               | < 1              | < 0.5             | < 1               |
| Benzo(a)pyrene                      |                         | < 0.1             | < 1               | < 0.1              | < 1               | < 1              | < 0.1             | < 1               | < 1              | < 0.1             | < 1               |
| Benzo(b)fluoranthene                |                         | < 0.5             | < 1               | < 0.5              | < 1               | < 1              | < 0.5             | < 1               | < 1              | < 0.5             | < 1               |
| Benzo(g,h,i)perylene                |                         | < 0.3             | < 1               | < 0.3              | < 1               | < 1              | < 0.3             | < 1               | < 1              | < 0.3             | < 1               |
| Benzo(k)fluoranthene                |                         | < 0.7             | < 1               | < 0.7              | < 1               | < 1              | < 0.7             | < 1               | < 1              | < 0.7             | < 1               |
| Benzyl alcohol                      |                         | < 0.5             | --                | < 0.5              | --                | --               | < 0.5             | --                | --               | < 0.5             | --                |
| Bis(2-chloroethoxy)methane          |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| bis(2-Chloroethoxy)ether            |                         | < 0.5             | --                | < 0.5              | --                | --               | < 0.5             | --                | --               | < 0.5             | --                |
| bis(2-Chloroisopropyl)ether         |                         | < 1.9             | --                | < 1.9              | --                | --               | < 1.9             | --                | --               | < 1.9             | --                |
| bis(2-Ethylhexyl) phthalate         |                         | < 0.6             | --                | < 0.6              | --                | --               | < 0.6             | --                | --               | < 0.6             | --                |
| 4-Bromophenyl phenyl ether          |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| Butyl benzyl phthalate              |                         | < 0.5             | --                | < 0.5              | --                | --               | < 0.5             | --                | --               | < 0.5             | --                |
| 4-Chloroaniline                     |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| 1-Chloronaphthalene                 |                         | < 0.6             | --                | < 0.6              | --                | --               | < 0.6             | --                | --               | < 0.6             | --                |
| 2-Chloronaphthalene                 |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| 4-Chlorophenyl phenyl ether         |                         | < 0.5             | --                | < 0.5              | --                | --               | < 0.5             | --                | --               | < 0.5             | --                |
| Chrysene                            |                         | < 0.7             | < 1               | < 0.7              | < 1               | < 1              | < 0.7             | < 1               | < 1              | < 0.7             | < 1               |
| Dibenz(a,j)acridine                 |                         | < 0.5             | --                | < 0.5              | --                | --               | < 0.5             | --                | --               | < 0.5             | --                |
| Dibenzo(a,h)anthracene              |                         | < 0.3             | < 1               | < 0.3              | < 1               | < 1              | < 0.3             | < 1               | < 1              | < 0.3             | < 1               |
| Dibenzofuran                        |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| 1,2-Dichlorobenzene                 |                         | < 0.3             | --                | < 0.3              | --                | --               | < 0.3             | --                | --               | < 0.3             | --                |
| 1,3-Dichlorobenzene                 |                         | < 0.3             | --                | < 0.3              | --                | --               | < 0.3             | --                | --               | < 0.3             | --                |
| 1,4-Dichlorobenzene                 |                         | < 0.5             | --                | < 0.5              | --                | --               | < 0.5             | --                | --               | < 0.5             | --                |
| 3,3'-Dichlorobenzidine              |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| Diethylphthalate                    |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| p-Dimethylaminoazobenzene           |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| 7,12-Dimethylbenz(a)anthracene      |                         | < 1.8             | --                | < 1.8              | --                | --               | < 1.8             | --                | --               | < 1.8             | --                |
| alpha, alpha-Dimethylphenethylamine |                         | < 0.1             | --                | < 0.1              | --                | --               | < 0.1             | --                | --               | < 0.1             | --                |
| Dimethyl phthalate                  |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| Di-n-butylphthalate                 |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| 2,4-Dinitrotoluene                  |                         | < 0.5             | --                | < 0.5              | --                | --               | < 0.5             | --                | --               | < 0.5             | --                |
| 2,6-Dinitrotoluene                  |                         | < 0.5             | --                | < 0.5              | --                | --               | < 0.5             | --                | --               | < 0.5             | --                |
| Di-n-octylphthalate                 |                         | < 0.7             | --                | < 0.7              | --                | --               | < 0.7             | --                | --               | < 0.7             | --                |
| Diphenylamine                       |                         | < 0.5             | --                | < 0.5              | --                | --               | < 0.5             | --                | --               | < 0.5             | --                |
| 1,2-Diphenylhydrazine               |                         | < 0.3             | --                | < 0.3              | --                | --               | < 0.3             | --                | --               | < 0.3             | --                |
| Fluoranthene                        |                         | < 0.5             | < 1               | < 0.5              | < 1               | < 1              | < 0.5             | < 1               | < 1              | < 0.5             | < 1               |
| Fluorene                            |                         | < 0.6             | < 1               | < 0.6              | < 1               | 1                | < 0.6             | 1                 | 1                | < 0.6             | 1                 |
| Hexachlorobenzene                   |                         | < 0.5             | --                | < 0.5              | --                | --               | < 0.5             | --                | --               | < 0.5             | --                |
| Hexachlorobutadiene                 |                         | < 0.5             | --                | < 0.5              | --                | --               | < 0.5             | --                | --               | < 0.5             | --                |
| Hexachlorocyclopentadiene           |                         | < 0.6             | --                | < 0.6              | --                | --               | < 0.6             | --                | --               | < 0.6             | --                |
| Hexachloroethane                    |                         | < 0.6             | --                | < 0.6              | --                | --               | < 0.6             | --                | --               | < 0.6             | --                |
| Indeno(1,2,3-cd)pyrene              |                         | < 0.5             | < 1               | < 0.5              | < 1               | < 1              | < 0.5             | < 1               | < 1              | < 0.5             | < 1               |
| Isophorone                          |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| 3-Methylcholanthrene                |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| 2-Methylnaphthalene                 |                         | < 0.5             | < 1               | < 0.5              | < 1               | < 1              | < 0.5             | < 1               | < 1              | < 0.5             | < 1               |
| Naphthalene                         |                         | < 0.4             | < 1               | < 0.4              | < 1               | 1                | < 0.4             | < 1               | < 1              | < 0.4             | < 1               |
| 1-Naphthylamine                     |                         | < 1.5             | --                | < 1.5              | --                | --               | < 1.5             | --                | --               | < 1.5             | --                |
| 2-Naphthylamine                     |                         | < 1               | --                | < 1                | --                | --               | < 1               | --                | --               | < 1               | --                |
| 2-Nitroaniline                      |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| 3-Nitroaniline                      |                         | < 0.9             | --                | < 0.9              | --                | --               | < 0.9             | --                | --               | < 0.9             | --                |
| 4-Nitroaniline                      |                         | < 0.8             | --                | < 0.8              | --                | --               | < 0.8             | --                | --               | < 0.8             | --                |
| Nitrobenzene                        |                         | < 0.5             | --                | < 0.5              | --                | --               | < 0.5             | --                | --               | < 0.5             | --                |
| N-Nitrosodimethylamine              |                         | < 1.2             | --                | < 1.2              | --                | --               | < 1.2             | --                | --               | < 1.2             | --                |
| N-Nitroso-di-n-butylamine           |                         | < 1.1             | --                | < 1.1              | --                | --               | < 1.1             | --                | --               | < 1.1             | --                |
| N-Nitrosodiethylamine               |                         | < 10              | --                | < 10               | --                | --               | < 10              | --                | --               | < 10              | --                |
| N-Nitrosodiphenylamine              |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| N-Nitroso-di-n-propylamine          |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| N-Nitrosopiperidine                 |                         | < 0.8             | --                | < 0.8              | --                | --               | < 0.8             | --                | --               | < 0.8             | --                |
| N-Nitrosopyrrolidine                |                         | < 10              | --                | < 10               | --                | --               | < 10              | --                | --               | < 10              | --                |
| Pentachlorobenzene                  |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| Pentachloronitrobenzene             |                         | < 5               | --                | < 5                | --                | --               | < 5               | --                | --               | < 5               | --                |
| Phenacetin                          |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| Phenanthrene                        |                         | < 0.4             | < 1               | < 0.4              | < 1               | < 1              | < 0.4             | < 1               | < 1              | < 0.4             | < 1               |
| 2-Picoline                          |                         | < 7.7             | --                | < 7.7              | --                | --               | < 7.7             | --                | --               | < 7.7             | --                |
| Pronamide                           |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| Pyrene                              |                         | < 0.5             | < 1               | < 0.5              | < 1               | < 1              | < 0.5             | < 1               | < 1              | < 0.5             | < 1               |
| 1,2,4,5-Tetrachlorobenzene          |                         | < 0.4             | --                | < 0.4              | --                | --               | < 0.4             | --                | --               | < 0.4             | --                |
| 1,2,4-Trichlorobenzene              |                         | < 0.6             | --                | < 0.6              | --                | --               | < 0.6             | --                | --               | < 0.6             | --                |
| 1-Methylnaphthalene                 |                         | < 0.3             | < 1               | < 0.3              | < 1               | < 1              | < 0.3             | < 1               | < 1              | < 0.3             | < 1               |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

SVOC Semi-Volatile Organic Compound

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

## Appendix C

Historical SVOC Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Parameter                           | Well ID<br>Date Sampled | MW-090<br>6/17/98 | MW-091<br>2/11/97 | MW-094<br>6/26/98 | MW-095<br>4/30/97 | MW-095<br>6/22/98 | MW-096<br>4/30/97 | MW-096<br>6/21/98 | MW-097<br>4/30/97 | MW-097<br>6/21/98 | MW-098<br>4/30/97 |   |
|-------------------------------------|-------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---|
| Benzoic acid                        | <                       | 1.7               | --                | <                 | 1.7               | --                | <                 | 1.7               | --                | <                 | 1.7               |   |
| 4-Chloro-3-methylphenol             | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| 2-Chlorophenol                      | <                       | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               |   |
| 2,4-Dichlorophenol                  | <                       | 3.9               | --                | <                 | 3.9               | --                | <                 | 3.9               | --                | <                 | 3.9               |   |
| 2,6-Dichlorophenol                  | <                       | 0.1               | --                | <                 | 0.1               | --                | <                 | 0.1               | --                | <                 | 0.1               |   |
| 2,4-Dimethylphenol                  | <                       | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               |   |
| 4,6-Dinitro-2-methylphenol          | <                       | 1.6               | --                | <                 | 1.6               | --                | <                 | 1.6               | --                | <                 | 1.6               |   |
| 2,4-Dinitrophenol                   | <                       | 3.3               | --                | <                 | 3.3               | --                | <                 | 3.3               | --                | <                 | 3.3               |   |
| 2-Methylphenol                      | <                       | 0.3               | --                | <                 | 0.3               | --                | <                 | 0.3               | --                | <                 | 0.3               |   |
| 4-Methylphenol                      | <                       | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               |   |
| 2-Nitrophenol                       | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| 4-Nitrophenol                       | <                       | 0.7               | --                | <                 | 0.7               | --                | <                 | 0.7               | --                | <                 | 0.7               |   |
| Pentachlorophenol                   | <                       | 0.7               | --                | <                 | 0.7               | --                | <                 | 0.7               | --                | <                 | 0.7               |   |
| Phenol                              | <                       | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               |   |
| 2,3,4,6-Tetrachlorophenol           | <                       | 0.6               | --                | <                 | 0.6               | --                | <                 | 0.6               | --                | <                 | 0.6               |   |
| 2,4,5-Trichlorophenol               | <                       | 3                 | --                | <                 | 3                 | --                | <                 | 3                 | --                | <                 | 3                 |   |
| 2,4,6-Trichlorophenol               | <                       | 0.3               | --                | <                 | 0.3               | --                | <                 | 0.3               | --                | <                 | 0.3               |   |
| Acenaphthene                        | <                       | 0.4               | 2                 | <                 | 0.4               | <                 | 1                 | <                 | 0.4               | <                 | 1                 |   |
| Acenaphthylene                      | <                       | 0.4               | <                 | 1                 | <                 | 0.4               | <                 | 1                 | <                 | 0.4               | <                 | 1 |
| Acetophenone                        | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| 4-Aminobiphenyl                     | <                       | 0.7               | --                | <                 | 0.7               | --                | <                 | 0.7               | --                | <                 | 0.7               |   |
| Aniline                             | <                       | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               |   |
| Anthracene                          | <                       | 0.4               | <                 | 1                 | <                 | 0.4               | <                 | 1                 | <                 | 0.4               | <                 | 1 |
| Benidine                            | <                       | 2.7               | --                | <                 | 2.7               | --                | <                 | 2.7               | --                | <                 | 2.7               |   |
| Benzo(a)anthracene                  | <                       | 0.5               | <                 | 1                 | <                 | 0.5               | <                 | 1                 | <                 | 0.5               | <                 | 1 |
| Benzo(a)pyrene                      | <                       | 0.1               | <                 | 1                 | <                 | 0.1               | <                 | 1                 | <                 | 0.1               | <                 | 1 |
| Benzo(b)fluoranthene                | <                       | 0.5               | <                 | 1                 | <                 | 0.5               | <                 | 1                 | <                 | 0.5               | <                 | 1 |
| Benzo(g,h,i)perylene                | <                       | 0.3               | <                 | 1                 | <                 | 0.3               | <                 | 1                 | <                 | 0.3               | <                 | 1 |
| Benzo(k)fluoranthene                | <                       | 0.7               | <                 | 1                 | <                 | 0.7               | <                 | 1                 | <                 | 0.7               | <                 | 1 |
| Benzyl alcohol                      | <                       | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               |   |
| Bis(2-chloroethoxy)methane          | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| bis(2-Chloroethyl)ether             | <                       | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               |   |
| bis(2-Chloroisopropyl)ether         | <                       | 1.9               | --                | <                 | 1.9               | --                | <                 | 1.9               | --                | <                 | 1.9               |   |
| bis(2-Ethylhexyl) phthalate         | <                       | 0.6               | --                | <                 | 0.6               | --                | <                 | 0.6               | --                | <                 | 0.6               |   |
| 4-Bromophenyl phenyl ether          | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| Butyl benzyl phthalate              | <                       | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               |   |
| 4-Chloroaniline                     | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| 1-Chloronaphthalene                 | <                       | 0.6               | --                | <                 | 0.6               | --                | <                 | 0.6               | --                | <                 | 0.6               |   |
| 2-Chloronaphthalene                 | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| 4-Chlorophenyl phenyl ether         | <                       | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               |   |
| Chrysene                            | <                       | 0.7               | <                 | 1                 | <                 | 0.7               | <                 | 1                 | <                 | 0.7               | <                 | 1 |
| Dibenz(a,j)acridine                 | <                       | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               |   |
| Dibenzo(a,h)anthracene              | <                       | 0.3               | <                 | 1                 | <                 | 0.3               | <                 | 1                 | <                 | 0.3               | <                 | 1 |
| Dibenzofuran                        | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| 1,2-Dichlorobenzene                 | <                       | 0.3               | --                | <                 | 0.3               | --                | <                 | 0.3               | --                | <                 | 0.3               |   |
| 1,3-Dichlorobenzene                 | <                       | 0.3               | --                | <                 | 0.3               | --                | <                 | 0.3               | --                | <                 | 0.3               |   |
| 1,4-Dichlorobenzene                 | <                       | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               |   |
| 3,3'-Dichlorobenzidine              | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| Diethylphthalate                    | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| p-Dimethylaminoazobenzene           | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| 7,12-Dimethylbenz(a)anthracene      | <                       | 1.8               | --                | <                 | 1.8               | --                | <                 | 1.8               | --                | <                 | 1.8               |   |
| alpha, alpha-Dimethylphenethylamine | <                       | 0.1               | --                | <                 | 0.1               | --                | <                 | 0.1               | --                | <                 | 0.1               |   |
| Dimethyl phthalate                  | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| Di-n-butylphthalate                 | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| 2,4-Dinitrotoluene                  | <                       | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               |   |
| 2,6-Dinitrotoluene                  | <                       | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               |   |
| Di-n-octylphthalate                 | <                       | 0.7               | --                | <                 | 0.7               | --                | <                 | 0.7               | --                | <                 | 0.7               |   |
| Diphenylamine                       | <                       | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               |   |
| 1,2-Diphenylhydrazine               | <                       | 0.3               | --                | <                 | 0.3               | --                | <                 | 0.3               | --                | <                 | 0.3               |   |
| Fluoranthene                        | <                       | 0.5               | <                 | 1                 | <                 | 0.5               | <                 | 1                 | <                 | 0.5               | <                 | 1 |
| Fluorene                            | <                       | 0.6               | 1                 | <                 | 0.6               | <                 | 1                 | <                 | 0.6               | <                 | 1                 |   |
| Hexachlorobenzene                   | <                       | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               |   |
| Hexachlorobutadiene                 | <                       | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               |   |
| Hexachlorocyclopentadiene           | <                       | 0.6               | --                | <                 | 0.6               | --                | <                 | 0.6               | --                | <                 | 0.6               |   |
| Hexachloroethane                    | <                       | 0.6               | --                | <                 | 0.6               | --                | <                 | 0.6               | --                | <                 | 0.6               |   |
| Indeno(1,2,3-cd)pyrene              | <                       | 0.5               | <                 | 1                 | <                 | 0.5               | <                 | 1                 | <                 | 0.5               | <                 | 1 |
| Isophorone                          | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| 3-Methylcholanthrene                | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| 2-Methylnaphthalene                 | <                       | 0.5               | 2                 | <                 | 0.5               | <                 | 1                 | <                 | 0.5               | <                 | 1                 |   |
| Naphthalene                         | <                       | 0.4               | 2                 | <                 | 0.4               | <                 | 1                 | <                 | 0.4               | <                 | 1                 |   |
| 1-Naphthylamine                     | <                       | 1.5               | --                | <                 | 1.5               | --                | <                 | 1.5               | --                | <                 | 1.5               |   |
| 2-Naphthylamine                     | <                       | 1                 | --                | <                 | 1                 | --                | <                 | 1                 | --                | <                 | 1                 |   |
| 2-Nitroaniline                      | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| 3-Nitroaniline                      | <                       | 0.9               | --                | <                 | 0.9               | --                | <                 | 0.9               | --                | <                 | 0.9               |   |
| 4-Nitroaniline                      | <                       | 0.8               | --                | <                 | 0.8               | --                | <                 | 0.8               | --                | <                 | 0.8               |   |
| Nitrobenzene                        | <                       | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               | --                | <                 | 0.5               |   |
| N-Nitrosodimethylamine              | <                       | 1.2               | --                | <                 | 1.2               | --                | <                 | 1.2               | --                | <                 | 1.2               |   |
| N-Nitroso-di-n-butylamine           | <                       | 1.1               | --                | <                 | 1.1               | --                | <                 | 1.1               | --                | <                 | 1.1               |   |
| N-Nitrosodiethylamine               | <                       | 10                | --                | <                 | 10                | --                | <                 | 10                | --                | <                 | 10                |   |
| N-Nitrosodiphenylamine              | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| N-Nitroso-di-n-propylamine          | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| N-Nitrosopiperidine                 | <                       | 0.8               | --                | <                 | 0.8               | --                | <                 | 0.8               | --                | <                 | 0.8               |   |
| N-Nitrosopyrrolidine                | <                       | 10                | --                | <                 | 10                | --                | <                 | 10                | --                | <                 | 10                |   |
| Pentachlorobenzene                  | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| Pentachloronitrobenzene             | <                       | 5                 | --                | <                 | 5                 | --                | <                 | 5                 | --                | <                 | 5                 |   |
| Phenacetin                          | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| Phenanthrene                        | <                       | 0.4               | <                 | 1                 | <                 | 0.4               | <                 | 1                 | <                 | 0.4               | <                 | 1 |
| 2-Picoline                          | <                       | 7.7               | --                | <                 | 7.7               | --                | <                 | 7.7               | --                | <                 | 7.7               |   |
| Pronamide                           | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| Pyrene                              | <                       | 0.5               | <                 | 1                 | <                 | 0.5               | <                 | 1                 | <                 | 0.5               | <                 | 1 |
| 1,2,4,5-Tetrachlorobenzene          | <                       | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               | --                | <                 | 0.4               |   |
| 1,2,4-Trichlorobenzene              | <                       | 0.6               | --                | <                 | 0.6               | --                | <                 | 0.6               | --                | <                 | 0.6               |   |
| 1-Methylnaphthalene                 | <                       | 0.3               | 5                 | <                 | 0.3               | <                 | 1                 | <                 | 0.3               | <                 | 1                 |   |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

SVOC Semi-Volatile Organic Compound

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

## Appendix C

Historical SVOC Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Well ID<br>Date Sampled             | MW-098<br>6/29/98 | MW-104<br>7/17/97 | MW-104<br>6/21/98 | MW-106<br>2/11/97 | MW-106<br>6/18/98 | MW-108<br>7/18/97 | MW-108<br>6/22/98 | MW-110<br>6/30/98 | MW-111<br>6/29/98 | PIPELINE_4<br>8/2/91 |
|-------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|----------------------|
| Parameter                           |                   |                   |                   |                   |                   |                   |                   |                   |                   |                      |
| Benzoic acid                        | < 8.5             | --                | < 1.7             | --                | < 1.7             | --                | < 1.7             | < 8.5             | < 1.7             | --                   |
| 4-Chloro-3-methylphenol             | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| 2-Chlorophenol                      | < 3               | --                | < 0.5             | --                | < 0.5             | --                | < 0.5             | < 3               | < 0.5             | --                   |
| 2,4-Dichlorophenol                  | < 20              | --                | < 3.9             | --                | < 3.9             | --                | < 3.9             | < 20              | < 3.9             | --                   |
| 2,6-Dichlorophenol                  | < 0.5             | --                | < 0.1             | --                | < 0.1             | --                | < 0.1             | < 0.5             | < 0.1             | --                   |
| 2,4-Dimethylphenol                  | < 3               | --                | < 0.5             | --                | < 0.5             | --                | < 0.5             | < 3               | < 0.5             | --                   |
| 4,6-Dinitro-2-methylphenol          | < 8               | --                | < 1.6             | --                | < 1.6             | --                | < 1.6             | < 8               | < 1.6             | --                   |
| 2,4-Dinitrophenol                   | < 17              | --                | < 3.3             | --                | < 3.3             | --                | < 3.3             | < 17              | < 3.3             | --                   |
| 2-Methylphenol                      | < 2               | --                | < 0.3             | --                | < 0.3             | --                | < 0.3             | < 2               | < 0.3             | --                   |
| 4-Methylphenol                      | < 3               | --                | < 0.5             | --                | < 0.5             | --                | < 0.5             | < 3               | < 0.5             | --                   |
| 2-Nitrophenol                       | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| 4-Nitrophenol                       | < 4               | --                | < 0.7             | --                | < 0.7             | --                | < 0.7             | < 4               | < 0.7             | --                   |
| Pentachlorophenol                   | < 4               | --                | < 0.7             | --                | < 0.7             | --                | < 0.7             | < 4               | < 0.7             | --                   |
| Phenol                              | < 3               | --                | < 0.5             | --                | < 0.5             | --                | < 0.5             | 8.95              | < 0.5             | --                   |
| 2,3,4,6-Tetrachlorophenol           | < 3               | --                | < 0.6             | --                | < 0.6             | --                | < 0.6             | < 3               | < 0.6             | --                   |
| 2,4,5-Trichlorophenol               | < 15              | --                | < 3               | --                | < 3               | --                | < 3               | < 15              | < 3               | --                   |
| 2,4,6-Trichlorophenol               | < 2               | --                | < 0.3             | --                | < 0.3             | --                | < 0.3             | < 2               | < 0.3             | --                   |
| Acenaphthene                        | < 2               | < 1               | < 0.4             | < 1               | < 0.4             | < 1               | < 0.4             | < 2               | < 0.4             | < 10                 |
| Acenaphthylene                      | < 2               | < 1               | < 0.4             | < 1               | < 0.4             | < 1               | < 0.4             | < 2               | < 0.4             | --                   |
| Acetophenone                        | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| 4-Aminobiphenyl                     | < 4               | --                | < 0.7             | --                | < 0.7             | --                | < 0.7             | < 4               | < 0.7             | --                   |
| Aniline                             | < 3               | --                | < 0.5             | --                | < 0.5             | --                | < 0.5             | < 3               | < 0.5             | --                   |
| Anthracene                          | < 2               | < 1               | < 0.4             | < 1               | < 0.4             | < 1               | < 0.4             | < 2               | < 0.4             | < 10                 |
| Benidine                            | < 14              | --                | < 2.7             | --                | < 2.7             | --                | < 2.7             | < 14              | < 2.7             | --                   |
| Benzo(a)anthracene                  | < 3               | < 1               | < 0.5             | < 1               | < 0.5             | < 1               | < 0.5             | < 3               | < 0.5             | < 10                 |
| Benzo(a)pyrene                      | < 0.1             | < 1               | < 0.1             | < 1               | < 0.1             | < 1               | < 0.1             | < 0.1             | < 0.1             | < 10                 |
| Benzo(b)fluoranthene                | < 3               | < 1               | < 0.5             | < 1               | < 0.5             | < 1               | < 0.5             | < 3               | < 0.5             | < 10                 |
| Benzo(g,h,i)perylene                | < 2               | < 1               | < 0.3             | < 1               | < 0.3             | < 1               | < 0.3             | < 2               | < 0.3             | < 10                 |
| Benzo(k)fluoranthene                | < 4               | < 1               | < 0.7             | < 1               | < 0.7             | < 1               | < 0.7             | < 4               | < 0.7             | < 10                 |
| Benzyl alcohol                      | < 3               | --                | < 0.5             | --                | < 0.5             | --                | < 0.5             | < 3               | < 0.5             | --                   |
| Bis(2-chloroethoxy)methane          | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| bis(2-Chloroethyl)ether             | < 3               | --                | < 0.5             | --                | < 0.5             | --                | < 0.5             | < 3               | < 0.5             | --                   |
| bis(2-Chloroisopropyl)ether         | < 9.5             | --                | < 1.9             | --                | < 1.9             | --                | < 1.9             | 9.5               | < 1.9             | --                   |
| bis(2-Ethylhexyl) phthalate         | < 3               | --                | < 0.6             | --                | < 0.6             | --                | < 0.6             | 4.5               | 0.71              | --                   |
| 4-Bromophenyl phenyl ether          | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| Butyl benzyl phthalate              | < 3               | --                | < 0.5             | --                | < 0.5             | --                | < 0.5             | < 3               | < 0.5             | --                   |
| 4-Chloroaniline                     | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| 1-Chloronaphthalene                 | < 3               | --                | < 0.6             | --                | < 0.6             | --                | < 0.6             | < 3               | < 0.6             | --                   |
| 2-Chloronaphthalene                 | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| 4-Chlorophenyl phenyl ether         | < 3               | --                | < 0.5             | --                | < 0.5             | --                | < 0.5             | < 3               | < 0.5             | --                   |
| Chrysene                            | < 4               | < 1               | < 0.7             | < 1               | < 0.7             | < 1               | < 0.7             | < 4               | < 0.7             | < 10                 |
| Dibenz(a,j)acridine                 | < 3               | --                | < 0.5             | --                | < 0.5             | --                | < 0.5             | < 3               | < 0.5             | --                   |
| Dibenzo(a,h)anthracene              | < 2               | < 1               | < 0.3             | < 1               | < 0.3             | < 1               | < 0.3             | < 2               | < 0.3             | < 10                 |
| Dibenzofuran                        | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| 1,2-Dichlorobenzene                 | < 2               | --                | < 0.3             | --                | < 0.3             | --                | < 0.3             | < 2               | < 0.3             | --                   |
| 1,3-Dichlorobenzene                 | < 2               | --                | < 0.3             | --                | < 0.3             | --                | < 0.3             | < 2               | < 0.3             | --                   |
| 1,4-Dichlorobenzene                 | < 3               | --                | < 0.5             | --                | < 0.5             | --                | < 0.5             | < 3               | < 0.5             | --                   |
| 3,3'-Dichlorobenzidine              | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| Diethylphthalate                    | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| p-Dimethylaminoazobenzene           | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| 7,12-Dimethylbenz(a)anthracene      | < 9               | --                | < 1.8             | --                | < 1.8             | --                | < 1.8             | < 9               | < 1.8             | --                   |
| alpha, alpha-Dimethylphenethylamine | < 0.5             | --                | < 0.1             | --                | < 0.1             | --                | < 0.1             | 0.5               | < 0.1             | --                   |
| Dimethyl phthalate                  | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | 5.4               | 1.8               | --                   |
| Di-n-butylphthalate                 | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| 2,4-Dinitrotoluene                  | < 3               | --                | < 0.5             | --                | < 0.5             | --                | < 0.5             | < 3               | < 0.5             | --                   |
| 2,6-Dinitrotoluene                  | < 3               | --                | < 0.5             | --                | < 0.5             | --                | < 0.5             | < 3               | < 0.5             | --                   |
| Di-n-octylphthalate                 | < 4               | --                | < 0.7             | --                | < 0.7             | --                | < 0.7             | < 4               | < 0.7             | --                   |
| Diphenylamine                       | < 3               | --                | < 0.5             | --                | < 0.5             | --                | < 0.5             | < 3               | < 0.5             | --                   |
| 1,2-Diphenylhydrazine               | < 2               | --                | < 0.3             | --                | < 0.3             | --                | < 0.3             | < 2               | < 0.3             | --                   |
| Fluoranthene                        | < 3               | < 1               | < 0.5             | < 1               | < 0.5             | < 1               | < 0.5             | < 3               | < 0.5             | < 10                 |
| Fluorene                            | < 3               | < 1               | < 0.6             | 1                 | < 0.6             | < 1               | < 0.6             | < 3               | < 0.6             | < 10                 |
| Hexachlorobenzene                   | < 3               | --                | < 0.5             | --                | < 0.5             | --                | < 0.5             | < 3               | < 0.5             | --                   |
| Hexachlorobutadiene                 | < 3               | --                | < 0.5             | --                | < 0.5             | --                | < 0.5             | < 3               | < 0.5             | --                   |
| Hexachlorocyclopentadiene           | < 3               | --                | < 0.6             | --                | < 0.6             | --                | < 0.6             | < 3               | < 0.6             | --                   |
| Hexachloroethane                    | < 3               | --                | < 0.6             | --                | < 0.6             | --                | < 0.6             | < 3               | < 0.6             | --                   |
| Indeno(1,2,3-cd)pyrene              | < 3               | < 1               | < 0.5             | < 1               | < 0.5             | < 1               | < 0.5             | < 3               | < 0.5             | < 10                 |
| Isophorone                          | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| 3-Methylcholanthrene                | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| 2-Methylnaphthalene                 | 16                | < 1               | < 0.5             | < 1               | < 0.5             | < 1               | < 0.5             | 19                | < 0.5             | --                   |
| Naphthalene                         | 6.9               | < 1               | < 0.4             | < 1               | < 0.4             | < 1               | < 0.4             | 8.3               | < 0.4             | < 10                 |
| 1-Naphthylamine                     | < 7.5             | --                | < 1.5             | --                | < 1.5             | --                | < 1.5             | < 7.5             | < 1.5             | --                   |
| 2-Naphthylamine                     | < 5               | --                | < 1               | --                | < 1               | --                | < 1               | < 5               | < 1               | --                   |
| 2-Nitroaniline                      | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| 3-Nitroaniline                      | < 5               | --                | < 0.9             | --                | < 0.9             | --                | < 0.9             | < 5               | < 0.9             | --                   |
| 4-Nitroaniline                      | < 4               | --                | < 0.8             | --                | < 0.8             | --                | < 0.8             | < 4               | < 0.8             | --                   |
| Nitrobenzene                        | < 3               | --                | < 0.5             | --                | < 0.5             | --                | < 0.5             | < 3               | < 0.5             | --                   |
| N-Nitrosodimethylamine              | < 6               | --                | < 1.2             | --                | < 1.2             | --                | < 1.2             | < 6               | < 1.2             | --                   |
| N-Nitroso-di-n-butylamine           | < 5.5             | --                | < 1.1             | --                | < 1.1             | --                | < 1.1             | < 5.5             | < 1.1             | --                   |
| N-Nitrosodiethylamine               | < 50              | --                | < 10              | --                | < 10              | --                | < 10              | < 50              | < 10              | --                   |
| N-Nitrosodiphenylamine              | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| N-Nitroso-di-n-propylamine          | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| N-Nitrosopiperidine                 | < 4               | --                | < 0.8             | --                | < 0.8             | --                | < 0.8             | < 4               | < 0.8             | --                   |
| N-Nitrosopyrrolidine                | < 50              | --                | < 10              | --                | < 10              | --                | < 10              | < 50              | < 10              | --                   |
| Pentachlorobenzene                  | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| Pentachloronitrobenzene             | < 25              | --                | < 5               | --                | < 5               | --                | < 5               | < 25              | < 5               | --                   |
| Phenacetin                          | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| Phenanthrene                        | < 2               | < 1               | < 0.4             | < 1               | < 0.4             | < 1               | < 0.4             | < 2               | < 0.4             | < 10                 |
| 2-Picoline                          | < 39              | --                | < 7.7             | --                | < 7.7             | --                | < 7.7             | < 39              | < 7.7             | --                   |
| Pronamide                           | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| Pyrene                              | < 3               | < 1               | < 0.5             | < 1               | < 0.5             | < 1               | < 0.5             | < 3               | < 0.5             | < 10                 |
| 1,2,4,5-Tetrachlorobenzene          | < 2               | --                | < 0.4             | --                | < 0.4             | --                | < 0.4             | < 2               | < 0.4             | --                   |
| 1,2,4-Trichlorobenzene              | < 3               | --                | < 0.6             | --                | < 0.6             | --                | < 0.6             | < 3               | < 0.6             | --                   |
| (1-Methylnaphthalene)               | 834               | < 1               | < 0.3             | < 1               | < 0.3             | < 1               | < 0.3             | 360               | < 0.3             | --                   |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

SVOC Semi-Volatile Organic Compound

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

# Appendix C

Historical SVOC Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Well ID<br>Date Sampled             | SUMP-16A<br>9/21/91 | SUMP-16A<br>9/26/91 | SW-01<br>12/10/97 | SW-01<br>6/30/98 | SW-02<br>6/24/98 | SW-03<br>6/24/98 | TH-A11<br>9/21/91 | UIHS_ARROYO<br>6/26/98 |
|-------------------------------------|---------------------|---------------------|-------------------|------------------|------------------|------------------|-------------------|------------------------|
| Parameter                           |                     |                     |                   |                  |                  |                  |                   |                        |
| Benzoic acid                        | --                  | --                  | --                | < 1.7            | < 1.7            | < 1.7            | --                | < 1.7                  |
| 4-Chloro-3-methylphenol             | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| 2-Chlorophenol                      | --                  | --                  | --                | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| 2,4-Dichlorophenol                  | --                  | --                  | --                | < 3.9            | < 3.9            | < 3.9            | --                | < 3.9                  |
| 2,6-Dichlorophenol                  | --                  | --                  | --                | < 0.1            | < 0.1            | < 0.1            | --                | < 0.1                  |
| 2,4-Dimethylphenol                  | --                  | --                  | --                | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| 4,6-Dinitro-2-methylphenol          | --                  | --                  | --                | < 1.6            | < 1.6            | < 1.6            | --                | < 1.6                  |
| 2,4-Dinitrophenol                   | --                  | --                  | --                | < 3.3            | < 3.3            | < 3.3            | --                | < 3.3                  |
| 2-Methylphenol                      | --                  | --                  | --                | < 0.3            | < 0.3            | < 0.3            | --                | < 0.3                  |
| 4-Methylphenol                      | --                  | --                  | --                | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| 2-Nitrophenol                       | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| 4-Nitrophenol                       | --                  | --                  | --                | < 0.7            | < 0.7            | < 0.7            | --                | < 0.7                  |
| Pentachlorophenol                   | --                  | --                  | --                | < 0.7            | < 0.7            | < 0.7            | --                | < 0.7                  |
| Phenol                              | < 50                | < 50                | < 5               | < 0.5            | < 0.5            | < 0.5            | < 50              | < 0.5                  |
| 2,3,4,6-Tetrachlorophenol           | --                  | --                  | --                | < 0.6            | < 0.6            | < 0.6            | --                | < 0.6                  |
| 2,4,5-Trichlorophenol               | --                  | --                  | --                | < 3              | < 3              | < 3              | --                | < 3                    |
| 2,4,6-Trichlorophenol               | --                  | --                  | --                | < 0.3            | < 0.3            | < 0.3            | --                | < 0.3                  |
| Acenaphthene                        | --                  | --                  | 3                 | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| Acenaphthylene                      | --                  | --                  | < 1               | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| Acetophenone                        | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| 4-Aminobiphenyl                     | --                  | --                  | --                | < 0.7            | < 0.7            | < 0.7            | --                | < 0.7                  |
| Aniline                             | --                  | --                  | --                | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| Anthracene                          | --                  | --                  | < 1               | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| Benzidine                           | --                  | --                  | --                | < 2.7            | < 2.7            | < 2.7            | --                | < 2.7                  |
| Benzo(a)anthracene                  | --                  | --                  | < 1               | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| Benzo(a)pyrene                      | --                  | --                  | < 0.7             | < 0.1            | < 0.1            | < 0.1            | --                | < 0.1                  |
| Benzo(b)fluoranthene                | --                  | --                  | < 1               | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| Benzo(g,h,i)perylene                | --                  | --                  | < 1               | < 0.3            | < 0.3            | < 0.3            | --                | < 0.3                  |
| Benzo(k)fluoranthene                | --                  | --                  | < 1               | < 0.7            | < 0.7            | < 0.7            | --                | < 0.7                  |
| Benzyl alcohol                      | --                  | --                  | --                | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| Bis(2-chloroethoxy)methane          | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| bis(2-Chloroethyl)ether             | --                  | --                  | --                | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| bis(2-Chloroisopropyl)ether         | --                  | --                  | --                | < 1.9            | < 1.9            | < 1.9            | --                | < 1.9                  |
| bis(2-Ethylhexyl) phthalate         | --                  | --                  | --                | 0.93             | < 0.6            | < 0.6            | --                | < 0.6                  |
| 4-Bromophenyl phenyl ether          | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| Butyl benzyl phthalate              | --                  | --                  | --                | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| 4-Chloroaniline                     | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| 1-Chloronaphthalene                 | --                  | --                  | --                | < 0.6            | < 0.6            | < 0.6            | --                | < 0.6                  |
| 2-Chloronaphthalene                 | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| 4-Chlorophenyl phenyl ether         | --                  | --                  | --                | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| Chrysene                            | --                  | --                  | < 1               | < 0.7            | < 0.7            | < 0.7            | --                | < 0.7                  |
| Dibenz(a,j)acridine                 | --                  | --                  | --                | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| Dibenzo(a,h)anthracene              | --                  | --                  | < 1               | < 0.3            | < 0.3            | < 0.3            | --                | < 0.3                  |
| Dibenzofuran                        | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| 1,2-Dichlorobenzene                 | --                  | --                  | --                | < 0.3            | < 0.3            | < 0.3            | --                | < 0.3                  |
| 1,3-Dichlorobenzene                 | --                  | --                  | --                | < 0.3            | < 0.3            | < 0.3            | --                | < 0.3                  |
| 1,4-Dichlorobenzene                 | --                  | --                  | --                | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| 3,3'-Dichlorobenzidine              | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| Diethylphthalate                    | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| p-Dimethylaminoazobenzene           | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| 7,12-Dimethylbenz(a)anthracene      | --                  | --                  | --                | < 1.8            | < 1.8            | < 1.8            | --                | < 1.8                  |
| alpha, alpha-Dimethylphenethylamine | --                  | --                  | --                | < 0.1            | < 0.1            | < 0.1            | --                | < 0.1                  |
| Dimethyl phthalate                  | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| Di-n-butylphthalate                 | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| 2,4-Dinitrotoluene                  | --                  | --                  | --                | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| 2,6-Dinitrotoluene                  | --                  | --                  | --                | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| Di-n-octylphthalate                 | --                  | --                  | --                | < 0.7            | < 0.7            | < 0.7            | --                | < 0.7                  |
| Diphenylamine                       | --                  | --                  | --                | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| 1,2-Diphenylhydrazine               | --                  | --                  | --                | < 0.3            | < 0.3            | < 0.3            | --                | < 0.3                  |
| Fluoranthene                        | --                  | --                  | < 1               | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| Fluorene                            | --                  | --                  | < 1               | < 0.6            | < 0.6            | < 0.6            | --                | < 0.6                  |
| Hexachlorobenzene                   | --                  | --                  | --                | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| Hexachlorobutadiene                 | --                  | --                  | --                | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| Hexachlorocyclopentadiene           | --                  | --                  | --                | < 0.6            | < 0.6            | < 0.6            | --                | < 0.6                  |
| Hexachloroethane                    | --                  | --                  | --                | < 0.6            | < 0.6            | < 0.6            | --                | < 0.6                  |
| Indeno(1,2,3-cd)pyrene              | --                  | --                  | < 1               | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| Isophorone                          | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| 3-Methylcholanthrene                | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| 2-Methylnaphthalene                 | --                  | --                  | < 1               | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| Naphthalene                         | --                  | --                  | < 1               | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| 1-Naphthylamine                     | --                  | --                  | --                | < 1.5            | < 1.5            | < 1.5            | --                | < 1.5                  |
| 2-Naphthylamine                     | --                  | --                  | --                | < 1              | < 1              | < 1              | --                | < 1                    |
| 2-Nitroaniline                      | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| 3-Nitroaniline                      | --                  | --                  | --                | < 0.9            | < 0.9            | < 0.9            | --                | < 0.9                  |
| 4-Nitroaniline                      | --                  | --                  | --                | < 0.8            | < 0.8            | < 0.8            | --                | < 0.8                  |
| Nitrobenzene                        | --                  | --                  | --                | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| N-Nitrosodimethylamine              | --                  | --                  | --                | < 1.2            | < 1.2            | < 1.2            | --                | < 1.2                  |
| N-Nitroso-di-n-butylamine           | --                  | --                  | --                | < 1.1            | < 1.1            | < 1.1            | --                | < 1.1                  |
| N-Nitrosodiethylamine               | --                  | --                  | --                | < 10             | < 10             | < 10             | --                | < 10                   |
| N-Nitrosodiphenylamine              | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| N-Nitroso-di-n-propylamine          | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| N-Nitrosopiperidine                 | --                  | --                  | --                | < 0.8            | < 0.8            | < 0.8            | --                | < 0.8                  |
| N-Nitrosopyrrolidine                | --                  | --                  | --                | < 10             | < 10             | < 10             | --                | < 10                   |
| Pentachlorobenzene                  | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| Pentachloronitrobenzene             | --                  | --                  | --                | < 5              | < 5              | < 5              | --                | < 5                    |
| Phenacetin                          | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| Phenanthrene                        | --                  | --                  | < 1               | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| 2-Picoline                          | --                  | --                  | --                | < 7.7            | < 7.7            | < 7.7            | --                | < 7.7                  |
| Pronamide                           | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| Pyrene                              | --                  | --                  | < 1               | < 0.5            | < 0.5            | < 0.5            | --                | < 0.5                  |
| 1,2,4,5-Tetrachlorobenzene          | --                  | --                  | --                | < 0.4            | < 0.4            | < 0.4            | --                | < 0.4                  |
| 1,2,4-Trichlorobenzene              | --                  | --                  | --                | < 0.6            | < 0.6            | < 0.6            | --                | < 0.6                  |
| 1-Methylnaphthalene                 | --                  | --                  | < 1               | < 0.3            | < 0.3            | < 0.3            | --                | < 0.3                  |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

SVOC Semi-Volatile Organic Compound

< Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

Historical Dissolved Metals  
Analytical Data  
May 1991 - October 1998

## Appendix C

## Historical Dissolved Metals Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter  | Well ID<br>Date Sampled | LYMAN<br>6/29/98 | MW-013<br>6/21/98 | MW-014<br>6/22/98 | MW-041<br>6/19/98 | MW-043<br>6/22/98 | MW-044<br>6/22/98 | MW-046<br>5/29/97 |
|------------|-------------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Aluminum   | <                       | 0.026            | <                 | 0.026             | 0.03              | <                 | <                 | <                 |
| Arsenic    | <                       | 0.0018           | 0.015             | 0.0052            | 0.011             | 0.0052            | <                 | 0.1               |
| Barium     | <                       | 0.018            | 0.52              | 0.56              | 0.36              | 0.28              | <                 | 0.005             |
| Boron      | <                       | 0.09             | 0.22              | 0.31              | 0.27              | 0.3               | 0.23              | 0.31              |
| Cadmium    | <                       | 0.0003           | 0.0004            | 0.0005            | 0.0002            | 0.0003            | <                 | 0.001             |
| Chromium   | <                       | 0.0008           | 0.0008            | 0.0009            | 0.0038            | 0.0008            | <                 | 0.005             |
| Cobalt     | <                       | 0.0003           | 0.0005            | 0.0003            | 0.0026            | 0.0082            | <                 | 0.005             |
| Copper     | <                       | 0.0018           | <                 | <                 | 0.0018            | 0.0018            | <                 | 0.005             |
| Iron       | <                       | 0.035            | 3.4               | 4.7               | 0.93              | 2.5               | <                 | 0.05              |
| Lead       | <                       | 0.0022           | <                 | 0.0022            | <                 | 0.0022            | <                 | <                 |
| Manganese  | <                       | 0.0002           | 0.22              | 0.24              | 0.2               | 0.2               | <                 | 0.003             |
| Mercury    | <                       | 0.0001           | <                 | <                 | <                 | 0.0001            | <                 | 0.068             |
| Molybdenum | <                       | 0.0034           | 0.0031            | 0.0039            | 0.009             | 0.054             | <                 | 0.0002            |
| Nickel     | <                       | 0.0009           | 0.014             | 0.0025            | 0.0054            | 0.039             | <                 | 0.005             |
| Selenium   | <                       | 0.0023           | <                 | 0.0023            | <                 | 0.0023            | <                 | 0.005             |
| Silver     | <                       | 0.0007           | <                 | 0.0007            | <                 | 0.0007            | <                 | 0.005             |
| Zinc       | <                       | 0.014            | 0.037             | 0.014             | 0.037             | 0.014             | <                 | 0.02              |

## Notes:

Concentrations listed in milligrams per liter (mg/L).

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

Historical Dissolved Metals Analytical Data  
 May 1991 - October 1998  
 Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter  | Well ID<br>Date Sampled | MW-046<br>6/21/98 | MW-049<br>6/21/98 | MW-050<br>6/19/98 | MW-054<br>6/25/98 | MW-055<br>6/25/98 | MW-057<br>6/25/98 | MW-058<br>6/22/98 |
|------------|-------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Aluminum   | <                       | 0.026             | <                 | 0.026             | <                 | 0.026             | <                 | 0.088             |
| Arsenic    | <                       | 0.0033            | <                 | 0.0052            | <                 | 0.0094            | <                 | 0.019             |
| Barium     | <                       | 0.32              | 0.048             | 0.028             | 0.015             | 0.4               | 0.42              | 0.062             |
| Boron      | <                       | 0.2               | 0.054             | 0.48              | 0.29              | 0.34              | 0.075             | 0.12              |
| Cadmium    | <                       | 0.0002            | <                 | 0.0002            | <                 | 0.0004            | 0.0002            | <                 |
| Chromium   | <                       | 0.0016            | 0.0038            | 0.0009            | 0.0008            | 0.0013            | 0.0008            | <                 |
| Cobalt     | <                       | 0.0003            | <                 | 0.0003            | 0.0003            | 0.0012            | 0.0005            | <                 |
| Copper     | <                       | 0.0018            | <                 | 0.0018            | <                 | 0.0018            | 0.0018            | <                 |
| Iron       | <                       | 0.014             | 0.055             | 0.013             | 0.013             | 2.23              | 0.13              | 0.29              |
| Lead       | <                       | 0.0022            | 0.0022            | 0.0022            | <                 | 0.0022            | 0.0022            | <                 |
| Manganese  | <                       | 0.09              | 0.079             | 0.035             | 0.005             | 0.12              | 0.2               | 0.28              |
| Mercury    | <                       | 0.0001            | <                 | <                 | <                 | 0.0001            | <                 | <                 |
| Molybdenum | <                       | 0.0007            | 0.0001            | 0.0055            | 0.0026            | 0.0031            | 0.0047            | 0.0001            |
| Nickel     | <                       | 0.0036            | 0.0009            | 0.0053            | 0.0009            | 0.0009            | 0.0009            | 0.0057            |
| Selenium   | <                       | 0.0023            | <                 | 0.0037            | 0.005             | 0.005             | <                 | 0.0015            |
| Silver     | <                       | 0.0007            | 0.022             | 0.0075            | 0.0007            | 0.0007            | 0.0007            | 0.0023            |
| Zinc       | <                       | 0.014             | <                 | 0.039             | 0.015             | 0.014             | 0.02              | 0.091             |

## Notes:

Concentrations listed in milligrams per liter (mg/L).  
 < Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical Dissolved Metals Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter  | Well ID<br>Date Sampled | MW-059<br>6/24/98 | MW-060<br>6/21/98 | MW-061<br>6/18/98 | MW-061A<br>6/18/98 | MW-062<br>6/26/98 | MW-063<br>6/25/98 | MW-064<br>6/23/98 |
|------------|-------------------------|-------------------|-------------------|-------------------|--------------------|-------------------|-------------------|-------------------|
| Aluminum   |                         | <                 | <                 | 0.09              | 0.25               | <                 | <                 | 0.066             |
| Arsenic    |                         | 0.026             | 0.0018            | 0.0024            | 0.0047             | 0.026             | 0.0028            | 0.0015            |
| Barium     |                         | 0.24              | 0.016             | 0.025             | 0.054              | 0.0093            | 0.32              | 0.035             |
| Boron      |                         | 0.23              | 0.057             | 0.068             | 0.073              | 0.12              | 0.064             | 0.071             |
| Cadmium    |                         | <                 | <                 | <                 | <                  | 0.0002            | <                 | <                 |
| Chromium   |                         | 0.038             | <                 | <                 | <                  | 0.0002            | 0.0002            | 0.0002            |
| Cobalt     |                         | 0.0008            | <                 | <                 | <                  | 0.0024            | 0.0012            | 0.0008            |
| Copper     |                         | <                 | <                 | <                 | <                  | 0.0006            | 0.0005            | <                 |
| Iron       |                         | 0.053             | <                 | 0.0018            | 0.0018             | 0.0018            | 0.0018            | <                 |
| Lead       |                         | <                 | <                 | 0.032             | 0.061              | 0.25              | <                 | 0.021             |
| Manganese  |                         | 0.0022            | <                 | <                 | <                  | 0.0022            | 0.0022            | <                 |
| Mercury    |                         | 1.5               | 0.0004            | 0.001             | 0.11               | 0.39              | 0.0015            | 0.026             |
| Molybdenum |                         | <                 | 0.0003            | 0.001             | 0.0001             | 0.0001            | <                 | <                 |
| Nickel     |                         | 0.0074            | 0.0024            | 0.0011            | 0.0013             | 0.004             | 0.0008            | 0.036             |
| Selenium   |                         | <                 | <                 | <                 | 0.0048             | <                 | <                 | 0.0028            |
| Silver     |                         | 0.0023            | <                 | 0.0023            | 0.0023             | 0.0009            | 0.0009            | <                 |
| Zinc       |                         | <                 | 0.0007            | 0.0025            | 0.0007             | 0.005             | 0.005             | 0.0023            |
|            |                         | 0.028             | 0.026             | 0.054             | 0.17               | 0.015             | 0.007             | 0.0013            |
|            |                         |                   |                   |                   |                    |                   | 0.042             | 0.086             |

### Notes:

Concentrations listed in milligrams per liter (mg/L).

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

Historical Dissolved Metals Analytical Data  
 May 1991 - October 1998  
 Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter  | Well ID<br>Date Sampled | MW-065A<br>6/25/98 | MW-066<br>6/17/98 | MW-067<br>6/24/98 | MW-068<br>6/26/98 | MW-069<br>6/29/98 | MW-070<br>6/16/98 | MW-071<br>6/19/98 |
|------------|-------------------------|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Aluminum   |                         | < 0.026            | 0.048             | < 0.026           | < 0.026           | < 0.026           | 0.036             | < 0.026           |
| Arsenic    |                         | 0.0087             | 0.0024            | < 0.0018          | 0.0085            | 0.0062            | 0.0018            | < 0.0018          |
| Barium     |                         | 0.095              | 0.014             | 0.29              | 0.15              | 0.12              | 0.057             | 0.013             |
| Boron      |                         | 0.066              | 0.085             | 0.054             | 0.1               | 0.16              | 0.073             | 0.24              |
| Cadmium    |                         | 0.0002             | < 0.0002          | < 0.0002          | 0.0002            | 0.0005            | 0.0002            | < 0.0002          |
| Chromium   |                         | 0.0008             | 0.0022            | < 0.0008          | 0.0014            | 0.001             | 0.0008            | < 0.0008          |
| Cobalt     |                         | 0.0052             | < 0.0003          | 0.0027            | 0.0019            | 0.0005            | 0.0003            | < 0.0003          |
| Copper     |                         | < 0.0018           | 0.0024            | < 0.0018          | 0.0018            | < 0.0018          | 0.0018            | < 0.0018          |
| Iron       |                         | 0.59               | < 0.013           | 0.017             | 0.08              | 0.27              | 0.013             | < 0.013           |
| Lead       |                         | < 0.0022           | < 0.0022          | < 0.0022          | < 0.0022          | < 0.0022          | 0.0022            | < 0.0022          |
| Manganese  |                         | 0.74               | 0.0008            | 0.82              | 0.1               | 0.59              | 0.0026            | 0.0027            |
| Mercury    |                         | < 0.0001           | 0.0005            | < 0.0001          | 0.0002            | < 0.0001          | 0.0003            | < 0.0001          |
| Molybdenum |                         | 0.0049             | 0.004             | 0.0093            | 0.0046            | 0.0033            | 0.0023            | 0.0005            |
| Nickel     |                         | 0.024              | < 0.0009          | 0.09              | < 0.0009          | < 0.0009          | 0.0009            | < 0.0009          |
| Selenium   |                         | < 0.005            | < 0.0023          | < 0.0023          | < 0.005           | < 0.005           | 0.0023            | < 0.0023          |
| Silver     |                         | < 0.0007           | < 0.0007          | < 0.0007          | < 0.0007          | < 0.0007          | 0.0007            | < 0.0007          |
| Zinc       |                         | 0.03               | 0.045             | 0.026             | 0.1               | 0.024             | 0.051             | 0.014             |

## Notes:

Concentrations listed in milligrams per liter (mg/L).  
 < Constituent not detected above noted laboratory detection limit.

## Appendix C

Historical Dissolved Metals Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter  | Well ID<br>Date Sampled | MW-072<br>6/30/98 | MW-073<br>6/30/98 | MW-074<br>6/24/98 | MW-075<br>6/30/98 | MW-076<br>6/29/98 | MW-078<br>6/19/98 | MW-081<br>6/29/98 |
|------------|-------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Aluminum   |                         | < 0.026           | < 0.026           | < 0.026           | 0.033             | < 0.026           | < 0.026           | < 0.026           |
| Arsenic    |                         | 0.0027            | 0.0032            | 0.011             | 0.0045            | 0.0031            | 0.0097            | 0.011             |
| Barium     |                         | 0.14              | 0.034             | 0.57              | 0.082             | 0.27              | 0.93              | 0.054             |
| Boron      |                         | 0.086             | 0.31              | 0.28              | 0.11              | 0.066             | 0.1               | 0.087             |
| Cadmium    |                         | 0.0002            | < 0.0002          | < 0.0002          | < 0.0002          | < 0.0002          | 0.0003            | 0.0002            |
| Chromium   |                         | 0.0077            | 0.0084            | < 0.0008          | 0.0068            | 0.001             | 0.0031            | 0.001             |
| Cobalt     |                         | 0.0004            | < 0.0003          | 0.0024            | < 0.0003          | < 0.0003          | 0.0013            | < 0.0003          |
| Copper     |                         | < 0.0018          | < 0.0018          | < 0.0018          | < 0.0018          | < 0.0018          | 0.0018            | < 0.0018          |
| Iron       |                         | 0.89              | 0.26              | 1.3               | 0.18              | 0.037             | 1.6               | 0.99              |
| Lead       |                         | < 0.0022          | < 0.0022          | < 0.0022          | < 0.0022          | < 0.0022          | < 0.0022          | < 0.0022          |
| Manganese  |                         | 0.65              | 0.065             | 0.33              | 0.26              | 0.15              | 0.82              | 0.2               |
| Mercury    |                         | < 0.0001          | < 0.0001          | < 0.0001          | < 0.0001          | < 0.0003          | < 0.0001          | < 0.0001          |
| Molybdenum |                         | 0.0035            | 0.0028            | 0.0033            | 0.0023            | 0.0042            | 0.0034            | < 0.0003          |
| Nickel     |                         | 0.0014            | 0.0015            | 0.0037            | 0.0039            | < 0.0009          | 0.0065            | < 0.0009          |
| Selenium   |                         | < 0.0023          | < 0.0023          | < 0.0023          | < 0.0023          | < 0.005           | 0.0035            | < 0.005           |
| Silver     |                         | < 0.0007          | 0.008             | < 0.0007          | < 0.0007          | < 0.0007          | 0.0007            | < 0.0007          |
| Zinc       |                         | < 0.014           | 0.052             | 0.037             | 0.041             | 0.041             | 0.087             | < 0.014           |

## Notes:

Concentrations listed in milligrams per liter (mg/L).

< Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical Dissolved Metals Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter  | Well ID<br>Date Sampled | MW-082<br>6/25/98 | MW-083<br>6/25/98 | MW-084<br>6/23/98 | MW-085<br>6/23/98 | MW-086<br>6/26/98 | MW-087<br>6/19/98 | MW-087A<br>6/19/98 |
|------------|-------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|
| Aluminum   |                         | < 0.026           | < 0.026           | < 0.026           | < 0.026           | < 0.026           | < 0.026           | < 0.026            |
| Arsenic    |                         | {0.01}            | {0.024}           | {0.019}           | {0.012}           | {0.003}           | {0.0036}          | {0.0036}           |
| Barium     |                         | {0.063}           | {0.11}            | {0.25}            | {0.26}            | {0.66}            | {0.016}           | {0.024}            |
| Boron      |                         | {0.11}            | {0.083}           | {0.062}           | {0.22}            | {0.28}            | {0.06}            | {0.4}              |
| Cadmium    |                         | {0.0002}          | {0.0002}          | < 0.0002          | < 0.0002          | {0.0002}          | < 0.0002          | < 0.0002           |
| Chromium   |                         | {0.0009}          | {0.0026}          | < 0.0008          | < 0.0008          | {0.0017}          | < 0.0008          | {0.0013}           |
| Cobalt     |                         | {0.0009}          | {0.0013}          | {0.0003}          | < 0.0003          | {0.002}           | < 0.0003          | {0.0009}           |
| Copper     |                         | < 0.0018          | < 0.0018          | < 0.0018          | {0.0018}          | < 0.0018          | < 0.0018          | < 0.0018           |
| Iron       |                         | {0.44}            | {0.81}            | {0.86}            | {1.1}             | {0.53}            | < 0.013           | {0.24}             |
| Lead       |                         | < 0.0022          | < 0.0022          | < 0.0022          | < 0.0022          | < 0.0022          | < 0.0022          | < 0.0022           |
| Manganese  |                         | {0.18}            | {0.54}            | {0.25}            | {0.19}            | {0.17}            | {0.0012}          | {0.012}            |
| Mercury    |                         | < 0.0001          | < 0.0001          | < 0.0001          | < 0.0001          | 0.0001            | < 0.0001          | < 0.0001           |
| Molybdenum |                         | {0.004}           | {0.0045}          | {0.0043}          | {0.002}           | {0.0012}          | {0.0025}          | {0.0053}           |
| Nickel     |                         | {0.0027}          | {0.0047}          | {0.002}           | {0.002}           | < 0.0009          | < 0.0009          | {0.0099}           |
| Selenium   |                         | < 0.005           | < 0.005           | < 0.0023          | < 0.0023          | < 0.005           | < 0.0023          | {0.0025}           |
| Silver     |                         | < 0.0007          | < 0.0007          | < 0.0007          | < 0.0007          | < 0.0007          | < 0.0007          | < 0.003            |
| Zinc       |                         | < 0.014           | < 0.014           | {0.014}           | {0.067}           | {0.039}           | {0.014}           | {0.014}            |

## Notes:

Concentrations listed in milligrams per liter (mg/L).

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical Dissolved Metals Analytical Data  
May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter  | Well ID<br>Date Sampled | MW-088<br>6/18/98 | MW-089<br>6/17/98 | MW-090<br>6/17/98 | MW-094<br>6/26/98 | MW-095<br>6/22/98 | MW-096<br>6/21/98 | MW-097<br>6/21/98 |
|------------|-------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Aluminum   |                         | < 0.055           | < 0.026           | < 0.026           | < 0.026           | < 0.026           | < 0.026           | < 0.026           |
| Arsenic    |                         | < 0.0018          | < 0.0018          | < 0.0044          | < 0.0018          | < 0.0018          | < 0.0018          | < 0.0018          |
| Barium     |                         | < 0.016           | < 0.018           | < 0.14            | < 0.04            | < 0.28            | < 0.015           | < 0.054           |
| Boron      |                         | < 0.1             | < 0.074           | < 0.11            | < 0.058           | < 0.049           | < 0.064           | < 0.056           |
| Cadmium    |                         | < 0.0002          | < 0.0002          | < 0.0002          | < 0.0002          | < 0.0002          | < 0.0002          | < 0.0002          |
| Chromium   |                         | < 0.0008          | < 0.0008          | < 0.001           | < 0.0066          | < 0.0008          | < 0.0016          | < 0.0009          |
| Cobalt     |                         | < 0.0003          | < 0.0003          | < 0.0003          | < 0.0003          | < 0.0003          | < 0.0003          | < 0.0003          |
| Copper     |                         | < 0.0018          | < 0.0018          | < 0.0018          | < 0.0018          | < 0.0018          | < 0.0018          | < 0.0018          |
| Iron       |                         | < 0.064           | < 0.014           | < 0.013           | < 0.013           | < 0.013           | < 0.013           | < 0.013           |
| Lead       |                         | < 0.0022          | < 0.0022          | < 0.0022          | < 0.0022          | < 0.0022          | < 0.0022          | < 0.0022          |
| Manganese  |                         | < 0.0062          | < 0.046           | < 0.0002          | < 0.0023          | < 0.019           | < 0.0071          | < 0.0002          |
| Mercury    |                         | < 0.0001          | < 0.0003          | < 0.0001          | < 0.0001          | < 0.0001          | < 0.0003          | < 0.0001          |
| Molybdenum |                         | < 0.0041          | < 0.0033          | < 0.0025          | < 0.0023          | < 0.0025          | < 0.0026          | < 0.0021          |
| Nickel     |                         | < 0.0009          | < 0.004           | < 0.0021          | < 0.0009          | < 0.0009          | < 0.0009          | < 0.0009          |
| Selenium   |                         | < 0.0023          | < 0.0023          | < 0.0023          | < 0.005           | < 0.0023          | < 0.0023          | < 0.0026          |
| Silver     |                         | < 0.0007          | < 0.0009          | < 0.0007          | < 0.0007          | < 0.0007          | < 0.0007          | < 0.0007          |
| Zinc       |                         | < 0.055           | < 0.026           | < 0.018           | < 0.022           | < 0.017           | < 0.014           | < 0.014           |

## Notes:

Concentrations listed in milligrams per liter (mg/L).

< Constituent not detected above noted laboratory detection limit.

## Appendix C

Historical Dissolved Metals Analytical Data  
 May 1991 - October 1998  
 Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter  | Well ID<br>Date Sampled | MW-098<br>6/29/98 | MW-104<br>6/21/98 | MW-106<br>6/18/98 | MW-108<br>6/22/98 | MW-110<br>6/30/98 | MW-111<br>6/29/98 | SW-01<br>6/30/98 |
|------------|-------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|
| Aluminum   |                         | <                 | <                 | <                 | <                 | <                 | <                 | <                |
| Arsenic    |                         | 0.026             | 0.0018            | 0.026             | 0.026             | 0.0046            | 0.0018            | 0.026            |
| Barium     |                         | 0.0047            | 0.017             | 0.0035            | 0.0019            | 0.0035            | 0.0018            | 0.0018           |
| Boron      |                         | 0.2               | 0.066             | 0.22              | 0.11              | 0.18              | 0.035             | 0.027            |
| Cadmium    |                         | 0.055             | 0.0002            | 0.074             | 0.046             | 0.071             | 0.13              | 0.056            |
| Chromium   |                         | 0.0003            | <                 | <                 | <                 | <                 | <                 | <                |
| Chromium   |                         | 0.001             | <                 | <                 | <                 | 0.0002            | 0.0002            | 0.0002           |
| Cobalt     |                         | 0.0003            | <                 | <                 | <                 | 0.0001            | 0.001             | 0.0011           |
| Copper     |                         | <                 | <                 | <                 | <                 | <                 | <                 | <                |
| Copper     |                         | 0.0018            | <                 | 0.0003            | 0.0003            | 0.0003            | 0.0003            | 0.0003           |
| Iron       |                         | 0.034             | <                 | 0.0033            | 0.0018            | 0.0018            | 0.0018            | 0.0018           |
| Lead       |                         | <                 | <                 | <                 | <                 | 0.043             | 0.092             | 0.06             |
| Manganese  |                         | 0.0022            | <                 | 0.013             | 0.013             | 0.0022            | 0.0022            | 0.0031           |
| Lead       |                         | <                 | <                 | <                 | <                 | 0.065             | 0.223             | 0.0032           |
| Manganese  |                         | 0.0002            | <                 | 0.0066            | 0.0004            | 0.0001            | 0.0001            | 0.0001           |
| Mercury    |                         | <                 | <                 | 0.0005            | 0.0001            | 0.0001            | 0.0001            | 0.0001           |
| Molybdenum |                         | 0.0034            | 0.0034            | 0.0019            | 0.0028            | 0.0038            | 0.0044            | 0.0019           |
| Nickel     |                         | <                 | <                 | <                 | <                 | <                 | <                 | <                |
| Nickel     |                         | 0.0009            | 0.0009            | 0.0009            | 0.0009            | 0.0009            | 0.0009            | 0.0009           |
| Selenium   |                         | <                 | <                 | <                 | <                 | <                 | <                 | <                |
| Selenium   |                         | 0.005             | 0.0023            | 0.0023            | 0.0023            | 0.0023            | 0.005             | 0.0023           |
| Silver     |                         | <                 | <                 | <                 | <                 | <                 | <                 | <                |
| Silver     |                         | 0.0007            | 0.0007            | 0.0007            | 0.0007            | 0.0007            | 0.0007            | 0.0007           |
| Zinc       |                         | 0.022             | 0.022             | 0.046             | 0.014             | 0.024             | 0.014             | 0.09             |

## Notes:

Concentrations listed in milligrams per liter (mg/L).  
 < Constituent not detected above noted laboratory detection limit.

## Appendix C

Historical Dissolved Metals Analytical Data  
 May 1991 - October 1998  
 Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter  | Well ID<br>Date Sampled | SW-02<br>6/24/98 | SW-03<br>6/24/98 | UIHS_ARROYO<br>6/26/98 |
|------------|-------------------------|------------------|------------------|------------------------|
| Aluminum   | <                       | 0.026            | <                | <                      |
| Arsenic    | <                       | 0.0018           | <                | 0.0018                 |
| Barium     | <                       | 0.072            | 0.0022           | 0.044                  |
| Boron      | <                       | 0.084            | 0.11             | 0.078                  |
| Cadmium    | <                       | 0.0002           | 0.0003           | <                      |
| Chromium   | <                       | 0.0008           | 0.001            | <                      |
| Cobalt     | <                       | 0.0003           | 0.0004           | 0.0004                 |
| Copper     | <                       | 0.0018           | 0.0018           | 0.0018                 |
| Iron       | <                       | 0.013            | 0.015            | 0.015                  |
| Lead       | <                       | 0.018            | 0.0022           | 0.0022                 |
| Manganese  | <                       | 0.06             | 0.0015           | 0.012                  |
| Mercury    | <                       | 0.0001           | 0.0001           | <                      |
| Molybdenum | <                       | 0.002            | 0.0024           | 0.0021                 |
| Nickel     | <                       | 0.0009           | 0.0009           | <                      |
| Selenium   | <                       | 0.0023           | 0.005            | <                      |
| Silver     | <                       | 0.0007           | 0.0007           | <                      |
| Zinc       | <                       | 0.028            | 0.048            | 0.024                  |

## Notes:

Concentrations listed in milligrams per liter (mg/L).

< Constituent not detected above noted laboratory detection limit.

Historical Pesticide and PCB  
Analytical Data  
May 1991 - October 1998

## Appendix C

Historical Pesticide and PCB Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter           | Well ID<br>Date Sampled | LYMAN<br>6/29/98 | MW-013<br>6/21/98 | MW-014<br>6/22/98 | MW-041<br>6/19/98 | MW-043<br>6/22/98 | MW-044<br>6/22/98 | MW-046<br>6/21/98 | MW-049<br>6/21/98 | MW-050<br>6/19/98 |
|---------------------|-------------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Aldrin              |                         | < 0.02           | 0.14              | < 0.1             | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             | < 0.02            |
| alpha-BHC           |                         | < 0.02           | 0.43              | < 0.1             | < 0.02            | < 0.02            | < 0.02            | < 0.02            | 0.06              | < 0.02            |
| beta-BHC            |                         | < 0.02           | 0.47              | < 0.1             | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             | < 0.02            |
| delta-BHC           |                         | < 0.02           | 0.22              | 0.17              | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             | < 0.02            |
| gamma-BHC (Lindane) |                         | < 0.02           | < 0.02            | < 0.1             | 0.02              | < 0.02            | < 0.02            | 0.06              | < 0.1             | < 0.02            |
| 4,4'-DDD            |                         | < 0.02           | 0.22              | < 0.1             | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             | < 0.02            |
| 4,4'-DDE            |                         | < 0.02           | < 0.02            | < 0.1             | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             | < 0.02            |
| 4,4'-DDT            |                         | < 0.02           | < 0.02            | < 0.1             | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             | < 0.02            |
| Dieldrin            |                         | < 0.02           | < 0.02            | < 0.1             | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             | < 0.02            |
| Endosulfan I        |                         | < 0.02           | 0.02              | < 0.1             | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             | < 0.02            |
| Endosulfan II       |                         | < 0.02           | < 0.02            | < 0.1             | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             | < 0.02            |
| Endosulfan sulfate  |                         | < 0.02           | < 0.02            | < 0.1             | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             | < 0.02            |
| Endrin              |                         | < 0.02           | < 0.02            | < 0.1             | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             | < 0.02            |
| Endrin aldehyde     |                         | < 0.02           | < 0.02            | < 0.1             | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             | < 0.02            |
| Heptachlor          |                         | < 0.02           | < 0.02            | < 0.1             | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             | < 0.02            |
| Heptachlor epoxide  |                         | < 0.02           | < 0.02            | < 0.1             | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             | < 0.02            |
| Methoxychlor        |                         | < 0.02           | < 0.02            | < 0.1             | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             | < 0.02            |
| Chlordane           |                         | < 0.01           | < 0.01            | < 0.05            | < 0.01            | < 0.01            | < 0.01            | < 0.01            | < 0.05            | < 0.01            |
| Toxaphene           |                         | < 0.12           | < 0.12            | < 0.6             | < 0.12            | < 0.12            | < 0.12            | < 0.12            | < 0.6             | < 0.12            |
| PCB-1016            |                         | < 0.04           | < 0.04            | < 0.2             | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.2             | < 0.04            |
| PCB-1221            |                         | < 0.04           | < 0.04            | < 0.2             | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.2             | < 0.04            |
| PCB-1232            |                         | < 0.04           | < 0.04            | < 0.2             | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.2             | < 0.04            |
| PCB-1242            |                         | < 0.04           | < 0.04            | < 0.2             | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.2             | < 0.04            |
| PCB-1248            |                         | < 0.04           | < 0.04            | < 0.2             | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.2             | < 0.04            |
| PCB-1254            |                         | < 0.04           | < 0.04            | < 0.2             | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.2             | < 0.04            |
| PCB-1260            |                         | < 0.04           | < 0.04            | < 0.2             | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.2             | < 0.04            |

## Notes:

Concentrations listed in micrograms per liter (ug/L):

PCBs Polychlorinated Biphenyls

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

## Appendix C

Historical Pesticide and PCB Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter           | Well ID<br>Date Sampled | MW-054<br>6/25/98 | MW-055<br>6/25/98 | MW-057<br>6/25/98 | MW-058<br>6/22/98 | MW-059<br>6/24/98 | MW-060<br>7/19/91 | MW-060<br>6/21/98 | MW-061<br>6/18/98 | MW-061A<br>6/18/98 |
|---------------------|-------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|
| Aldrin              |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 1               | --                | < 0.02            | < 0.02            | < 0.02             |
| alpha-BHC           |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 1               | --                | < 0.02            | < 0.02            | < 0.02             |
| beta-BHC            |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 1               | < 14              | < 0.02            | < 0.02            | < 0.02             |
| delta-BHC           |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 1               | --                | < 0.02            | < 0.02            | < 0.02             |
| gamma-BHC (Lindane) |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 1               | --                | < 0.02            | < 0.02            | 0.11               |
| 4,4'-DDD            |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 1               | --                | < 0.02            | < 0.02            | < 0.02             |
| 4,4'-DDE            |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 1               | --                | < 0.02            | < 0.02            | < 0.02             |
| 4,4'-DDT            |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 1               | --                | < 0.02            | < 0.02            | < 0.02             |
| Dieldrin            |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 1               | --                | < 0.02            | < 0.02            | < 0.02             |
| Endosulfan I        |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 1               | --                | < 0.02            | < 0.02            | < 0.02             |
| Endosulfan II       |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 1               | --                | < 0.02            | < 0.02            | < 0.02             |
| Endosulfan sulfate  |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 1               | --                | < 0.02            | < 0.02            | < 0.02             |
| Endrin              |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 1               | --                | < 0.02            | < 0.02            | < 0.02             |
| Endrin aldehyde     |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 1               | --                | < 0.02            | < 0.02            | < 0.02             |
| Heptachlor          |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 1               | --                | < 0.02            | < 0.02            | < 0.02             |
| Heptachlor epoxide  |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 1               | --                | < 0.02            | < 0.02            | < 0.02             |
| Methoxychlor        |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 1               | --                | < 0.02            | < 0.02            | < 0.02             |
| Chlordane           |                         | < 0.01            | < 0.01            | < 0.01            | < 0.01            | < 0.5             | --                | < 0.01            | < 0.01            | < 0.01             |
| Toxaphene           |                         | < 0.12            | < 0.12            | < 0.12            | < 0.12            | < 6               | --                | < 0.12            | < 0.12            | < 0.12             |
| PCB-1016            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 2               | --                | < 0.04            | < 0.04            | < 0.04             |
| PCB-1221            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 2               | --                | < 0.04            | < 0.04            | < 0.04             |
| PCB-1232            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 2               | --                | < 0.04            | < 0.04            | < 0.04             |
| PCB-1242            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 2               | --                | < 0.04            | < 0.04            | < 0.04             |
| PCB-1248            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 2               | --                | < 0.04            | < 0.04            | < 0.04             |
| PCB-1254            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 2               | --                | < 0.04            | < 0.04            | < 0.04             |
| PCB-1260            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 2               | --                | < 0.04            | < 0.04            | < 0.04             |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

PCBs Polychlorinated Biphenyls

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

## Appendix C

Historical Pesticide and PCB Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter           | Well ID<br>Date Sampled | MW-062<br>6/26/98 | MW-063<br>6/25/98 | MW-064<br>6/23/98 | MW-065A<br>6/25/98 | MW-066<br>6/17/98 | MW-067<br>6/24/98 | MW-068<br>6/26/98 | MW-069<br>6/29/98 | MW-070<br>6/16/98 |
|---------------------|-------------------------|-------------------|-------------------|-------------------|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Aldrin              |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.1             | < 0.02            | < 0.02            |
| alpha-BHC           |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | 0.18              | < 0.02            | < 0.02            |
| beta-BHC            |                         | 0.08              | < 0.02            | < 0.02            | 0.36               | < 0.02            | 0.03              | 1.29              | < 0.02            | < 0.02            |
| delta-BHC           |                         | < 0.02            | < 0.02            | < 0.02            | 0.04               | < 0.02            | < 0.02            | 0.26              | < 0.02            | < 0.02            |
| gamma-BHC (Lindane) |                         | < 0.02            | < 0.02            | < 0.02            | 0.1                | < 0.02            | 0.04              | 0.43              | < 0.02            | < 0.02            |
| 4,4'-DDD            |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.1             | < 0.02            | < 0.02            |
| 4,4'-DDE            |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.1             | < 0.02            | < 0.02            |
| 4,4'-DDT            |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.1             | < 0.02            | < 0.02            |
| Dieldrin            |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.1             | < 0.02            | < 0.02            |
| Endosulfan I        |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.1             | < 0.02            | < 0.02            |
| Endosulfan II       |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.1             | < 0.02            | < 0.02            |
| Endosulfan sulfate  |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.1             | < 0.02            | < 0.02            |
| Endrin              |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.1             | < 0.02            | < 0.02            |
| Endrin aldehyde     |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.1             | < 0.02            | < 0.02            |
| Heptachlor          |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.1             | < 0.02            | < 0.02            |
| Heptachlor epoxide  |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.1             | < 0.02            | < 0.02            |
| Methoxychlor        |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.1             | < 0.02            | < 0.02            |
| Chlordane           |                         | < 0.01            | < 0.01            | < 0.01            | < 0.01             | < 0.01            | < 0.01            | < 0.05            | < 0.01            | < 0.01            |
| Toxaphene           |                         | < 0.12            | < 0.12            | < 0.12            | < 0.12             | < 0.12            | < 0.12            | < 0.6             | < 0.12            | < 0.12            |
| PCB-1016            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04             | < 0.04            | < 0.04            | < 0.2             | < 0.04            | < 0.04            |
| PCB-1221            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04             | < 0.04            | < 0.04            | < 0.2             | < 0.04            | < 0.04            |
| PCB-1232            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04             | < 0.04            | < 0.04            | < 0.2             | < 0.04            | < 0.04            |
| PCB-1242            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04             | < 0.04            | < 0.04            | < 0.2             | < 0.04            | < 0.04            |
| PCB-1248            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04             | < 0.04            | < 0.04            | < 0.2             | < 0.04            | < 0.04            |
| PCB-1254            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04             | < 0.04            | < 0.04            | < 0.2             | < 0.04            | < 0.04            |
| PCB-1260            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04             | < 0.04            | < 0.04            | < 0.2             | < 0.04            | < 0.04            |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

PCBs Polychlorinated Biphenyls

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

## Appendix C

Historical Pesticide and PCB Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter           | Well ID<br>Date Sampled | MW-071<br>6/19/98 | MW-072<br>6/30/98 | MW-073<br>6/30/98 | MW-074<br>6/24/98 | MW-075<br>6/30/98 | MW-076<br>6/29/98 | MW-078<br>6/19/98 | MW-081<br>6/29/98 | MW-082<br>6/25/98 |
|---------------------|-------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Aldrin              |                         | < 0.02            | < 0.1             | < 0.02            | < 0.2             | < 0.1             | < 0.4             | < 0.02            | < 0.2             | < 0.02            |
| alpha-BHC           |                         | < 0.02            | < 0.1             | < 0.02            | < 0.2             | < 0.1             | < 0.4             | < 0.02            | < 0.2             | < 0.02            |
| beta-BHC            |                         | < 0.02            | 0.29              | 0.17              | 0.32              | 0.26              | < 0.4             | < 0.02            | 0.51              | 0.22              |
| delta-BHC           |                         | < 0.02            | 0.1               | 0.06              | 0.2               | 0.1               | < 0.4             | < 0.02            | 0.2               | 0.04              |
| gamma-BHC (Lindane) |                         | < 0.02            | < 0.1             | 0.32              | < 0.2             | < 0.1             | < 0.4             | < 0.02            | < 0.2             | 0.21              |
| 4,4'-DDD            |                         | < 0.02            | < 0.1             | < 0.02            | < 0.2             | < 0.1             | < 0.4             | < 0.02            | < 0.2             | < 0.02            |
| 4,4'-DDE            |                         | < 0.02            | < 0.1             | < 0.02            | < 0.2             | < 0.1             | < 0.4             | < 0.02            | < 0.2             | < 0.02            |
| 4,4'-DDT            |                         | < 0.02            | < 0.1             | < 0.02            | < 0.2             | < 0.1             | < 0.4             | < 0.02            | < 0.2             | < 0.02            |
| Dieldrin            |                         | < 0.02            | < 0.1             | 0.06              | < 0.2             | < 0.1             | < 0.4             | < 0.02            | < 0.2             | < 0.02            |
| Endosulfan I        |                         | < 0.02            | < 0.1             | < 0.02            | < 0.2             | < 0.1             | < 0.4             | < 0.02            | < 0.2             | < 0.02            |
| Endosulfan II       |                         | < 0.02            | < 0.1             | < 0.02            | < 0.2             | < 0.1             | < 0.4             | < 0.02            | < 0.2             | < 0.02            |
| Endosulfan sulfate  |                         | < 0.02            | < 0.1             | < 0.02            | < 0.2             | < 0.1             | < 0.4             | < 0.02            | < 0.2             | < 0.02            |
| Endrin              |                         | < 0.02            | < 0.1             | < 0.02            | < 0.2             | < 0.1             | < 0.4             | < 0.02            | < 0.2             | < 0.02            |
| Endrin aldehyde     |                         | < 0.02            | < 0.1             | < 0.02            | < 0.2             | < 0.1             | < 0.4             | < 0.02            | < 0.2             | < 0.02            |
| Heptachlor          |                         | < 0.02            | < 0.1             | < 0.02            | < 0.2             | < 0.1             | < 0.4             | < 0.02            | < 0.2             | < 0.02            |
| Heptachlor epoxide  |                         | < 0.02            | < 0.1             | < 0.02            | < 0.2             | < 0.1             | < 0.4             | < 0.02            | < 0.2             | < 0.02            |
| Methoxychlor        |                         | < 0.02            | < 0.1             | < 0.02            | < 0.2             | < 0.1             | < 0.4             | < 0.02            | < 0.2             | < 0.02            |
| Chlordane           |                         | < 0.01            | < 0.05            | < 0.01            | < 0.1             | < 0.05            | < 0.2             | < 0.01            | < 0.1             | < 0.01            |
| Toxaphene           |                         | < 0.12            | < 0.6             | < 0.12            | < 1.2             | < 0.6             | < 2.4             | < 0.12            | < 1.2             | < 0.12            |
| PCB-1016            |                         | < 0.04            | < 0.2             | < 0.04            | < 0.4             | < 0.2             | < 0.8             | < 0.04            | < 0.4             | < 0.04            |
| PCB-1221            |                         | < 0.04            | < 0.2             | < 0.04            | < 0.4             | < 0.2             | < 0.8             | < 0.04            | < 0.4             | < 0.04            |
| PCB-1232            |                         | < 0.04            | < 0.2             | < 0.04            | < 0.4             | < 0.2             | < 0.8             | < 0.04            | < 0.4             | < 0.04            |
| PCB-1242            |                         | < 0.04            | < 0.2             | < 0.04            | < 0.4             | < 0.2             | < 0.8             | < 0.04            | < 0.4             | < 0.04            |
| PCB-1248            |                         | < 0.04            | < 0.2             | < 0.04            | < 0.4             | < 0.2             | < 0.8             | < 0.04            | < 0.4             | < 0.04            |
| PCB-1254            |                         | < 0.04            | < 0.2             | < 0.04            | < 0.4             | < 0.2             | < 0.8             | < 0.04            | < 0.4             | < 0.04            |
| PCB-1260            |                         | < 0.04            | < 0.2             | < 0.04            | < 0.4             | < 0.2             | < 0.8             | < 0.04            | < 0.4             | < 0.04            |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

PCBs Polychlorinated Biphenyls

&lt; Constituent not detected above noted laboratory detection limit.

.. Not analyzed or not reported.

## Appendix C

## Historical Pesticide and PCB Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter           | Well ID<br>Date Sampled | MW-083<br>6/25/98 | MW-084<br>6/23/98 | MW-085<br>6/23/98 | MW-086<br>6/26/98 | MW-087<br>6/19/98 | MW-087A<br>6/19/98 | MW-088<br>6/18/98 | MW-089<br>6/17/98 | MW-090<br>6/17/98 |
|---------------------|-------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|-------------------|-------------------|-------------------|
| Aldrin              |                         | < 0.02            | < 0.02            | < 0.4             | 0.16              | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.02            |
| alpha-BHC           |                         | < 0.02            | < 0.02            | < 0.4             | 0.46              | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.02            |
| beta-BHC            |                         | 0.18              | < 0.02            | < 0.4             | 0.31              | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.02            |
| delta-BHC           |                         | 0.04              | < 0.02            | < 0.4             | 0.14              | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.02            |
| gamma-BHC (Lindane) |                         | 0.22              | < 0.02            | < 0.4             | 0.53              | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.02            |
| 4,4'-DDD            |                         | < 0.02            | < 0.02            | < 0.4             | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.02            |
| 4,4'-DDE            |                         | < 0.02            | < 0.02            | < 0.4             | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.02            |
| 4,4'-DDT            |                         | < 0.02            | < 0.02            | < 0.4             | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.02            |
| Dieldrin            |                         | < 0.02            | < 0.02            | < 0.4             | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.02            |
| Endosulfan I        |                         | < 0.02            | < 0.02            | < 0.4             | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.02            |
| Endosulfan II       |                         | < 0.02            | < 0.02            | < 0.4             | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.02            |
| Endosulfan sulfate  |                         | < 0.02            | < 0.02            | < 0.4             | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.02            |
| Endrin              |                         | < 0.02            | < 0.02            | < 0.4             | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.02            |
| Endrin aldehyde     |                         | < 0.02            | < 0.02            | < 0.4             | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.02            |
| Heptachlor          |                         | < 0.02            | < 0.02            | < 0.4             | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.02            |
| Heptachlor epoxide  |                         | < 0.02            | < 0.02            | < 0.4             | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.02            |
| Methoxychlor        |                         | < 0.02            | < 0.02            | < 0.4             | < 0.02            | < 0.02            | < 0.02             | < 0.02            | < 0.02            | < 0.02            |
| Chlordane           |                         | < 0.01            | < 0.01            | < 0.2             | < 0.01            | < 0.01            | < 0.01             | < 0.01            | < 0.01            | < 0.01            |
| Toxaphene           |                         | < 0.12            | < 0.12            | < 2.4             | < 0.12            | < 0.12            | < 0.12             | < 0.12            | < 0.12            | < 0.12            |
| PCB-1016            |                         | < 0.04            | < 0.04            | < 0.8             | < 0.04            | < 0.04            | < 0.04             | < 0.04            | < 0.04            | < 0.04            |
| PCB-1221            |                         | < 0.04            | < 0.04            | < 0.8             | < 0.04            | < 0.04            | < 0.04             | < 0.04            | < 0.04            | < 0.04            |
| PCB-1232            |                         | < 0.04            | < 0.04            | < 0.8             | < 0.04            | < 0.04            | < 0.04             | < 0.04            | < 0.04            | < 0.04            |
| PCB-1242            |                         | < 0.04            | < 0.04            | < 0.8             | < 0.04            | < 0.04            | < 0.04             | < 0.04            | < 0.04            | < 0.04            |
| PCB-1248            |                         | < 0.04            | < 0.04            | < 0.8             | < 0.04            | < 0.04            | < 0.04             | < 0.04            | < 0.04            | < 0.04            |
| PCB-1254            |                         | < 0.04            | < 0.04            | < 0.8             | < 0.04            | < 0.04            | < 0.04             | < 0.04            | < 0.04            | < 0.04            |
| PCB-1260            |                         | < 0.04            | < 0.04            | < 0.8             | < 0.04            | < 0.04            | < 0.04             | < 0.04            | < 0.04            | < 0.04            |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

PCBs Polychlorinated Biphenyls

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

## Appendix C

## Historical Pesticide and PCB Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter           | Well ID<br>Date Sampled | MW-094<br>6/26/98 | MW-095<br>6/22/98 | MW-096<br>6/21/98 | MW-097<br>6/21/98 | MW-098<br>6/29/98 | MW-104<br>6/21/98 | MW-106<br>6/18/98 | MW-108<br>6/22/98 | MW-110<br>6/30/98 |
|---------------------|-------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Aldrin              |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             |
| alpha-BHC           |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             |
| beta-BHC            |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             |
| delta-BHC           |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             |
| gamma-BHC (Lindane) |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             |
| 4,4'-DDD            |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             |
| 4,4'-DDE            |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             |
| 4,4'-DDT            |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             |
| Dieldrin            |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             |
| Endosulfan I        |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             |
| Endosulfan II       |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             |
| Endosulfan sulfate  |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             |
| Endrin              |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             |
| Endrin aldehyde     |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             |
| Heptachlor          |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             |
| Heptachlor epoxide  |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             |
| Methoxychlor        |                         | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.02            | < 0.1             |
| Chlordane           |                         | < 0.01            | < 0.01            | < 0.01            | < 0.01            | < 0.01            | < 0.01            | < 0.01            | < 0.01            | < 0.05            |
| Toxaphene           |                         | < 0.12            | < 0.12            | < 0.12            | < 0.12            | < 0.12            | < 0.12            | < 0.12            | < 0.12            | < 0.6             |
| PCB-1016            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.2             |
| PCB-1221            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.2             |
| PCB-1232            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.2             |
| PCB-1242            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.2             |
| PCB-1248            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.2             |
| PCB-1254            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.2             |
| PCB-1260            |                         | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.04            | < 0.2             |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

PCBs Polychlorinated Biphenyls

&lt; Constituent not detected above noted laboratory detection limit.

.. Not analyzed or not reported.

## Appendix C

Historical Pesticide and PCB Analytical Data  
 May 1991 - October 1998  
 Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter           | Well ID<br>Date Sampled | MW-111<br>6/29/98 | SW-01<br>12/10/97 | SW-01<br>6/30/98 | SW-02<br>6/24/98 | SW-03<br>6/24/98 | UIHS_ARROYO<br>6/26/98 |
|---------------------|-------------------------|-------------------|-------------------|------------------|------------------|------------------|------------------------|
| Aldrin              |                         | < 0.02            |                   | < 0.02           | < 0.02           | < 0.02           | < 0.02                 |
| alpha-BHC           |                         | < 0.02            | --                | < 0.02           | < 0.02           | < 0.02           | < 0.02                 |
| beta-BHC            |                         | < 0.02            | < 0.05            | < 0.02           | < 0.02           | < 0.02           | < 0.02                 |
| delta-BHC           |                         | < 0.02            | --                | < 0.02           | < 0.02           | < 0.02           | < 0.02                 |
| gamma-BHC (Lindane) |                         | < 0.02            | --                | < 0.02           | < 0.02           | < 0.02           | < 0.02                 |
| 4,4'-DDD            |                         | < 0.02            | --                | < 0.02           | < 0.02           | < 0.02           | < 0.02                 |
| 4,4'-DDE            |                         | < 0.02            | --                | < 0.02           | < 0.02           | < 0.02           | < 0.02                 |
| 4,4'-DDT            |                         | < 0.02            | --                | < 0.02           | < 0.02           | < 0.02           | < 0.02                 |
| Dieldrin            |                         | < 0.02            | --                | < 0.02           | < 0.02           | < 0.02           | < 0.02                 |
| Endosulfan I        |                         | < 0.02            | --                | < 0.02           | < 0.02           | < 0.02           | < 0.02                 |
| Endosulfan II       |                         | < 0.02            | --                | < 0.02           | < 0.02           | < 0.02           | < 0.02                 |
| Endosulfan sulfate  |                         | < 0.02            | --                | < 0.02           | < 0.02           | < 0.02           | < 0.02                 |
| Endrin              |                         | < 0.02            | --                | < 0.02           | < 0.02           | < 0.02           | < 0.02                 |
| Endrin aldehyde     |                         | < 0.02            | --                | < 0.02           | < 0.02           | < 0.02           | < 0.02                 |
| Heptachlor          |                         | < 0.02            | --                | < 0.02           | < 0.02           | < 0.02           | < 0.02                 |
| Heptachlor epoxide  |                         | < 0.02            | --                | < 0.02           | < 0.02           | < 0.02           | < 0.02                 |
| Methoxychlor        |                         | < 0.02            | --                | < 0.02           | < 0.02           | < 0.02           | < 0.02                 |
| Chlordane           |                         | < 0.01            | --                | < 0.01           | < 0.01           | < 0.01           | < 0.01                 |
| Toxaphene           |                         | < 0.12            | --                | < 0.12           | < 0.12           | < 0.12           | < 0.12                 |
| PCB-1016            |                         | < 0.04            | --                | < 0.04           | < 0.04           | < 0.04           | < 0.04                 |
| PCB-1221            |                         | < 0.04            | --                | < 0.04           | < 0.04           | < 0.04           | < 0.04                 |
| PCB-1232            |                         | < 0.04            | --                | < 0.04           | < 0.04           | < 0.04           | < 0.04                 |
| PCB-1242            |                         | < 0.04            | --                | < 0.04           | < 0.04           | < 0.04           | < 0.04                 |
| PCB-1248            |                         | < 0.04            | --                | < 0.04           | < 0.04           | < 0.04           | < 0.04                 |
| PCB-1254            |                         | < 0.04            | --                | < 0.04           | < 0.04           | < 0.04           | < 0.04                 |
| PCB-1260            |                         | < 0.04            | --                | < 0.04           | < 0.04           | < 0.04           | < 0.04                 |

## Notes:

Concentrations listed in micrograms per liter (ug/L).

PCBs Polychlorinated Biphenyls

&lt; Constituent not detected above noted laboratory detection limit.

-- Not analyzed or not reported.

Historical General Chemistry  
Analytical Data  
May 1991 - October 1998

# Appendix C

Historical General Chemistry Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | BIEBBLE<br>7/1/91 | BIEBBLE<br>4/1/92 | BIEBBLE<br>7/1/92 | BIEBBLE<br>10/1/92 | BIEBBLE<br>1/1/93 | BIEBBLE<br>4/15/93 | BIEBBLE<br>7/15/93 | BIEBBLE<br>10/14/93 |
|----------------------------------|-------------------------|-------------------|-------------------|-------------------|--------------------|-------------------|--------------------|--------------------|---------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --                | --                 | --                | --                 | --                 | --                  |
| Ammonia (as N)                   |                         | --                | --                | --                | --                 | --                | --                 | --                 | --                  |
| Bromide                          |                         | --                | --                | --                | --                 | --                | --                 | --                 | --                  |
| Carbonate Alkalinity             |                         | --                | --                | --                | --                 | --                | --                 | --                 | --                  |
| Chloride                         | 14                      | 14                | 13.5              | 7.8               | 10.1               | 10.6              | 11.4               | 13.3               | 10.4                |
| Cyanide                          | --                      | --                | --                | --                | --                 | --                | --                 | --                 | --                  |
| Fluoride                         | 1.4                     | --                | --                | --                | --                 | --                | --                 | --                 | --                  |
| Hydroxide                        | --                      | --                | --                | --                | --                 | --                | --                 | --                 | --                  |
| Carbon Dioxide                   | --                      | --                | --                | --                | --                 | --                | --                 | --                 | --                  |
| Nitrate                          | --                      | --                | --                | --                | --                 | --                | --                 | --                 | --                  |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                | --                | --                | --                 | --                | --                 | --                 | --                  |
| Orthophosphate                   | --                      | --                | --                | --                | --                 | --                | --                 | --                 | --                  |
| pH*                              | --                      | --                | --                | --                | --                 | --                | --                 | --                 | --                  |
| Phenols, total                   | --                      | --                | --                | --                | --                 | --                | --                 | --                 | --                  |
| Specific conductivity**          | --                      | --                | --                | --                | --                 | --                | --                 | --                 | --                  |
| Sulfate                          | 250                     | --                | --                | --                | --                 | --                | --                 | --                 | --                  |
| Total dissolved solids (TDS)     | 1000                    | --                | --                | --                | --                 | --                | --                 | --                 | --                  |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data  
 May 1991 - October 1998  
 Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | BIEBBLE<br>1/13/94 | BIEBBLE<br>4/5/94 | BIEBBLE<br>7/21/94 | BIEBBLE<br>10/6/94 | BIEBBLE<br>1/11/95 | BIEBBLE<br>4/7/95 | BIEBBLE<br>7/21/95 | BIEBBLE<br>10/12/95 | BIEBBLE<br>1/19/96 |
|----------------------------------|-------------------------|--------------------|-------------------|--------------------|--------------------|--------------------|-------------------|--------------------|---------------------|--------------------|
| Bicarbonate Alkalinity           |                         | --                 | --                | --                 | --                 | --                 | --                | --                 | --                  | --                 |
| Ammonia (as N)                   |                         | --                 | --                | --                 | --                 | --                 | --                | --                 | --                  | --                 |
| Bromide                          |                         | --                 | --                | --                 | --                 | --                 | --                | --                 | --                  | --                 |
| Carbonate Alkalinity             |                         | --                 | --                | --                 | --                 | --                 | --                | --                 | --                  | --                 |
| Chloride                         | 11                      | 11                 | 10.5              | 15                 | 13                 | 8                  | 10.8              | 10                 | 13                  | 9                  |
| Cyanide                          | --                      | --                 | --                | --                 | --                 | --                 | --                | --                 | --                  | --                 |
| Fluoride                         | --                      | --                 | --                | --                 | --                 | --                 | --                | --                 | --                  | --                 |
| Hydroxide                        | --                      | --                 | --                | --                 | --                 | --                 | --                | --                 | --                  | --                 |
| Carbon Dioxide                   | --                      | --                 | --                | --                 | --                 | --                 | --                | --                 | --                  | --                 |
| Nitrate                          | --                      | --                 | --                | --                 | --                 | --                 | --                | --                 | --                  | --                 |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                 | --                | --                 | --                 | --                 | --                | --                 | --                  | --                 |
| Orthophosphate                   | --                      | --                 | --                | --                 | --                 | --                 | --                | --                 | --                  | --                 |
| pH*                              | --                      | --                 | --                | --                 | --                 | --                 | --                | --                 | --                  | --                 |
| Phenols, total                   | --                      | --                 | --                | --                 | --                 | --                 | --                | --                 | --                  | --                 |
| Specific conductivity**          | --                      | --                 | --                | --                 | --                 | --                 | --                | --                 | --                  | --                 |
| Sulfate                          | --                      | --                 | --                | --                 | --                 | --                 | --                | --                 | --                  | --                 |
| Total dissolved solids (TDS)     | --                      | --                 | --                | --                 | --                 | --                 | --                | --                 | --                  | --                 |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | BIEBBLE<br>4/17/96 | BIEBBLE<br>7/1/96 | BIEBBLE<br>10/1/96 | BIEBBLE<br>2/10/97 | IW-02<br>8/1/96 | IW-02<br>8/22/96 | LOWER-QUEEN-MAX<br>4/1/92 | LOWER-QUEEN-MAX<br>7/1/92 |
|----------------------------------|-------------------------|--------------------|-------------------|--------------------|--------------------|-----------------|------------------|---------------------------|---------------------------|
| Bicarbonate Alkalinity           |                         | --                 | --                | --                 | --                 | --              | --               | --                        | --                        |
| Ammonia (as N)                   |                         | --                 | --                | --                 | --                 | --              | --               | --                        | --                        |
| Bromide                          |                         | --                 | --                | --                 | --                 | --              | --               | --                        | --                        |
| Carbonate Alkalinity             |                         | --                 | --                | --                 | --                 | --              | --               | --                        | --                        |
| Chloride                         | 10.5                    | 11                 | 11                | 10                 | 7                  | 218             | 236              | --                        | --                        |
| Cyanide                          | --                      | --                 | --                | --                 | --                 | --              | --               | --                        | --                        |
| Fluoride                         | --                      | --                 | --                | --                 | --                 | --              | --               | --                        | --                        |
| Hydroxide                        | --                      | --                 | --                | --                 | --                 | --              | --               | --                        | --                        |
| Carbon Dioxide                   | --                      | --                 | --                | --                 | --                 | --              | --               | --                        | --                        |
| Nitrate                          | --                      | --                 | --                | --                 | --                 | --              | --               | --                        | --                        |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                 | --                | --                 | --                 | --              | --               | --                        | --                        |
| Orthophosphate                   | --                      | --                 | --                | --                 | --                 | --              | --               | --                        | --                        |
| pH*                              | --                      | --                 | --                | --                 | --                 | --              | --               | --                        | --                        |
| Phenols, total                   | --                      | --                 | --                | --                 | --                 | --              | --               | --                        | --                        |
| Specific conductivity**          | --                      | --                 | --                | --                 | --                 | --              | --               | --                        | --                        |
| Sulfate                          | --                      | --                 | --                | --                 | --                 | 370             | --               | --                        | --                        |
| Total dissolved solids (TDS)     | --                      | --                 | --                | --                 | --                 | --              | --               | --                        | --                        |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | 10/1/92 | 1/1/93 | 4/1/93 | 7/1/93 | 10/1/93 | 1/1/94 |
|----------------------------------|-------------------------|---------|--------|--------|--------|---------|--------|
| Bicarbonate Alkalinity           |                         | --      | --     | --     | --     | --      | --     |
| Ammonia (as N)                   |                         | --      | --     | --     | --     | --      | --     |
| Bromide                          |                         | --      | --     | --     | --     | --      | --     |
| Carbonate Alkalinity             |                         | --      | --     | --     | --     | --      | --     |
| Chloride                         |                         | 285     | 344    | 363    | 459    | 181     | 160    |
| Cyanide                          |                         | --      | --     | --     | --     | --      | --     |
| Fluoride                         |                         | --      | --     | --     | --     | --      | --     |
| Hydroxide                        |                         | --      | --     | --     | --     | --      | --     |
| Carbon Dioxide                   |                         | --      | --     | --     | --     | --      | --     |
| Nitrate                          |                         | --      | --     | --     | --     | --      | --     |
| Nitrogen, Kjeldahl, total (as N) |                         | --      | --     | --     | --     | --      | --     |
| Orthophosphate                   |                         | --      | --     | --     | --     | --      | --     |
| pH*                              |                         | --      | --     | --     | --     | --      | --     |
| Phenols, total                   |                         | --      | --     | --     | --     | --      | --     |
| Specific conductivity**          |                         | --      | --     | --     | --     | --      | --     |
| Sulfate                          |                         | --      | --     | --     | --     | --      | --     |
| Total dissolved solids (TDS)     |                         | --      | --     | --     | --     | --      | --     |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data  
 May 1991 - October 1998  
 Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | LOWER-QUEEN-MAX<br>4/1/94 | LOWER-QUEEN-MAX<br>7/1/94 | LOWER-QUEEN-MAX<br>10/1/94 | LOWER-QUEEN-MAX<br>1/1/95 | LOWER-QUEEN-MAX<br>4/1/95 | LYMAN<br>7/1/91 | LYMAN<br>4/1/92 |
|----------------------------------|-------------------------|---------------------------|---------------------------|----------------------------|---------------------------|---------------------------|-----------------|-----------------|
| Bicarbonate Alkalinity           |                         | --                        | --                        | --                         | --                        | --                        | --              | --              |
| Ammonia (as N)                   |                         | --                        | --                        | --                         | --                        | --                        | --              | --              |
| Bromide                          |                         | --                        | --                        | --                         | --                        | --                        | --              | --              |
| Carbonate Alkalinity             |                         | --                        | --                        | --                         | --                        | --                        | --              | --              |
| Chloride                         | 139                     |                           | 129                       | 130                        | 152                       | 152                       | 20              | 12.6            |
| Cyanide                          | --                      | --                        | --                        | --                         | --                        | --                        | --              | --              |
| Fluoride                         | --                      | --                        | --                        | --                         | --                        | --                        | 1.3             | --              |
| Hydroxide                        | --                      | --                        | --                        | --                         | --                        | --                        | --              | --              |
| Carbon Dioxide                   | --                      | --                        | --                        | --                         | --                        | --                        | --              | --              |
| Nitrate                          | --                      | --                        | --                        | --                         | --                        | --                        | --              | --              |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                        | --                        | --                         | --                        | --                        | --              | --              |
| Orthophosphate                   | --                      | --                        | --                        | --                         | --                        | --                        | --              | --              |
| pH*                              | --                      | --                        | --                        | --                         | --                        | --                        | --              | --              |
| Phenols, total                   | --                      | --                        | --                        | --                         | --                        | --                        | --              | --              |
| Specific conductivity**          | --                      | --                        | --                        | --                         | --                        | --                        | --              | --              |
| Sulfate                          | --                      | --                        | --                        | --                         | --                        | --                        | 450             | --              |
| Total dissolved solids (TDS)     | --                      | --                        | --                        | --                         | --                        | --                        | 980             | --              |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

- \* Measured in standard units (su)
- \*\* Measured in micro-mhos per centimeter (umho/cm)
- Not analyzed or not reported.
- < Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data  
 May 1991 - October 1998  
 Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | LYMAN<br>7/1/92 | LYMAN<br>10/1/92 | LYMAN<br>1/1/93 | LYMAN<br>4/15/93 | LYMAN<br>5/12/93 | LYMAN<br>6/28/93 | LYMAN<br>7/15/93 | LYMAN<br>8/3/93 |
|----------------------------------|-------------------------|-----------------|------------------|-----------------|------------------|------------------|------------------|------------------|-----------------|
| Bicarbonate Alkalinity           |                         | --              | --               | --              | --               | --               | --               | --               | --              |
| Ammonia (as N)                   |                         | --              | --               | --              | --               | --               | --               | --               | --              |
| Bromide                          |                         | --              | --               | --              | --               | --               | --               | --               | --              |
| Carbonate Alkalinity             |                         | --              | --               | --              | --               | --               | --               | --               | --              |
| Chloride                         | 14.6                    | 13.2            | 15.5             | 13              | 13               | 12.5             | 15               | 13.1             | 13.1            |
| Cyanide                          | --                      | --              | --               | --              | --               | --               | --               | --               | --              |
| Fluoride                         | --                      | --              | --               | --              | --               | --               | --               | --               | --              |
| Hydroxide                        | --                      | --              | --               | --              | --               | --               | --               | --               | --              |
| Carbon Dioxide                   | --                      | --              | --               | --              | --               | --               | --               | --               | --              |
| Nitrate                          | --                      | --              | --               | --              | --               | --               | --               | --               | --              |
| Nitrogen, Kjeldahl, total (as N) | --                      | --              | --               | --              | --               | --               | --               | --               | --              |
| Orthophosphate                   | --                      | --              | --               | --              | --               | --               | --               | --               | --              |
| pH*                              | --                      | --              | --               | --              | --               | --               | --               | --               | --              |
| Phenols, total                   | --                      | --              | --               | --              | --               | --               | --               | --               | --              |
| Specific conductivity**          | --                      | --              | --               | --              | --               | --               | --               | --               | --              |
| Sulfate                          | --                      | --              | --               | --              | --               | --               | --               | --               | --              |
| Total dissolved solids (TDS)     | --                      | --              | --               | --              | --               | --               | --               | --               | --              |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | LYMAN<br>9/21/93 | LYMAN<br>10/14/93 | LYMAN<br>11/10/93 | LYMAN<br>12/6/93 | LYMAN<br>1/12/94 | LYMAN<br>2/9/94 | LYMAN<br>3/16/94 | LYMAN<br>4/5/94 |
|----------------------------------|-------------------------|------------------|-------------------|-------------------|------------------|------------------|-----------------|------------------|-----------------|
| Bicarbonate Alkalinity           |                         | --               | --                | --                | --               | --               | --              | --               | --              |
| Ammonia (as N)                   |                         | --               | --                | --                | --               | --               | --              | --               | --              |
| Bromide                          |                         | --               | --                | --                | --               | --               | --              | --               | --              |
| Carbonate Alkalinity             |                         | --               | --                | --                | --               | --               | --              | --               | --              |
| Chloride                         | 12.4                    |                  | 14.6              | 482               | 14               | 13               | 12.6            | 13               | 12.5            |
| Cyanide                          | --                      | --               | --                | --                | --               | --               | --              | --               | --              |
| Fluoride                         | --                      | --               | --                | --                | --               | --               | --              | --               | --              |
| Hydroxide                        | --                      | --               | --                | --                | --               | --               | --              | --               | --              |
| Carbon Dioxide                   | --                      | --               | --                | --                | --               | --               | --              | --               | --              |
| Nitrate                          | --                      | --               | --                | --                | --               | --               | --              | --               | --              |
| Nitrogen, Kjeldahl, total (as N) | --                      | --               | --                | --                | --               | --               | --              | --               | --              |
| Orthophosphate                   | --                      | --               | --                | --                | --               | --               | --              | --               | --              |
| pH*                              | --                      | --               | --                | --                | --               | --               | --              | --               | --              |
| Phenols, total                   | --                      | --               | --                | --                | --               | --               | --              | --               | --              |
| Specific conductivity**          | --                      | --               | --                | --                | --               | --               | --              | --               | --              |
| Sulfate                          | --                      | --               | --                | --                | --               | --               | --              | --               | --              |
| Total dissolved solids (TDS)     | --                      | --               | --                | --                | --               | --               | --              | --               | --              |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | LYMAN<br>5/19/94 | LYMAN<br>6/23/94 | LYMAN<br>7/21/94 | LYMAN<br>8/24/94 | LYMAN<br>9/20/94 | LYMAN<br>10/6/94 | LYMAN<br>11/30/94 | LYMAN<br>12/16/94 |
|----------------------------------|-------------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --               | --               | --               | --               | --               | --               | --                | --                |
| Ammonia (as N)                   |                         | --               | --               | --               | --               | --               | --               | --                | --                |
| Bromide                          |                         | --               | --               | --               | --               | --               | --               | --                | --                |
| Carbonate Alkalinity             |                         | --               | --               | --               | --               | --               | --               | --                | --                |
| Chloride                         | 12.1                    | 12               | 12               | 12               | 11.5             | 11               | 14               | 12.1              | 11.8              |
| Cyanide                          | --                      | --               | --               | --               | --               | --               | --               | --                | --                |
| Fluoride                         | --                      | --               | --               | --               | --               | --               | --               | --                | --                |
| Hydroxide                        | --                      | --               | --               | --               | --               | --               | --               | --                | --                |
| Carbon Dioxide                   | --                      | --               | --               | --               | --               | --               | --               | --                | --                |
| Nitrate                          | --                      | --               | --               | --               | --               | --               | --               | --                | --                |
| Nitrogen, Kjeldahl, total (as N) | --                      | --               | --               | --               | --               | --               | --               | --                | --                |
| Orthophosphate                   | --                      | --               | --               | --               | --               | --               | --               | --                | --                |
| pH*                              | --                      | --               | --               | --               | --               | --               | --               | --                | --                |
| Phenols, total                   | --                      | --               | --               | --               | --               | --               | --               | --                | --                |
| Specific conductivity**          | --                      | --               | --               | --               | --               | --               | --               | --                | --                |
| Sulfate                          | --                      | --               | --               | --               | --               | --               | --               | --                | --                |
| Total dissolved solids (TDS)     | --                      | --               | --               | --               | --               | --               | --               | --                | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | LYMAN<br>1/11/95 | LYMAN<br>3/9/95 | LYMAN<br>4/7/95 | LYMAN<br>5/18/95 | LYMAN<br>7/21/95 | LYMAN<br>10/12/95 | LYMAN<br>1/19/96 | LYMAN<br>4/18/96 |
|----------------------------------|-------------------------|------------------|-----------------|-----------------|------------------|------------------|-------------------|------------------|------------------|
| Bicarbonate Alkalinity           |                         | --               | --              | --              | --               | --               | --                | --               | --               |
| Ammonia (as N)                   |                         | --               | --              | --              | --               | --               | --                | --               | --               |
| Bromide                          |                         | --               | --              | --              | --               | --               | --                | --               | --               |
| Carbonate Alkalinity             |                         | --               | --              | --              | --               | --               | --                | --               | --               |
| Chloride                         | 11                      | 12               | 13              | 10              | 11               | 12               | 9                 | 11.1             | --               |
| Cyanide                          | --                      | --               | --              | --              | --               | --               | --                | --               | --               |
| Fluoride                         | --                      | --               | --              | --              | --               | --               | --                | --               | --               |
| Hydroxide                        | --                      | --               | --              | --              | --               | --               | --                | --               | --               |
| Carbon Dioxide                   | --                      | --               | --              | --              | --               | --               | --                | --               | --               |
| Nitrate                          | --                      | --               | --              | --              | --               | --               | --                | --               | --               |
| Nitrogen, Kjeldahl, total (as N) | --                      | --               | --              | --              | --               | --               | --                | --               | --               |
| Orthophosphate                   | --                      | --               | --              | --              | --               | --               | --                | --               | --               |
| pH*                              | --                      | --               | --              | --              | --               | --               | --                | --               | --               |
| Phenols, total                   | --                      | --               | --              | --              | --               | --               | --                | --               | --               |
| Specific conductivity**          | --                      | --               | --              | --              | --               | --               | --                | --               | --               |
| Sulfate                          | --                      | --               | --              | --              | --               | --               | --                | --               | --               |
| Total dissolved solids (TDS)     | --                      | --               | --              | --              | --               | --               | --                | --               | --               |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | LYMAN<br>7/1/96 | LYMAN<br>10/1/96 | LYMAN<br>2/10/97 | LYMAN<br>4/30/98 | LYMAN<br>6/29/98 | MW-001<br>4/1/91 | MW-001<br>5/1/91 | MW-001<br>12/1/91 |
|----------------------------------|-------------------------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --              | --               | --               | --               | --               | --               | --               | --                |
| Ammonia (as N)                   |                         | --              | --               | --               | --               | --               | --               | --               | --                |
| Bromide                          |                         | --              | --               | --               | --               | --               | --               | --               | --                |
| Carbonate Alkalinity             |                         | --              | --               | --               | --               | --               | --               | --               | --                |
| Chloride                         |                         | 9               | 10               | 11               | 15               | 13               | 2000             | 310              | 152               |
| Cyanide                          |                         | --              | --               | --               | --               | < 0.005          | --               | --               | --                |
| Fluoride                         |                         | --              | --               | --               | --               | 0.6              | --               | --               | --                |
| Hydroxide                        |                         | --              | --               | --               | --               | --               | --               | --               | --                |
| Carbon Dioxide                   |                         | --              | --               | --               | --               | --               | --               | --               | --                |
| Nitrate                          |                         | --              | --               | --               | --               | --               | --               | --               | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --              | --               | --               | --               | --               | --               | --               | --                |
| Orthophosphate                   |                         | --              | --               | --               | --               | --               | --               | --               | --                |
| pH*                              |                         | --              | --               | --               | --               | 7.4              | --               | --               | --                |
| Phenols, total                   |                         | --              | --               | --               | --               | < 0.005          | --               | --               | --                |
| Specific conductivity**          |                         | --              | --               | --               | --               | --               | --               | --               | --                |
| Sulfate                          |                         | --              | --               | --               | --               | 670              | --               | --               | --                |
| Total dissolved solids (TDS)     |                         | --              | --               | --               | --               | 1000             | --               | 820              | --                |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

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Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Parameter                        | Well ID<br>Date Sampled | MW-010<br>5/1/91 | MW-010<br>9/1/91 | MW-010<br>12/1/91 | MW-010<br>4/1/92 | MW-010<br>7/1/92 | MW-010<br>10/1/92 | MW-010<br>1/1/94 | MW-010<br>2/1/97 | MW-011<br>12/1/91 |
|----------------------------------|-------------------------|------------------|------------------|-------------------|------------------|------------------|-------------------|------------------|------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --               | --               | --                | --               | --               | --                | --               | --               | --                |
| Ammonia (as N)                   |                         | --               | --               | --                | --               | --               | --                | --               | --               | --                |
| Bromide                          |                         | --               | --               | --                | --               | --               | --                | --               | --               | --                |
| Carbonate Alkalinity             |                         | --               | --               | --                | --               | --               | --                | --               | --               | --                |
| Chloride                         | 60                      | --               | --               | 323               | 319              | 240              | 312               | 0                | 120              | 790               |
| Cyanide                          | --                      | --               | --               | --                | --               | --               | --                | --               | --               | --                |
| Fluoride                         | --                      | --               | --               | --                | --               | --               | --                | --               | --               | --                |
| Hydroxide                        | --                      | --               | --               | --                | --               | --               | --                | --               | --               | --                |
| Carbon Dioxide                   | --                      | --               | --               | --                | --               | --               | --                | --               | --               | --                |
| Nitrate                          | --                      | --               | --               | --                | --               | --               | --                | --               | --               | --                |
| Nitrogen, Kjeldahl, total (as N) | --                      | --               | --               | --                | --               | --               | --                | --               | --               | --                |
| Orthophosphate                   | --                      | --               | --               | --                | --               | --               | --                | --               | --               | --                |
| pH*                              | --                      | --               | --               | --                | --               | --               | --                | --               | --               | --                |
| Phenols, total                   | --                      | --               | --               | --                | --               | --               | --                | --               | --               | --                |
| Specific conductivity**          | --                      | --               | --               | --                | --               | --               | --                | --               | --               | --                |
| Sulfate                          | --                      | --               | < 10             | --                | --               | --               | --                | --               | --               | --                |
| Total dissolved solids (TDS)     | --                      | 1600             | 1440             | --                | --               | --               | --                | --               | --               | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

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Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Parameter                        | Well ID<br>Date Sampled | MW-011<br>4/1/92 | MW-011<br>7/1/92 | MW-011<br>10/1/92 | MW-011<br>1/1/93 | MW-011<br>10/5/94 | MW-011<br>7/21/95 | MW-011<br>1/20/96 | MW-011<br>4/19/96 | MW-011<br>7/1/96 |
|----------------------------------|-------------------------|------------------|------------------|-------------------|------------------|-------------------|-------------------|-------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --               | --               | --                | --               | --                | --                | --                | --                | --               |
| Ammonia (as N)                   |                         | --               | --               | --                | --               | --                | --                | --                | --                | --               |
| Bromide                          |                         | --               | --               | --                | --               | --                | --                | --                | --                | --               |
| Carbonate Alkalinity             |                         | --               | --               | --                | --               | --                | --                | --                | --                | --               |
| Chloride                         |                         | 6533             | 2703             | 239               | 5443             | 130               | 2609              | 120               | 120               | 37               |
| Cyanide                          |                         | --               | --               | --                | --               | --                | --                | --                | --                | --               |
| Fluoride                         |                         | --               | --               | --                | --               | --                | --                | --                | --                | --               |
| Hydroxide                        |                         | --               | --               | --                | --               | --                | --                | --                | --                | --               |
| Carbon Dioxide                   |                         | --               | --               | --                | --               | --                | --                | --                | --                | --               |
| Nitrate                          |                         | --               | --               | --                | --               | --                | --                | --                | --                | --               |
| Nitrogen, Kjeldahl, total (as N) |                         | --               | --               | --                | --               | --                | --                | --                | --                | --               |
| Orthophosphate                   |                         | --               | --               | --                | --               | --                | --                | --                | --                | --               |
| pH*                              |                         | --               | --               | --                | --               | --                | --                | --                | --                | --               |
| Phenols, total                   |                         | --               | --               | --                | --               | --                | --                | --                | --                | --               |
| Specific conductivity**          |                         | --               | --               | --                | --               | --                | --                | --                | --                | --               |
| Sulfate                          |                         | --               | --               | --                | --               | --                | --                | --                | --                | --               |
| Total dissolved solids (TDS)     |                         | --               | --               | --                | --               | --                | --                | --                | --                | --               |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-011<br>10/1/96 | MW-011<br>2/7/97 | MW-013<br>9/1/91 | MW-013<br>12/1/91 | MW-013<br>4/1/92 | MW-013<br>7/1/92 | MW-013<br>10/1/96 | MW-013<br>2/7/97 | MW-013<br>3/21/97 |
|----------------------------------|-------------------------|-------------------|------------------|------------------|-------------------|------------------|------------------|-------------------|------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --               | --               | --                | --               | --               | --                | --               | --                |
| Ammonia (as N)                   |                         | --                | --               | --               | --                | --               | --               | --                | --               | --                |
| Bromide                          |                         | --                | --               | --               | --                | --               | --               | --                | --               | --                |
| Carbonate Alkalinity             |                         | --                | --               | --               | --                | --               | --               | --                | --               | --                |
| Chloride                         |                         | 16                | 46               | 780              | 1240              | 269              | 70               | 45                | 70               | 0.4               |
| Cyanide                          |                         | --                | --               | --               | --                | --               | --               | --                | --               | --                |
| Fluoride                         |                         | --                | --               | --               | --                | --               | --               | --                | --               | --                |
| Hydroxide                        |                         | --                | --               | --               | --                | --               | --               | --                | --               | --                |
| Carbon Dioxide                   |                         | --                | --               | --               | --                | --               | --               | --                | --               | --                |
| Nitrate                          |                         | --                | --               | --               | --                | --               | --               | --                | --               | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --               | --               | --                | --               | --               | --                | --               | --                |
| Orthophosphate                   |                         | --                | --               | --               | --                | --               | --               | --                | --               | --                |
| pH*                              |                         | --                | --               | --               | --                | --               | --               | --                | --               | --                |
| Phenols, total                   |                         | --                | --               | --               | --                | --               | --               | --                | --               | --                |
| Specific conductivity**          |                         | --                | --               | --               | --                | --               | --               | --                | --               | --                |
| Sulfate                          |                         | --                | --               | --               | --                | --               | --               | --                | --               | --                |
| Total dissolved solids (TDS)     |                         | --                | --               | --               | --                | --               | --               | --                | --               | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-013<br>6/21/98 | MW-014<br>6/22/98 | MW-016<br>4/15/93 | MW-017<br>4/15/93 | MW-018<br>5/1/91 | MW-018<br>4/1/92 | MW-018<br>7/1/92 | MW-018<br>10/1/92 | MW-019<br>5/1/91 |
|----------------------------------|-------------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --                | --                | --               | --               | --               | --                | --               |
| Ammonia (as N)                   |                         | --                | --                | --                | --                | --               | --               | --               | --                | --               |
| Bromide                          |                         | --                | --                | --                | --                | --               | --               | --               | --                | --               |
| Carbonate Alkalinity             |                         | --                | --                | --                | --                | --               | --               | --               | --                | --               |
| Chloride                         |                         | (230)             | (330)             | 246               | (306)             | (310)            | (464)            | 109              | (408)             | (320)            |
| Cyanide                          | < 0.005                 | < 0.005           | < 0.005           | --                | --                | --               | --               | --               | --                | --               |
| Fluoride                         | 0.3                     | 0.3               | 0.4               | --                | --                | --               | --               | --               | --                | --               |
| Hydroxide                        | --                      | --                | --                | --                | --                | --               | --               | --               | --                | --               |
| Carbon Dioxide                   | --                      | --                | --                | --                | --                | --               | --               | --               | --                | --               |
| Nitrate                          | --                      | --                | --                | --                | --                | --               | --               | --               | --                | --               |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                | --                | --                | --                | --               | --               | --               | --                | --               |
| Orthophosphate                   | --                      | --                | --                | --                | --                | --               | --               | --               | --                | --               |
| pH*                              | 7                       | 7                 | 7                 | --                | --                | --               | --               | --               | --                | --               |
| Phenols, total                   | (0.023)                 | (0.023)           | (0.008)           | --                | --                | --               | --               | --               | --                | --               |
| Specific conductivity**          | --                      | --                | --                | --                | --                | --               | --               | --               | --                | --               |
| Sulfate                          | < 5                     | < 5               | < 5               | --                | --                | --               | --               | --               | --                | --               |
| Total dissolved solids (TDS)     | 1000                    | 1000              | (1400)            | --                | --                | (1580)           | --               | --               | --                | 16<br>(1540)     |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-019<br>5/22/91 | MW-019<br>7/1/91 | MW-019<br>9/1/91 | MW-019<br>4/1/92 | MW-019<br>7/1/92 | MW-019<br>10/1/92 | MW-019<br>10/1/96 | MW-019<br>2/7/97 | MW-021<br>5/1/91 |
|----------------------------------|-------------------------|-------------------|------------------|------------------|------------------|------------------|-------------------|-------------------|------------------|------------------|
| Bicarbonate Alkalinity           |                         | --                | --               | --               | --               | --               | --                | --                | --               | --               |
| Ammonia (as N)                   |                         | --                | --               | --               | --               | --               | --                | --                | --               | --               |
| Bromide                          |                         | --                | --               | --               | --               | --               | --                | --                | --               | --               |
| Carbonate Alkalinity             |                         | --                | --               | --               | --               | --               | --                | --                | --               | --               |
| Chloride                         |                         | --                | 466.3            | --               | 463.7            | 90               | 420.3             | 96                | 240              | 230              |
| Cyanide                          |                         | --                | --               | --               | --               | --               | --                | --                | --               | --               |
| Fluoride                         |                         | --                | --               | --               | --               | --               | --                | --                | --               | --               |
| Hydroxide                        |                         | --                | --               | --               | --               | --               | --                | --                | --               | --               |
| Carbon Dioxide                   |                         | --                | --               | --               | --               | --               | --                | --                | --               | --               |
| Nitrate                          |                         | --                | --               | --               | --               | --               | --                | --                | --               | --               |
| Nitrogen, Kjeldahl, total (as N) | < 0.1                   | --                | --               | --               | --               | --               | --                | --                | --               | --               |
| Orthophosphate                   |                         | --                | --               | --               | --               | --               | --                | --                | --               | --               |
| pH*                              |                         | --                | --               | --               | --               | --               | --                | --                | --               | --               |
| Phenols, total                   |                         | --                | --               | --               | --               | --               | --                | --                | --               | --               |
| Specific conductivity**          |                         | --                | --               | --               | --               | --               | --                | --                | --               | --               |
| Sulfate                          |                         | --                | --               | < 10             | --               | --               | --                | --                | --               | --               |
| Total dissolved solids (TDS)     |                         | --                | --               | 1460             | --               | --               | --                | --                | --               | 4220             |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

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Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-021<br>12/1/91 | MW-021<br>4/15/93 | MW-024<br>7/1/92 | MW-026<br>5/1/91 | MW-026<br>12/1/91 | MW-026<br>7/1/92 | MW-026<br>10/1/92 | MW-026<br>1/1/93 | MW-031<br>7/1/92 |
|----------------------------------|-------------------------|-------------------|-------------------|------------------|------------------|-------------------|------------------|-------------------|------------------|------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --               | --               | --                | --               | --                | --               | --               |
| Ammonia (as N)                   |                         | --                | --                | --               | --               | --                | --               | --                | --               | --               |
| Bromide                          |                         | --                | --                | --               | --               | --                | --               | --                | --               | --               |
| Carbonate Alkalinity             |                         | --                | --                | --               | --               | --                | --               | --                | --               | --               |
| Chloride                         |                         | 343               | 283               | 455              | 440              | 356               | 164              | 222               | 177              | 337              |
| Cyanide                          |                         | --                | --                | --               | --               | --                | --               | --                | --               | --               |
| Fluoride                         |                         | --                | --                | --               | --               | --                | --               | --                | --               | --               |
| Hydroxide                        |                         | --                | --                | --               | --               | --                | --               | --                | --               | --               |
| Carbon Dioxide                   |                         | --                | --                | --               | --               | --                | --               | --                | --               | --               |
| Nitrate                          |                         | --                | --                | --               | --               | --                | --               | --                | --               | --               |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                | --               | --               | --                | --               | --                | --               | --               |
| Orthophosphate                   |                         | --                | --                | --               | --               | --                | --               | --                | --               | --               |
| pH*                              |                         | --                | --                | --               | --               | --                | --               | --                | --               | --               |
| Phenols, total                   |                         | --                | --                | --               | --               | --                | --               | --                | --               | --               |
| Specific conductivity**          |                         | --                | --                | --               | --               | --                | --               | --                | --               | --               |
| Sulfate                          |                         | --                | --                | --               | --               | --                | --               | --                | --               | --               |
| Total dissolved solids (TDS)     |                         | --                | --                | --               | 1650             | --                | --               | --                | --               | --               |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

Historical General Chemistry Analytical Data

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Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-031<br>10/1/92 | MW-037<br>6/1/91 | MW-037<br>6/25/91 | MW-037<br>7/14/93 | MW-038<br>5/1/91 | MW-038<br>5/22/91 | MW-038<br>6/1/91 | MW-038<br>6/25/91 | MW-038<br>12/1/91 |
|----------------------------------|-------------------------|-------------------|------------------|-------------------|-------------------|------------------|-------------------|------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --               | --                | --                | --               | --                | --               | --                | --                |
| Ammonia (as N)                   |                         | --                | --               | --                | --                | --               | --                | --               | --                | --                |
| Bromide                          |                         | --                | --               | --                | --                | --               | --                | --               | --                | --                |
| Carbonate Alkalinity             |                         | --                | --               | --                | --                | --               | --                | --               | --                | --                |
| Chloride                         |                         | 296               | 52               | --                | 173               | 60               | --                | 38               | --                | 111               |
| Cyanide                          |                         | --                | --               | --                | --                | --               | --                | --               | --                | --                |
| Fluoride                         |                         | --                | --               | --                | --                | --               | --                | --               | --                | --                |
| Hydroxide                        |                         | --                | --               | --                | --                | --               | --                | --               | --                | --                |
| Carbon Dioxide                   |                         | --                | --               | --                | --                | --               | --                | --               | --                | --                |
| Nitrate                          |                         | --                | --               | < 0.1             | --                | --               | < 0.1             | --               | < 0.1             | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --               | --                | --                | --               | --                | --               | --                | --                |
| Orthophosphate                   |                         | --                | --               | --                | --                | --               | --                | --               | --                | --                |
| pH*                              |                         | --                | --               | --                | --                | --               | --                | --               | --                | --                |
| Phenols, total                   |                         | --                | --               | --                | --                | --               | --                | --               | --                | --                |
| Specific conductivity**          |                         | --                | --               | --                | --                | --               | --                | --               | --                | --                |
| Sulfate                          |                         | --                | --               | --                | --                | < 10             | --                | --               | --                | --                |
| Total dissolved solids (TDS)     |                         | --                | --               | --                | --                | 790              | --                | --               | --                | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

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Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-038<br>4/1/92 | MW-038<br>7/1/92 | MW-038<br>10/1/92 | MW-038<br>10/1/96 | MW-038<br>2/7/97 | MW-039<br>5/1/91 | MW-039<br>6/1/91 | MW-039<br>6/25/91 | MW-039<br>1/1/93 |
|----------------------------------|-------------------------|------------------|------------------|-------------------|-------------------|------------------|------------------|------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --               | --               | --                | --                | --               | --               | --               | --                | --               |
| Ammonia (as N)                   |                         | --               | --               | --                | --                | --               | --               | --               | --                | --               |
| Bromide                          |                         | --               | --               | --                | --                | --               | --               | --               | --                | --               |
| Carbonate Alkalinity             |                         | --               | --               | --                | --                | --               | --               | --               | --                | --               |
| Chloride                         |                         | 127              | 147              | 128               | 280               | 310              | 9.6              | 244              | --                | 237              |
| Cyanide                          |                         | --               | --               | --                | --                | --               | --               | --               | --                | --               |
| Fluoride                         |                         | --               | --               | --                | --                | --               | --               | --               | --                | --               |
| Hydroxide                        |                         | --               | --               | --                | --                | --               | --               | --               | --                | --               |
| Carbon Dioxide                   |                         | --               | --               | --                | --                | --               | --               | --               | --                | --               |
| Nitrate                          |                         | --               | --               | --                | --                | --               | --               | --               | < 0.1             | --               |
| Nitrogen, Kjeldahl, total (as N) |                         | --               | --               | --                | --                | --               | --               | --               | --                | --               |
| Orthophosphate                   |                         | --               | --               | --                | --                | --               | --               | --               | --                | --               |
| pH*                              |                         | --               | --               | --                | --                | --               | --               | --               | --                | --               |
| Phenols, total                   |                         | --               | --               | --                | --                | --               | --               | --               | --                | --               |
| Specific conductivity**          |                         | --               | --               | --                | --                | --               | --               | --               | --                | --               |
| Sulfate                          |                         | --               | --               | --                | --                | --               | --               | --               | --                | --               |
| Total dissolved solids (TDS)     |                         | --               | --               | --                | --                | --               | --               | --               | --                | --               |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

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Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-039<br>4/15/93 | MW-039<br>7/15/93 | MW-039<br>10/14/93 | MW-039<br>1/13/94 | MW-039<br>4/7/94 | MW-039<br>7/20/94 | MW-039<br>1/10/95 | MW-039<br>10/1/96 | MW-039<br>2/7/97 |
|----------------------------------|-------------------------|-------------------|-------------------|--------------------|-------------------|------------------|-------------------|-------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Ammonia (as N)                   |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Bromide                          |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Carbonate Alkalinity             |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Chloride                         |                         | 83                | 296               | 271                | 260               | 220              | 198               | 194               | 140               | 160              |
| Cyanide                          |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Fluoride                         |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Hydroxide                        |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Carbon Dioxide                   |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Nitrate                          |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Orthophosphate                   |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| pH*                              |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Phenols, total                   |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Specific conductivity**          |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Sulfate                          |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Total dissolved solids (TDS)     |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --               |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-039<br>7/18/97 | MW-041<br>6/1/91 | MW-041<br>6/25/91 | MW-041<br>7/1/91 | MW-041<br>12/1/91 | MW-041<br>7/15/93 | MW-041<br>10/14/93 | MW-041<br>1/13/94 | MW-041<br>4/6/94 |
|----------------------------------|-------------------------|-------------------|------------------|-------------------|------------------|-------------------|-------------------|--------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --                | --               | --                | --               | --                | --                | --                 | --                | --               |
| Ammonia (as N)                   |                         | --                | --               | --                | --               | --                | --                | --                 | --                | --               |
| Bromide                          |                         | --                | --               | --                | --               | --                | --                | --                 | --                | --               |
| Carbonate Alkalinity             |                         | 160               | 29               | --                | 38               | 108               | 242               | 264                | 670               | 290              |
| Chloride                         |                         | --                | --               | --                | --               | --                | --                | --                 | --                | --               |
| Cyanide                          |                         | --                | --               | --                | --               | --                | --                | --                 | --                | --               |
| Fluoride                         |                         | --                | --               | --                | --               | --                | --                | --                 | --                | --               |
| Hydroxide                        |                         | --                | --               | --                | --               | --                | --                | --                 | --                | --               |
| Carbon Dioxide                   |                         | --                | --               | --                | --               | --                | --                | --                 | --                | --               |
| Nitrate                          |                         | --                | --               | 0.1               | 0.1              | --                | --                | --                 | --                | --               |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --               | --                | --               | --                | --                | --                 | --                | --               |
| Orthophosphate                   |                         | --                | --               | --                | --               | --                | --                | --                 | --                | --               |
| pH***                            |                         | --                | --               | --                | --               | --                | --                | --                 | --                | --               |
| Phenols, total                   |                         | --                | --               | --                | --               | --                | --                | --                 | --                | --               |
| Specific conductivity**          |                         | --                | --               | --                | --               | --                | --                | --                 | --                | --               |
| Sulfate                          |                         | --                | 41               | --                | --               | --                | --                | --                 | --                | --               |
| Total dissolved solids (TDS)     |                         | --                | 758              | --                | --               | --                | --                | --                 | --                | --               |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-041<br>7/20/94 | MW-041<br>10/6/94 | MW-041<br>1/11/95 | MW-041<br>4/6/95 | MW-041<br>7/21/95 | MW-041<br>10/12/95 | MW-041<br>1/20/96 | MW-041<br>4/19/96 | MW-041<br>7/1/96 |
|----------------------------------|-------------------------|-------------------|-------------------|-------------------|------------------|-------------------|--------------------|-------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Ammonia (as N)                   |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Bromide                          |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Carbonate Alkalinity             |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Chloride                         |                         | 259               | 300               | 326               | 300              | 270               | 240                | 270               | 260               | 250              |
| Cyanide                          |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Fluoride                         |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Hydroxide                        |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Carbon Dioxide                   |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Nitrate                          |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Orthophosphate                   |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| pH***                            |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Phenols, total                   |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Specific conductivity**          |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Sulfate                          |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Total dissolved solids (TDS)     |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 – October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-041<br>10/1/96 | MW-041<br>2/7/97 | MW-041<br>3/20/97 | MW-041<br>7/18/97 | MW-041<br>6/19/98 | MW-042<br>12/1/91 | MW-043<br>6/1/91 | MW-043<br>6/25/91 | MW-043<br>9/1/91 |
|----------------------------------|-------------------------|-------------------|------------------|-------------------|-------------------|-------------------|-------------------|------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --                | --               | --                | --                | --                | --                | --               | --                | --               |
| Ammonia (as N)                   |                         | --                | --               | --                | --                | --                | --                | --               | --                | --               |
| Bromide                          |                         | --                | --               | --                | --                | --                | --                | --               | --                | --               |
| Carbonate Alkalinity             |                         | --                | --               | --                | --                | --                | --                | --               | --                | --               |
| Chloride                         |                         | 250               | 180              | --                | 140               | 120               | 57.4              | 138              | --                | --               |
| Cyanide                          |                         | --                | --               | --                | --                | < 0.005           | --                | --               | --                | --               |
| Fluoride                         |                         | --                | --               | 1.5               | --                | 1.5               | --                | --               | --                | --               |
| Hydroxide                        |                         | --                | --               | --                | --                | --                | --                | --               | --                | --               |
| Carbon Dioxide                   |                         | --                | --               | --                | --                | --                | --                | --               | --                | --               |
| Nitrate                          |                         | --                | --               | --                | --                | --                | --                | --               | < 0.1             | --               |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --               | --                | --                | --                | --                | --               | --                | --               |
| Orthophosphate                   |                         | --                | --               | --                | --                | --                | --                | --               | --                | --               |
| pH***                            |                         | --                | --               | --                | --                | 7.5               | --                | --               | --                | --               |
| Phenols, total                   |                         | --                | --               | --                | --                | 0.024             | --                | --               | --                | --               |
| Specific conductivity**          |                         | --                | --               | --                | --                | --                | --                | --               | --                | --               |
| Sulfate                          |                         | --                | --               | 98                | --                | 190               | --                | 47               | --                | 370              |
| Total dissolved solids (TDS)     |                         | --                | --               | 4500              | --                | 4200              | --                | 1300             | --                | 4600             |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-043<br>7/15/93 | MW-043<br>10/14/93 | MW-043<br>1/13/94 | MW-043<br>4/6/94 | MW-043<br>7/20/94 | MW-043<br>10/6/94 | MW-043<br>1/11/95 | MW-043<br>4/6/95 | MW-043<br>7/21/95 |
|----------------------------------|-------------------------|-------------------|--------------------|-------------------|------------------|-------------------|-------------------|-------------------|------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Ammonia (as N)                   |                         | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Bromide                          |                         | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Carbonate Alkalinity             |                         | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Chloride                         |                         | 232               | 230                | 260               | 250              | 266               | 270               | 280               | 280              | 270               |
| Cyanide                          |                         | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Fluoride                         |                         | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Hydroxide                        |                         | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Carbon Dioxide                   |                         | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Nitrate                          |                         | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Orthophosphate                   |                         | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| pH***                            |                         | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Phenols, total                   |                         | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Specific conductivity**          |                         | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Sulfate                          |                         | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Total dissolved solids (TDS)     |                         | --                | --                 | --                | --               | --                | --                | --                | --               | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-043<br>10/12/95 | MW-043<br>1/20/96 | MW-043<br>4/19/96 | MW-043<br>7/1/96 | MW-043<br>10/1/96 | MW-043<br>2/7/97 | MW-043<br>7/18/97 | MW-043<br>6/22/98 | MW-044<br>6/1/91 |
|----------------------------------|-------------------------|--------------------|-------------------|-------------------|------------------|-------------------|------------------|-------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --                 | --                | --                | --               | --                | --               | --                | --                | --               |
| Ammonia (as N)                   |                         | --                 | --                | --                | --               | --                | --               | --                | --                | --               |
| Bromide                          |                         | --                 | --                | --                | --               | --                | --               | --                | --                | --               |
| Carbonate Alkalinity             |                         | --                 | --                | --                | --               | --                | --               | --                | --                | --               |
| Chloride                         |                         | 220                | 280               | 280               | 270              | 380               | 330              | 230               | 210               | 33               |
| Cyanide                          |                         | --                 | --                | --                | --               | --                | --               | --                | < 0.005           | --               |
| Fluoride                         |                         | --                 | --                | --                | --               | --                | --               | --                | 0.8               | --               |
| Hydroxide                        |                         | --                 | --                | --                | --               | --                | --               | --                | --                | --               |
| Carbon Dioxide                   |                         | --                 | --                | --                | --               | --                | --               | --                | --                | --               |
| Nitrate                          |                         | --                 | --                | --                | --               | --                | --               | --                | --                | --               |
| Nitrogen, Kjeldahl, total (as N) |                         | --                 | --                | --                | --               | --                | --               | --                | --                | --               |
| Orthophosphate                   |                         | --                 | --                | --                | --               | --                | --               | --                | --                | --               |
| pH***                            |                         | --                 | --                | --                | --               | --                | --               | --                | 7.3               | --               |
| Phenols, total                   |                         | --                 | --                | --                | --               | --                | --               | --                | 0.007             | --               |
| Specific conductivity**          |                         | --                 | --                | --                | --               | --                | --               | --                | --                | --               |
| Sulfate                          |                         | --                 | --                | --                | --               | --                | --               | --                | 53                | 33               |
| Total dissolved solids (TDS)     |                         | --                 | --                | --                | --               | --                | --               | --                | 1500              | 641              |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-044<br>6/25/91 | MW-044<br>4/1/92 | MW-044<br>7/1/92 | MW-044<br>10/1/92 | MW-044<br>1/1/93 | MW-044<br>4/15/93 | MW-044<br>7/15/93 | MW-044<br>10/14/93 | MW-044<br>1/13/94 |
|----------------------------------|-------------------------|-------------------|------------------|------------------|-------------------|------------------|-------------------|-------------------|--------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Ammonia (as N)                   |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Bromide                          |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Carbonate Alkalinity             |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Chloride                         |                         | 660               | 660              | 263              | 356               | 300              | 365               | 445               | 543                | 490               |
| Cyanide                          |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Fluoride                         |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Hydroxide                        |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Carbon Dioxide                   |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Nitrate                          |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Nitrogen, Kjeldahl, total (as N) | < 0.1                   | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Orthophosphate                   |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| pH***                            |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Phenols, total                   |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Specific conductivity**          |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Sulfate                          |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Total dissolved solids (TDS)     |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-044<br>4/6/94 | MW-044<br>7/20/94 | MW-044<br>10/5/94 | MW-044<br>1/11/95 | MW-044<br>4/6/95 | MW-044<br>7/21/95 | MW-044<br>10/12/95 | MW-044<br>1/20/96 | MW-044<br>4/19/96 |
|----------------------------------|-------------------------|------------------|-------------------|-------------------|-------------------|------------------|-------------------|--------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Ammonia (as N)                   |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Bromide                          |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Carbonate Alkalinity             |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Chloride                         |                         | 440              | 430               | 360               | 360               | 410              | 400               | 520                | 580               | 530               |
| Cyanide                          |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Fluoride                         |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Hydroxide                        |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Carbon Dioxide                   |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Nitrate                          |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Orthophosphate                   |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| pH***                            |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Phenols, total                   |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Specific conductivity**          |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Sulfate                          |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Total dissolved solids (TDS)     |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

Historical General Chemistry Analytical Data  
 May 1991 - October 1998  
 Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-044<br>7/1/96 | MW-044<br>10/1/96 | MW-044<br>2/7/97 | MW-044<br>7/18/97 | MW-044<br>6/22/98 | MW-045<br>6/1/91 | MW-045<br>6/25/91 | MW-045<br>9/1/91 | MW-045<br>12/1/91 |
|----------------------------------|-------------------------|------------------|-------------------|------------------|-------------------|-------------------|------------------|-------------------|------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --               | --                | --               | --                | --                | --               | --                | --               | --                |
| Ammonia (as N)                   |                         | --               | --                | --               | --                | --                | --               | --                | --               | --                |
| Bromide                          |                         | --               | --                | --               | --                | --                | --               | --                | --               | --                |
| Carbonate Alkalinity             |                         | --               | --                | --               | --                | --                | --               | --                | --               | --                |
| Chloride                         |                         | 480              | 32                | 180              | 310               | 260               | 507              | --                | --               | 354               |
| Cyanide                          |                         | --               | --                | --               | --                | < 0.005           | --               | --                | --               | --                |
| Fluoride                         |                         | --               | --                | --               | --                | 0.8               | --               | --                | --               | --                |
| Hydroxide                        |                         | --               | --                | --               | --                | --                | --               | --                | --               | --                |
| Carbon Dioxide                   |                         | --               | --                | --               | --                | --                | --               | --                | --               | --                |
| Nitrate                          |                         | --               | --                | --               | --                | --                | --               | 3.9               | --               | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --               | --                | --               | --                | --                | --               | --                | --               | --                |
| Orthophosphate                   |                         | --               | --                | --               | --                | --                | --               | --                | --               | --                |
| pH***                            |                         | --               | --                | --               | --                | 7.2               | --               | --                | --               | --                |
| Phenols, total                   |                         | --               | --                | --               | --                | 0.04              | --               | --                | --               | --                |
| Specific conductivity**          |                         | --               | --                | --               | --                | --                | --               | --                | --               | --                |
| Sulfate                          |                         | --               | --                | --               | --                | 66                | 2949             | --                | 2090             | --                |
| Total dissolved solids (TDS)     |                         | --               | --                | --               | --                | 1000              | 5440             | --                | 3920             | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-045<br>7/15/93 | MW-045<br>10/14/93 | MW-045<br>1/13/94 | MW-045<br>4/6/94 | MW-045<br>7/20/94 | MW-046<br>6/1/91 | MW-046<br>6/25/91 | MW-046<br>7/1/91 |
|----------------------------------|-------------------------|-------------------|--------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --                | --                 | --                | --               | --                | --               | --                | --               |
| Ammonia (as N)                   |                         | --                | --                 | --                | --               | --                | --               | --                | --               |
| Bromide                          |                         | --                | --                 | --                | --               | --                | --               | --                | --               |
| Carbonate Alkalinity             |                         | --                | --                 | --                | --               | --                | --               | --                | --               |
| Chloride                         |                         | 434               | 408                | 440               | 430              | 429               | 152              | --                | 45               |
| Cyanide                          |                         | --                | --                 | --                | --               | --                | --               | --                | --               |
| Fluoride                         |                         | --                | --                 | --                | --               | --                | --               | --                | --               |
| Hydroxide                        |                         | --                | --                 | --                | --               | --                | --               | --                | --               |
| Carbon Dioxide                   |                         | --                | --                 | --                | --               | --                | --               | --                | --               |
| Nitrate                          |                         | --                | --                 | --                | --               | --                | --               | 0.1               | 0.1              |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                 | --                | --               | --                | --               | --                | --               |
| Orthophosphate                   |                         | --                | --                 | --                | --               | --                | --               | --                | --               |
| pH***                            |                         | --                | --                 | --                | --               | --                | --               | --                | --               |
| Phenols, total                   |                         | --                | --                 | --                | --               | --                | --               | --                | --               |
| Specific conductivity**          |                         | --                | --                 | --                | --               | --                | --               | --                | --               |
| Sulfate                          |                         | --                | --                 | --                | --               | --                | 20               | --                | --               |
| Total dissolved solids (TDS)     |                         | --                | --                 | --                | --               | --                | 1220             | NA/R              | --               |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

Historical General Chemistry Analytical Data  
 May 1991 - October 1998  
 Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-046<br>10/1/96 | MW-046<br>2/11/97 | MW-046<br>5/29/97 | MW-046<br>7/18/97 | MW-046<br>12/10/97 | MW-046<br>6/21/98 | MW-047<br>6/1/91 | MW-047<br>6/25/91 | MW-047<br>12/1/91 |
|----------------------------------|-------------------------|-------------------|-------------------|-------------------|-------------------|--------------------|-------------------|------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | 990               | --                | --                 | --                | --               | --                | --                |
| Ammonia (as N)                   |                         | --                | --                | --                | --                | --                 | --                | --               | --                | --                |
| Bromide                          |                         | --                | --                | --                | --                | --                 | --                | --               | --                | --                |
| Carbonate Alkalinity             |                         | --                | --                | 3                 | --                | --                 | --                | --               | --                | --                |
| Chloride                         |                         | 170               | (220)             | 132               | 180               | --                 | 140               | 51               | --                | (433)             |
| Cyanide                          |                         | --                | --                | --                | --                | --                 | < 0.005           | --               | --                | --                |
| Fluoride                         |                         | --                | --                | 1.3               | 1.3               | 1.3                | 1.1               | --               | --                | --                |
| Hydroxide                        |                         | --                | --                | < 1               | --                | --                 | --                | --               | --                | --                |
| Carbon Dioxide                   |                         | --                | --                | 62                | --                | --                 | --                | --               | --                | --                |
| Nitrate                          |                         | --                | --                | --                | --                | --                 | --                | --               | < 0.1             | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                | --                | --                | --                 | --                | --               | --                | --                |
| Orthophosphate                   |                         | --                | --                | --                | --                | --                 | --                | --               | --                | --                |
| pH***                            |                         | --                | --                | 7.5               | --                | --                 | 7.2               | --               | --                | --                |
| Phenols, total                   |                         | --                | --                | --                | --                | --                 | --                | --               | --                | --                |
| Specific conductivity**          |                         | --                | --                | 1200              | --                | --                 | --                | --               | --                | --                |
| Sulfate                          |                         | --                | --                | 106               | --                | --                 | 22                | 23               | --                | --                |
| Total dissolved solids (TDS)     |                         | --                | --                | (300)             | --                | --                 | 940               | 652              | --                | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

## Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-047<br>10/1/96 | MW-048<br>12/1/91 | MW-048<br>7/1/92 | MW-048<br>10/1/96 | MW-049<br>6/1/91 | MW-049<br>6/25/91 | MW-049<br>7/15/93 | MW-049<br>10/14/93 | MW-049<br>1/13/94 |
|----------------------------------|-------------------------|-------------------|-------------------|------------------|-------------------|------------------|-------------------|-------------------|--------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --               | --                | --               | --                | --                | --                 | --                |
| Ammonia (as N)                   |                         | --                | --                | --               | --                | --               | --                | --                | --                 | --                |
| Bromide                          |                         | --                | --                | --               | --                | --               | --                | --                | --                 | --                |
| Carbonate Alkalinity             |                         | --                | --                | --               | --                | --               | --                | --                | --                 | --                |
| Chloride                         |                         | 700               | 400               | 431              | 200               | 865              | --                | 399               | 397                | 400               |
| Cyanide                          |                         | --                | --                | --               | --                | --               | --                | --                | --                 | --                |
| Fluoride                         |                         | --                | --                | --               | --                | --               | --                | --                | --                 | --                |
| Hydroxide                        |                         | --                | --                | --               | --                | --               | --                | --                | --                 | --                |
| Carbon Dioxide                   |                         | --                | --                | --               | --                | --               | --                | --                | --                 | --                |
| Nitrate                          |                         | --                | --                | --               | --                | --               | < 0.1             | --                | --                 | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                | --               | --                | --               | --                | --                | --                 | --                |
| Orthophosphate                   |                         | --                | --                | --               | --                | --               | --                | --                | --                 | --                |
| pH***                            |                         | --                | --                | --               | --                | --               | --                | --                | --                 | --                |
| Phenols, total                   |                         | --                | --                | --               | --                | --               | --                | --                | --                 | --                |
| Specific conductivity**          |                         | --                | --                | --               | --                | --               | --                | --                | --                 | --                |
| Sulfate                          |                         | --                | --                | --               | --                | 4800<br>3910     | --                | --                | --                 | --                |
| Total dissolved solids (TDS)     |                         | --                | --                | --               | --                | --               | --                | --                | --                 | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

Historical General Chemistry Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-049<br>4/6/94 | MW-049<br>7/20/94 | MW-049<br>10/5/94 | MW-049<br>1/11/95 | MW-049<br>4/6/95 | MW-049<br>7/21/95 | MW-049<br>10/12/95 | MW-049<br>1/20/96 | MW-049<br>4/19/96 |
|----------------------------------|-------------------------|------------------|-------------------|-------------------|-------------------|------------------|-------------------|--------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Ammonia (as N)                   |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Bromide                          |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Carbonate Alkalinity             |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Chloride                         |                         | 380              | 380               | 380               | 389               | 390              | 380               | 350                | 410               | 400               |
| Cyanide                          |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Fluoride                         |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Hydroxide                        |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Carbon Dioxide                   |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Nitrate                          |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Orthophosphate                   |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| pH***                            |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Phenols, total                   |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Specific conductivity**          |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Sulfate                          |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Total dissolved solids (TDS)     |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-049<br>7/1/96 | MW-049<br>10/1/96 | MW-049<br>2/7/97 | MW-049<br>3/20/97 | MW-049<br>7/18/97 | MW-049<br>6/21/98 | MW-050<br>6/1/91 | MW-050<br>6/25/91 | MW-050<br>12/1/91 |
|----------------------------------|-------------------------|------------------|-------------------|------------------|-------------------|-------------------|-------------------|------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           | --                      | --               | --                | --               | --                | --                | --                | --               | --                | --                |
| Ammonia (as N)                   | --                      | --               | --                | --               | --                | --                | --                | --               | --                | --                |
| Bromide                          | --                      | --               | --                | --               | --                | --                | --                | --               | --                | --                |
| Carbonate Alkalinity             | --                      | --               | --                | --               | --                | --                | --                | --               | --                | --                |
| Chloride                         | 360                     | 36               | 410               | --               | --                | 350               | 630               | 388              | --                | 380               |
| Cyanide                          | --                      | --               | --                | --               | --                | --                | 0.05              | --               | --                | --                |
| Fluoride                         | --                      | --               | --                | --               | 1.4               | --                | 1.3               | --               | --                | --                |
| Hydroxide                        | --                      | --               | --                | --               | --                | --                | --                | --               | --                | --                |
| Carbon Dioxide                   | --                      | --               | --                | --               | --                | --                | --                | --               | --                | --                |
| Nitrate                          | --                      | --               | --                | --               | --                | --                | --                | --               | 1.5               | --                |
| Nitrogen, Kjeldahl, total (as N) | --                      | --               | --                | --               | --                | --                | --                | --               | --                | --                |
| Orthophosphate                   | --                      | --               | --                | --               | --                | --                | --                | --               | --                | --                |
| pH***                            | --                      | --               | --                | --               | --                | --                | 7                 | --               | --                | --                |
| Phenols, total                   | --                      | --               | --                | --               | --                | --                | 0.012             | --               | --                | --                |
| Specific conductivity**          | --                      | --               | --                | --               | --                | --                | --                | --               | --                | --                |
| Sulfate                          | --                      | --               | --                | 1000             | --                | --                | 780               | 3420             | --                | --                |
| Total dissolved solids (TDS)     | --                      | --               | --                | 3100             | --                | --                | 2800              | 6070             | --                | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-050<br>4/1/92 | MW-050<br>7/1/92 | MW-050<br>10/1/92 | MW-050<br>1/1/93 | MW-050<br>4/15/93 | MW-050<br>7/15/93 | MW-050<br>10/14/93 | MW-050<br>1/13/94 | MW-050<br>4/6/94 |
|----------------------------------|-------------------------|------------------|------------------|-------------------|------------------|-------------------|-------------------|--------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Ammonia (as N)                   |                         | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Bromide                          |                         | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Carbonate Alkalinity             |                         | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Chloride                         |                         | 397              | 379              | 370               | 337              | 955               | 347               | 292                | 320               | 290              |
| Cyanide                          |                         | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Fluoride                         |                         | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Hydroxide                        |                         | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Carbon Dioxide                   |                         | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Nitrate                          |                         | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Nitrogen, Kjeldahl, total (as N) |                         | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Orthophosphate                   |                         | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| pH***                            |                         | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Phenols, total                   |                         | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Specific conductivity**          |                         | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Sulfate                          |                         | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Total dissolved solids (TDS)     |                         | --               | --               | --                | --               | --                | --                | --                 | --                | --               |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-050<br>7/20/94 | MW-050<br>10/5/94 | MW-050<br>1/11/95 | MW-050<br>4/6/95 | MW-050<br>7/21/95 | MW-050<br>10/12/95 | MW-050<br>1/20/96 | MW-050<br>4/19/96 | MW-050<br>7/1/96 |
|----------------------------------|-------------------------|-------------------|-------------------|-------------------|------------------|-------------------|--------------------|-------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Ammonia (as N)                   |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Bromide                          |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Carbonate Alkalinity             |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Chloride                         |                         | 290               | 290               | 314               | 320              | 310               | 240                | 290               | 330               | 310              |
| Cyanide                          |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Fluoride                         |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Hydroxide                        |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Carbon Dioxide                   |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Nitrate                          |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Orthophosphate                   |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| pH***                            |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Phenols, total                   |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Specific conductivity**          |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Sulfate                          |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |
| Total dissolved solids (TDS)     |                         | --                | --                | --                | --               | --                | --                 | --                | --                | --               |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-050<br>10/1/96 | MW-050<br>2/7/97 | MW-050<br>3/20/97 | MW-050<br>7/18/97 | MW-050<br>6/19/98 | MW-051<br>12/1/91 | MW-052<br>7/1/92 | MW-054<br>12/1/91 | MW-054<br>4/1/92 |
|----------------------------------|-------------------------|-------------------|------------------|-------------------|-------------------|-------------------|-------------------|------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --                | --               | --                | --                | --                | --                | --               | --                | --               |
| Ammonia (as N)                   |                         | --                | --               | --                | --                | --                | --                | --               | --                | --               |
| Bromide                          |                         | --                | --               | --                | --                | --                | --                | --               | --                | --               |
| Carbonate Alkalinity             |                         | --                | --               | --                | --                | --                | --                | --               | --                | --               |
| Chloride                         |                         | 360*              | 360*             | --                | 330*              | 340*              | 38                | 3                | 87                | 151              |
| Cyanide                          |                         | --                | --               | --                | --                | < 0.005           | --                | --               | --                | --               |
| Fluoride                         |                         | --                | --               | 1.2               | --                | 1.2               | --                | --               | --                | --               |
| Hydroxide                        |                         | --                | --               | --                | --                | --                | --                | --               | --                | --               |
| Carbon Dioxide                   |                         | --                | --               | --                | --                | --                | --                | --               | --                | --               |
| Nitrate                          |                         | --                | --               | --                | --                | --                | --                | --               | --                | --               |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --               | --                | --                | --                | --                | --               | --                | --               |
| Orthophosphate                   |                         | --                | --               | --                | --                | --                | --                | --               | --                | --               |
| pH***                            |                         | --                | --               | --                | --                | 8.2               | --                | --               | --                | --               |
| Phenols, total                   |                         | --                | --               | --                | --                | < 0.005           | --                | --               | --                | --               |
| Specific conductivity**          |                         | --                | --               | --                | --                | --                | --                | --               | --                | --               |
| Sulfate                          |                         | --                | --               | 3600*             | --                | 3800*             | --                | --               | --                | --               |
| Total dissolved solids (TDS)     |                         | --                | --               | 5900*             | --                | 5900*             | --                | --               | --                | --               |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-054<br>7/1/92 | MW-054<br>10/1/92 | MW-054<br>1/1/93 | MW-054<br>4/14/93 | MW-054<br>7/14/93 | MW-054<br>10/14/93 | MW-054<br>1/12/94 | MW-054<br>4/6/94 | MW-054<br>7/20/94 |
|----------------------------------|-------------------------|------------------|-------------------|------------------|-------------------|-------------------|--------------------|-------------------|------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --               | --                | --               | --                | --                | --                 | --                | --               | --                |
| Ammonia (as N)                   |                         | --               | --                | --               | --                | --                | --                 | --                | --               | --                |
| Bromide                          |                         | --               | --                | --               | --                | --                | --                 | --                | --               | --                |
| Carbonate Alkalinity             |                         | --               | --                | --               | --                | --                | --                 | --                | --               | --                |
| Chloride                         |                         | 80               | 55                | 134              | 145               | 146               | 122                | 140               | 102              | 135               |
| Cyanide                          |                         | --               | --                | --               | --                | --                | --                 | --                | --               | --                |
| Fluoride                         |                         | --               | --                | --               | --                | --                | --                 | --                | --               | --                |
| Hydroxide                        |                         | --               | --                | --               | --                | --                | --                 | --                | --               | --                |
| Carbon Dioxide                   |                         | --               | --                | --               | --                | --                | --                 | --                | --               | --                |
| Nitrate                          |                         | --               | --                | --               | --                | --                | --                 | --                | --               | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --               | --                | --               | --                | --                | --                 | --                | --               | --                |
| Orthophosphate                   |                         | --               | --                | --               | --                | --                | --                 | --                | --               | --                |
| pH***                            |                         | --               | --                | --               | --                | --                | --                 | --                | --               | --                |
| Phenols, total                   |                         | --               | --                | --               | --                | --                | --                 | --                | --               | --                |
| Specific conductivity**          |                         | --               | --                | --               | --                | --                | --                 | --                | --               | --                |
| Sulfate                          |                         | --               | --                | --               | --                | --                | --                 | --                | --               | --                |
| Total dissolved solids (TDS)     |                         | --               | --                | --               | --                | --                | --                 | --                | --               | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-054<br>10/5/94 | MW-054<br>1/10/95 | MW-054<br>4/6/95 | MW-054<br>7/21/95 | MW-054<br>10/11/95 | MW-054<br>1/20/96 | MW-054<br>4/18/96 | MW-054<br>7/11/96 |
|----------------------------------|-------------------------|-------------------|-------------------|------------------|-------------------|--------------------|-------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --               | --                | --                 | --                | --                | --                |
| Ammonia (as N)                   |                         | --                | --                | --               | --                | --                 | --                | --                | --                |
| Bromide                          |                         | --                | --                | --               | --                | --                 | --                | --                | --                |
| Carbonate Alkalinity             |                         | --                | --                | --               | --                | --                 | --                | --                | --                |
| Chloride                         | 130                     |                   | 32                | 102              | 95                | 110                | 120               | 140               | 110               |
| Cyanide                          | --                      | --                | --                | --               | --                | --                 | --                | --                | --                |
| Fluoride                         | --                      | --                | --                | --               | --                | --                 | --                | --                | --                |
| Hydroxide                        | --                      | --                | --                | --               | --                | --                 | --                | --                | --                |
| Carbon Dioxide                   | --                      | --                | --                | --               | --                | --                 | --                | --                | --                |
| Nitrate                          | --                      | --                | --                | --               | --                | --                 | --                | --                | --                |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                | --                | --               | --                | --                 | --                | --                | --                |
| Orthophosphate                   | --                      | --                | --                | --               | --                | --                 | --                | --                | --                |
| pH***                            | --                      | --                | --                | --               | --                | --                 | --                | --                | --                |
| Phenols, total                   | --                      | --                | --                | --               | --                | --                 | --                | --                | --                |
| Specific conductivity**          | --                      | --                | --                | --               | --                | --                 | --                | --                | --                |
| Sulfate                          | --                      | --                | --                | --               | --                | --                 | --                | --                | --                |
| Total dissolved solids (TDS)     | --                      | --                | --                | --               | --                | --                 | --                | --                | --                |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-054<br>10/1/96 | MW-054<br>2/10/97 | MW-054<br>7/16/97 | MW-054<br>6/25/98 | MW-055<br>6/1/91 | MW-055<br>12/1/91 | MW-055<br>4/1/92 | MW-055<br>7/1/92 | MW-055<br>10/1/92 |
|----------------------------------|-------------------------|-------------------|-------------------|-------------------|-------------------|------------------|-------------------|------------------|------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --                | --                | --               | --                | --               | --               | --                |
| Ammonia (as N)                   |                         | --                | --                | --                | --                | --               | --                | --               | --               | --                |
| Bromide                          |                         | --                | --                | --                | --                | --               | --                | --               | --               | --                |
| Carbonate Alkalinity             |                         | --                | --                | --                | --                | --               | --                | --               | --               | --                |
| Chloride                         |                         | 110               | 180               | 160               | 110               | 200              | 501               | 385              | 273              | 292               |
| Cyanide                          |                         | --                | --                | --                | < 0.005           | --               | --                | --               | --               | --                |
| Fluoride                         |                         | --                | --                | --                | 1.8               | --               | --                | --               | --               | --                |
| Hydroxide                        |                         | --                | --                | --                | --                | --               | --                | --               | --               | --                |
| Carbon Dioxide                   |                         | --                | --                | --                | --                | --               | --                | --               | --               | --                |
| Nitrate                          |                         | --                | --                | --                | --                | --               | --                | --               | --               | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                | --                | --                | --               | --                | --               | --               | --                |
| Orthophosphate                   |                         | --                | --                | --                | --                | --               | --                | --               | --               | --                |
| pH***                            |                         | --                | --                | --                | 7.1               | --               | --                | --               | --               | --                |
| Phenols, total                   |                         | --                | --                | --                | < 0.005           | --               | --                | --               | --               | --                |
| Specific conductivity**          |                         | --                | --                | --                | --                | --               | --                | --               | --               | --                |
| Sulfate                          |                         | --                | --                | --                | 1300              | --               | --                | --               | --               | --                |
| Total dissolved solids (TDS)     |                         | --                | --                | --                | 2200              | --               | --                | --               | --               | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-055<br>1/1/93 | MW-055<br>4/14/93 | MW-055<br>7/14/93 | MW-055<br>10/14/93 | MW-055<br>1/12/94 | MW-055<br>4/8/94 | MW-055<br>7/20/94 | MW-055<br>10/5/94 | MW-055<br>1/11/95 |
|----------------------------------|-------------------------|------------------|-------------------|-------------------|--------------------|-------------------|------------------|-------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Ammonia (as N)                   |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Bromide                          |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Carbonate Alkalinity             |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Chloride                         |                         | 300              | 301               | 312               | 287                | 320               | 310              | 299               | 390               | 321               |
| Cyanide                          |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Fluoride                         |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Hydroxide                        |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Carbon Dioxide                   |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Nitrate                          |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Orthophosphate                   |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| pH***                            |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Phenols, total                   |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Specific conductivity**          |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Sulfate                          |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Total dissolved solids (TDS)     |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-055<br>4/11/95 | MW-055<br>7/20/95 | MW-055<br>10/11/95 | MW-055<br>1/19/96 | MW-055<br>4/18/96 | MW-055<br>7/1/96 | MW-055<br>10/1/96 | MW-055<br>2/10/97 | MW-055<br>7/16/97 |
|----------------------------------|-------------------------|-------------------|-------------------|--------------------|-------------------|-------------------|------------------|-------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Ammonia (as N)                   |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Bromide                          |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Carbonate Alkalinity             |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Chloride                         |                         | 328               | 300               | 250                | 370               | 310               | 350              | 210               | 270               | 300               |
| Cyanide                          |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Fluoride                         |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Hydroxide                        |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Carbon Dioxide                   |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Nitrate                          |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Orthophosphate                   |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| pH***                            |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Phenols, total                   |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Specific conductivity**          |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Sulfate                          |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Total dissolved solids (TDS)     |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-055<br>6/25/98 | MW-056<br>6/1/91 | MW-056<br>7/1/91 | MW-056<br>9/1/91 | MW-056<br>12/1/91 | MW-056<br>7/1/92 | MW-056<br>10/1/92 | MW-056<br>1/1/93 | MW-056<br>10/1/96 |
|----------------------------------|-------------------------|-------------------|------------------|------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --               | --               | --               | --                | --               | --                | --               | --                |
| Ammonia (as N)                   |                         | --                | --               | --               | --               | --                | --               | --                | --               | --                |
| Bromide                          |                         | --                | --               | --               | --               | --                | --               | --                | --               | --                |
| Carbonate Alkalinity             |                         | --                | --               | --               | --               | --                | --               | --                | --               | --                |
| Chloride                         |                         | (300)             | 100              | 102              | --               | 197               | (248)            | 183               | (269)            | (270)             |
| Cyanide                          | <                       | 0.005             | --               | --               | --               | --                | --               | --                | --               | --                |
| Fluoride                         |                         | 1.5               | --               | --               | --               | --                | --               | --                | --               | --                |
| Hydroxide                        |                         | --                | --               | --               | --               | --                | --               | --                | --               | --                |
| Carbon Dioxide                   |                         | --                | --               | --               | --               | --                | --               | --                | --               | --                |
| Nitrate                          |                         | --                | --               | --               | --               | --                | --               | --                | --               | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --               | --               | --               | --                | --               | --                | --               | --                |
| Orthophosphate                   |                         | --                | --               | --               | --               | --                | --               | --                | --               | --                |
| pH***                            |                         | 7                 | --               | --               | --               | --                | --               | --                | --               | --                |
| Phenols, total                   |                         | (0.016)           | --               | --               | --               | --                | --               | --                | --               | --                |
| Specific conductivity**          |                         | --                | --               | --               | --               | --                | --               | --                | --               | --                |
| Sulfate                          |                         | 55                | --               | --               | < 10             | --                | --               | --                | --               | --                |
| Total dissolved solids (TDS)     |                         | (1500)            | --               | --               | (1220)           | --                | --               | --                | --               | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-056<br>2/11/97 | MW-056<br>3/20/97 | MW-057<br>6/1/91 | MW-057<br>7/1/91 | MW-057<br>12/1/91 | MW-057<br>4/1/92 | MW-057<br>7/1/92 | MW-057<br>10/1/92 | MW-057<br>1/1/93 |
|----------------------------------|-------------------------|-------------------|-------------------|------------------|------------------|-------------------|------------------|------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --               | --               | --                | --               | --               | --                | --               |
| Ammonia (as N)                   |                         | --                | --                | --               | --               | --                | --               | --               | --                | --               |
| Bromide                          |                         | --                | --                | --               | --               | --                | --               | --               | --                | --               |
| Carbonate Alkalinity             |                         | --                | --                | --               | --               | --                | --               | --               | --                | --               |
| Chloride                         |                         | 170               | --                | 15.2             | 21               | 32                | 117              | 63               | 67                | 131              |
| Cyanide                          |                         | --                | --                | --               | --               | --                | --               | --               | --                | --               |
| Fluoride                         |                         | --                | 1.5               | --               | < 1              | --                | --               | --               | --                | --               |
| Hydroxide                        |                         | --                | --                | --               | --               | --                | --               | --               | --                | --               |
| Carbon Dioxide                   |                         | --                | --                | --               | --               | --                | --               | --               | --                | --               |
| Nitrate                          |                         | --                | --                | --               | 2.7              | --                | --               | --               | --                | --               |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                | --               | --               | --                | --               | --               | --                | --               |
| Orthophosphate                   |                         | --                | --                | --               | --               | --                | --               | --               | --                | --               |
| pH***                            |                         | --                | --                | --               | --               | --                | --               | --               | --                | --               |
| Phenols, total                   |                         | --                | --                | --               | --               | --                | --               | --               | --                | --               |
| Specific conductivity**          |                         | --                | --                | --               | --               | --                | --               | --               | --                | --               |
| Sulfate                          |                         | --                | < 10              | --               | 60               | --                | --               | --               | --                | --               |
| Total dissolved solids (TDS)     |                         | --                | (1200)            | --               | 460              | --                | --               | --               | --                | --               |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-057<br>4/14/93 | MW-057<br>7/14/93 | MW-057<br>10/13/93 | MW-057<br>1/12/94 | MW-057<br>4/7/94 | MW-057<br>7/19/94 | MW-057<br>10/5/94 | MW-057<br>1/11/95 | MW-057<br>4/8/95 |
|----------------------------------|-------------------------|-------------------|-------------------|--------------------|-------------------|------------------|-------------------|-------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Ammonia (as N)                   |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Bromide                          |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Carbonate Alkalinity             |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Chloride                         | 80                      | 72                | 73.6              | 64                 | 58                | 48               | 60                | 35                | 31                | 31               |
| Cyanide                          | --                      | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Fluoride                         | --                      | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Hydroxide                        | --                      | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Carbon Dioxide                   | --                      | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Nitrate                          | --                      | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Orthophosphate                   | --                      | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| pH***                            | --                      | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Phenols, total                   | --                      | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Specific conductivity**          | --                      | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Sulfate                          | --                      | --                | --                | --                 | --                | --               | --                | --                | --                | --               |
| Total dissolved solids (TDS)     | --                      | --                | --                | --                 | --                | --               | --                | --                | --                | --               |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Parameter                        | Well ID<br>Date Sampled | MW-057<br>7/20/95 | MW-057<br>10/11/95 | MW-057<br>1/19/96 | MW-057<br>4/18/96 | MW-057<br>7/1/96 | MW-057<br>10/1/96 | MW-057<br>2/10/97 | MW-057<br>7/15/97 | MW-057<br>6/25/98 |
|----------------------------------|-------------------------|-------------------|--------------------|-------------------|-------------------|------------------|-------------------|-------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --                 | --                | --                | --               | --                | --                | --                | --                |
| Ammonia (as N)                   |                         | --                | --                 | --                | --                | --               | --                | --                | --                | --                |
| Bromide                          |                         | --                | --                 | --                | --                | --               | --                | --                | --                | --                |
| Carbonate Alkalinity             |                         | --                | --                 | --                | --                | --               | --                | --                | --                | --                |
| Chloride                         |                         | 37                | 47                 | 44                | 44                | 30               | 30                | 32                | 36                | 50                |
| Cyanide                          |                         | --                | --                 | --                | --                | --               | --                | --                | --                | < 0.005           |
| Fluoride                         |                         | --                | --                 | --                | --                | --               | --                | --                | --                | 0.5               |
| Hydroxide                        |                         | --                | --                 | --                | --                | --               | --                | --                | --                | --                |
| Carbon Dioxide                   |                         | --                | --                 | --                | --                | --               | --                | --                | --                | --                |
| Nitrate                          |                         | --                | --                 | --                | --                | --               | --                | --                | --                | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                 | --                | --                | --               | --                | --                | --                | --                |
| Orthophosphate                   |                         | --                | --                 | --                | --                | --               | --                | --                | --                | --                |
| pH***                            |                         | --                | --                 | --                | --                | --               | --                | --                | --                | 7.3               |
| Phenols, total                   |                         | --                | --                 | --                | --                | --               | --                | --                | --                | 0.006             |
| Specific conductivity**          |                         | --                | --                 | --                | --                | --               | --                | --                | --                | --                |
| Sulfate                          |                         | --                | --                 | --                | --                | --               | --                | --                | --                | 110               |
| Total dissolved solids (TDS)     |                         | --                | --                 | --                | --                | --               | --                | --                | --                | 490               |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

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-- Not analyzed or not reported.

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# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-058<br>12/1/91 | MW-058<br>4/1/92 | MW-058<br>7/1/92 | MW-058<br>10/1/92 | MW-058<br>1/1/93 | MW-058<br>4/13/93 | MW-058<br>7/13/93 | MW-058<br>10/13/93 | MW-058<br>4/5/94 |
|----------------------------------|-------------------------|-------------------|------------------|------------------|-------------------|------------------|-------------------|-------------------|--------------------|------------------|
| Bicarbonate Alkalinity           |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --               |
| Ammonia (as N)                   |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --               |
| Bromide                          |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --               |
| Carbonate Alkalinity             |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --               |
| Chloride                         | 124                     |                   | 156              | 149              | 155               | 175              | 133               | 133               | 59                 | 48               |
| Cyanide                          | --                      | --                | --               | --               | --                | --               | --                | --                | --                 | --               |
| Fluoride                         | --                      | --                | --               | --               | --                | --               | --                | --                | --                 | --               |
| Hydroxide                        | --                      | --                | --               | --               | --                | --               | --                | --                | --                 | --               |
| Carbon Dioxide                   | --                      | --                | --               | --               | --                | --               | --                | --                | --                 | --               |
| Nitrate                          | --                      | --                | --               | --               | --                | --               | --                | --                | --                 | --               |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                | --               | --               | --                | --               | --                | --                | --                 | --               |
| Orthophosphate                   | --                      | --                | --               | --               | --                | --               | --                | --                | --                 | --               |
| pH***                            | --                      | --                | --               | --               | --                | --               | --                | --                | --                 | --               |
| Phenols, total                   | --                      | --                | --               | --               | --                | --               | --                | --                | --                 | --               |
| Specific conductivity**          | --                      | --                | --               | --               | --                | --               | --                | --                | --                 | --               |
| Sulfate                          | --                      | --                | --               | --               | --                | --               | --                | --                | --                 | --               |
| Total dissolved solids (TDS)     | --                      | --                | --               | --               | --                | --               | --                | --                | --                 | --               |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-058<br>7/19/94 | MW-058<br>10/6/94 | MW-058<br>1/11/95 | MW-058<br>4/8/95 | MW-058<br>4/18/96 | MW-058<br>10/1/96 | MW-058<br>6/22/98 | MW-059<br>12/1/91 | MW-059<br>4/1/92 |
|----------------------------------|-------------------------|-------------------|-------------------|-------------------|------------------|-------------------|-------------------|-------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --                | --               | --                | --                | --                | --                | --               |
| Ammonia (as N)                   |                         | --                | --                | --                | --               | --                | --                | --                | --                | --               |
| Bromide                          |                         | --                | --                | --                | --               | --                | --                | --                | --                | --               |
| Carbonate Alkalinity             |                         | --                | --                | --                | --               | --                | --                | --                | --                | --               |
| Chloride                         | 38                      | --                | 36                | 26                | 39               | 29                | 38                | 42                | 149               | 52               |
| Cyanide                          | --                      | --                | --                | --                | --               | --                | --                | < 0.005           | --                | --               |
| Fluoride                         | --                      | --                | --                | --                | --               | --                | --                | 0.9               | --                | --               |
| Hydroxide                        | --                      | --                | --                | --                | --               | --                | --                | --                | --                | --               |
| Carbon Dioxide                   | --                      | --                | --                | --                | --               | --                | --                | --                | --                | --               |
| Nitrate                          | --                      | --                | --                | --                | --               | --                | --                | --                | --                | --               |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                | --                | --                | --               | --                | --                | --                | --                | --               |
| Orthophosphate                   | --                      | --                | --                | --                | --               | --                | --                | --                | --                | --               |
| pH***                            | --                      | --                | --                | --                | --               | --                | --                | 7.4               | --                | --               |
| Phenols, total                   | --                      | --                | --                | --                | --               | --                | --                | < 0.005           | --                | --               |
| Specific conductivity**          | --                      | --                | --                | --                | --               | --                | --                | --                | --                | --               |
| Sulfate                          | --                      | --                | --                | --                | --               | --                | --                | < 5               | --                | --               |
| Total dissolved solids (TDS)     | --                      | --                | --                | --                | --               | --                | --                | 760               | --                | --               |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-059<br>7/1/92 | MW-059<br>10/1/92 | MW-059<br>1/1/93 | MW-059<br>4/13/93 | MW-059<br>10/13/93 | MW-059<br>4/5/94 | MW-059<br>7/19/94 | MW-059<br>10/6/94 | MW-059<br>1/11/95 |
|----------------------------------|-------------------------|------------------|-------------------|------------------|-------------------|--------------------|------------------|-------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --               | --                | --               | --                | --                 | --               | --                | --                | --                |
| Ammonia (as N)                   |                         | --               | --                | --               | --                | --                 | --               | --                | --                | --                |
| Bromide                          |                         | --               | --                | --               | --                | --                 | --               | --                | --                | --                |
| Carbonate Alkalinity             |                         | --               | --                | --               | --                | --                 | --               | --                | --                | --                |
| Chloride                         |                         | 55               | 69                | 46               | 29                | 56                 | 30               | < 5               | 25                | 12                |
| Cyanide                          |                         | --               | --                | --               | --                | --                 | --               | --                | --                | --                |
| Fluoride                         |                         | --               | --                | --               | --                | --                 | --               | --                | --                | --                |
| Hydroxide                        |                         | --               | --                | --               | --                | --                 | --               | --                | --                | --                |
| Carbon Dioxide                   |                         | --               | --                | --               | --                | --                 | --               | --                | --                | --                |
| Nitrate                          |                         | --               | --                | --               | --                | --                 | --               | --                | --                | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --               | --                | --               | --                | --                 | --               | --                | --                | --                |
| Orthophosphate                   |                         | --               | --                | --               | --                | --                 | --               | --                | --                | --                |
| pH***                            |                         | --               | --                | --               | --                | --                 | --               | --                | --                | --                |
| Phenols, total                   |                         | --               | --                | --               | --                | --                 | --               | --                | --                | --                |
| Specific conductivity**          |                         | --               | --                | --               | --                | --                 | --               | --                | --                | --                |
| Sulfate                          |                         | --               | --                | --               | --                | --                 | --               | --                | --                | --                |
| Total dissolved solids (TDS)     |                         | --               | --                | --               | --                | --                 | --               | --                | --                | --                |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-059<br>2/9/97 | MW-059<br>6/24/98 | MW-060<br>7/1/91 | MW-060<br>12/1/91 | MW-060<br>4/1/92 | MW-060<br>7/1/92 | MW-060<br>10/1/92 | MW-060<br>1/1/93 | MW-060<br>4/14/93 |
|----------------------------------|-------------------------|------------------|-------------------|------------------|-------------------|------------------|------------------|-------------------|------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --               | --                | --               | --                | --               | --               | --                | --               | --                |
| Ammonia (as N)                   |                         | --               | --                | --               | --                | --               | --               | --                | --               | --                |
| Bromide                          |                         | --               | --                | --               | --                | --               | --               | --                | --               | --                |
| Carbonate Alkalinity             |                         | --               | --                | --               | --                | --               | --               | --                | --               | --                |
| Chloride                         |                         | 29               | 5603              | 13               | 10                | 10               | 10               | 14                | 6                | 9                 |
| Cyanide                          |                         | --               | < 0.005           | --               | --                | --               | --               | --                | --               | --                |
| Fluoride                         |                         | --               | 0.6               | 2                | --                | --               | --               | --                | --               | --                |
| Hydroxide                        |                         | --               | --                | --               | --                | --               | --               | --                | --               | --                |
| Carbon Dioxide                   |                         | --               | --                | --               | --                | --               | --               | --                | --               | --                |
| Nitrate                          |                         | --               | --                | 0.4              | --                | --               | --               | --                | --               | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --               | --                | --               | --                | --               | --               | --                | --               | --                |
| Orthophosphate                   |                         | --               | --                | --               | --                | --               | --               | --                | --               | --                |
| pH***                            |                         | --               | 7.5               | --               | --                | --               | --               | --                | --               | --                |
| Phenols, total                   |                         | --               | 0.022             | --               | --                | --               | --               | --                | --               | --                |
| Specific conductivity**          |                         | --               | --                | --               | --                | --               | --               | --                | --               | --                |
| Sulfate                          |                         | --               | 2300              | 383              | --                | --               | --               | --                | --               | --                |
| Total dissolved solids (TDS)     |                         | --               | 4100              | 860              | --                | --               | --               | --                | --               | --                |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-060<br>7/14/93 | MW-060<br>10/13/93 | MW-060<br>1/12/94 | MW-060<br>4/7/94 | MW-060<br>7/19/94 | MW-060<br>10/5/94 | MW-060<br>1/10/95 | MW-060<br>4/7/95 | MW-060<br>7/19/95 |
|----------------------------------|-------------------------|-------------------|--------------------|-------------------|------------------|-------------------|-------------------|-------------------|------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Ammonia (as N)                   |                         | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Bromide                          |                         | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Carbonate Alkalinity             |                         | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Chloride                         | 10.7                    | 13.5              | 9.5                | 9                 | < 5              | 9.1               | 20                | 8.8               | 9                | 9                 |
| Cyanide                          | --                      | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Fluoride                         | --                      | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Hydroxide                        | --                      | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Carbon Dioxide                   | --                      | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Nitrate                          | --                      | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Orthophosphate                   | --                      | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| pH***                            | --                      | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Phenols, total                   | --                      | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Specific conductivity**          | --                      | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Sulfate                          | --                      | --                | --                 | --                | --               | --                | --                | --                | --               | --                |
| Total dissolved solids (TDS)     | --                      | --                | --                 | --                | --               | --                | --                | --                | --               | --                |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-060<br>10/11/95 | MW-060<br>1/19/96 | MW-060<br>4/18/96 | MW-060<br>7/1/96 | MW-060<br>10/1/96 | MW-060<br>10/19/96 | MW-060<br>2/9/97 | MW-060<br>3/19/97 | MW-060<br>5/6/97 |
|----------------------------------|-------------------------|--------------------|-------------------|-------------------|------------------|-------------------|--------------------|------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --                 | --                | --                | --               | --                | --                 | --               | --                | --               |
| Ammonia (as N)                   |                         | --                 | --                | --                | --               | --                | --                 | --               | --                | --               |
| Bromide                          |                         | --                 | --                | --                | --               | --                | --                 | --               | --                | --               |
| Carbonate Alkalinity             |                         | --                 | --                | --                | --               | --                | --                 | --               | --                | --               |
| Chloride                         | 9                       | 16                 | 12.7              | 12                | 12               | 12                | 16                 | 9                | --                | 10               |
| Cyanide                          | --                      | --                 | --                | --                | --               | --                | --                 | --               | --                | --               |
| Fluoride                         | --                      | --                 | --                | --                | --               | --                | --                 | --               | 0.8               | --               |
| Hydroxide                        | --                      | --                 | --                | --                | --               | --                | --                 | --               | --                | --               |
| Carbon Dioxide                   | --                      | --                 | --                | --                | --               | --                | --                 | --               | --                | --               |
| Nitrate                          | --                      | --                 | --                | --                | --               | --                | --                 | --               | --                | --               |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                 | --                | --                | --               | --                | --                 | --               | --                | --               |
| Orthophosphate                   | --                      | --                 | --                | --                | --               | --                | --                 | --               | --                | --               |
| pH***                            | --                      | --                 | --                | --                | --               | --                | --                 | --               | --                | --               |
| Phenols, total                   | --                      | --                 | --                | --                | --               | --                | --                 | --               | --                | --               |
| Specific conductivity**          | --                      | --                 | --                | --                | --               | --                | --                 | --               | --                | --               |
| Sulfate                          | --                      | --                 | --                | --                | --               | --                | --                 | --               | 280               | --               |
| Total dissolved solids (TDS)     | --                      | --                 | --                | --                | --               | --                | --                 | --               | 760               | --               |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

Historical General Chemistry Analytical Data  
 May 1991 - October 1998  
 Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-060<br>7/15/97 | MW-060<br>10/16/97 | MW-060<br>6/21/98 | MW-061<br>12/1/91 | MW-061<br>1/13/94 | MW-061<br>4/7/94 | MW-061<br>7/20/94 | MW-061<br>10/4/94 | MW-061<br>1/11/95 |
|----------------------------------|-------------------------|-------------------|--------------------|-------------------|-------------------|-------------------|------------------|-------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --                 | --                | --                | --                | --               | --                | --                | --                |
| Ammonia (as N)                   |                         | --                | 0.07               | --                | --                | --                | --               | --                | --                | --                |
| Bromide                          |                         | --                | --                 | --                | --                | --                | --               | --                | --                | --                |
| Carbonate Alkalinity             |                         | --                | --                 | --                | --                | --                | --               | --                | --                | --                |
| Chloride                         |                         | 11                | --                 | 12                | (413)             | (420)             | (450)            | (387)             | (400)             | (439)             |
| Cyanide                          |                         | --                | --                 | < 0.005           | --                | --                | --               | --                | --                | --                |
| Fluoride                         |                         | --                | --                 | 1.4               | --                | --                | --               | --                | --                | --                |
| Hydroxide                        |                         | --                | --                 | --                | --                | --                | --               | --                | --                | --                |
| Carbon Dioxide                   |                         | --                | --                 | --                | --                | --                | --               | --                | --                | --                |
| Nitrate                          |                         | --                | 0.28               | --                | --                | --                | --               | --                | --                | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | < 0.2              | --                | --                | --                | --               | --                | --                | --                |
| Orthophosphate                   |                         | --                | 0.06               | --                | --                | --                | --               | --                | --                | --                |
| pH***                            |                         | --                | --                 | 7.3               | --                | --                | --               | --                | --                | --                |
| Phenols, total                   |                         | --                | --                 | < 0.005           | --                | --                | --               | --                | --                | --                |
| Specific conductivity**          |                         | --                | --                 | --                | --                | --                | --               | --                | --                | --                |
| Sulfate                          |                         | --                | --                 | 390               | --                | --                | --               | --                | --                | --                |
| Total dissolved solids (TDS)     |                         | --                | --                 | 720               | --                | --                | --               | --                | --                | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-061<br>4/11/95 | MW-061<br>7/21/95 | MW-061<br>10/10/95 | MW-061<br>1/20/96 | MW-061<br>4/18/96 | MW-061<br>7/1/96 | MW-061<br>10/1/96 | MW-061<br>2/10/97 | MW-061<br>7/17/97 |
|----------------------------------|-------------------------|-------------------|-------------------|--------------------|-------------------|-------------------|------------------|-------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Ammonia (as N)                   |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Bromide                          |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Carbonate Alkalinity             |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Chloride                         |                         | 420               | 400               | 300                | 420               | 450               | 370              | 420               | 410               | 390               |
| Cyanide                          |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Fluoride                         |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Hydroxide                        |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Carbon Dioxide                   |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Nitrate                          |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Orthophosphate                   |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| pH***                            |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Phenols, total                   |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Specific conductivity**          |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Sulfate                          |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |
| Total dissolved solids (TDS)     |                         | --                | --                | --                 | --                | --                | --               | --                | --                | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-061<br>6/18/98 | MW-061A<br>7/1/91 | MW-061A<br>9/1/91 | MW-061A<br>12/1/91 | MW-061A<br>4/1/92 | MW-061A<br>7/1/92 | MW-061A<br>10/1/92 | MW-061A<br>1/1/93 | MW-061A<br>4/13/93 |
|----------------------------------|-------------------------|-------------------|-------------------|-------------------|--------------------|-------------------|-------------------|--------------------|-------------------|--------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --                | --                 | --                | --                | --                 | --                | --                 |
| Ammonia (as N)                   |                         | --                | --                | --                | --                 | --                | --                | --                 | --                | --                 |
| Bromide                          |                         | --                | --                | --                | --                 | --                | --                | --                 | --                | --                 |
| Carbonate Alkalinity             |                         | --                | --                | --                | --                 | --                | --                | --                 | --                | --                 |
| Chloride                         |                         | 480               | 16                | --                | 12                 | 12                | 12                | 13                 | 12                | 15                 |
| Cyanide                          | < 0.005                 | 2.2               | 1.6               | --                | --                 | --                | --                | --                 | --                | --                 |
| Fluoride                         |                         | --                | --                | --                | --                 | --                | --                | --                 | --                | --                 |
| Hydroxide                        |                         | --                | --                | --                | --                 | --                | --                | --                 | --                | --                 |
| Carbon Dioxide                   |                         | --                | --                | --                | --                 | --                | --                | --                 | --                | --                 |
| Nitrate                          |                         | --                | 0.1               | --                | --                 | --                | --                | --                 | --                | --                 |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                | --                | --                 | --                | --                | --                 | --                | --                 |
| Orthophosphate                   |                         | --                | --                | --                | --                 | --                | --                | --                 | --                | --                 |
| pH***                            | 6.9                     | --                | --                | --                | --                 | --                | --                | --                 | --                | --                 |
| Phenols, total                   | < 0.005                 | --                | --                | --                | --                 | --                | --                | --                 | --                | --                 |
| Specific conductivity**          |                         | --                | --                | --                | --                 | --                | --                | --                 | --                | --                 |
| Sulfate                          | 1600                    | 347               | 335               | --                | --                 | --                | --                | --                 | --                | --                 |
| Total dissolved solids (TDS)     | 3200                    | 805               | 755               | --                | --                 | --                | --                | --                 | --                | --                 |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-061A<br>4/5/94 | MW-061A<br>7/19/94 | MW-061A<br>10/4/94 | MW-061A<br>1/10/95 | MW-061A<br>1/20/96 | MW-061A<br>4/19/96 | MW-061A<br>7/1/96 | MW-061A<br>2/6/97 | MW-061A<br>5/7/97 |
|----------------------------------|-------------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --                 | --                 | --                 | --                 | --                 | --                | 266               | --                |
| Ammonia (as N)                   |                         | --                | --                 | --                 | --                 | --                 | --                 | --                | --                | --                |
| Bromide                          |                         | --                | --                 | --                 | --                 | --                 | --                 | --                | < 0.3             | --                |
| Carbonate Alkalinity             |                         | --                | --                 | --                 | --                 | --                 | --                 | --                | < 1               | --                |
| Chloride                         | 10.7                    |                   | 8                  | 11                 | 32                 | 9                  | 10.2               | 7                 | 13                | 11                |
| Cyanide                          | --                      | --                | --                 | --                 | --                 | --                 | --                 | --                | --                | --                |
| Fluoride                         | --                      | --                | --                 | --                 | --                 | --                 | --                 | --                | 0.85              | --                |
| Hydroxide                        | --                      | --                | --                 | --                 | --                 | --                 | --                 | --                | < 1               | --                |
| Carbon Dioxide                   | --                      | --                | --                 | --                 | --                 | --                 | --                 | --                | --                | --                |
| Nitrate                          | --                      | --                | --                 | --                 | --                 | --                 | --                 | --                | --                | --                |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                | --                 | --                 | --                 | --                 | --                 | --                | --                | --                |
| Orthophosphate                   | --                      | --                | --                 | --                 | --                 | --                 | --                 | --                | --                | --                |
| pH***                            | --                      | --                | --                 | --                 | --                 | --                 | --                 | --                | --                | --                |
| Phenols, total                   | --                      | --                | --                 | --                 | --                 | --                 | --                 | --                | 7.5               | --                |
| Specific conductivity**          | --                      | --                | --                 | --                 | --                 | --                 | --                 | --                | 1020              | --                |
| Sulfate                          | --                      | --                | --                 | --                 | --                 | --                 | --                 | --                | 340               | --                |
| Total dissolved solids (TDS)     | --                      | --                | --                 | --                 | --                 | --                 | --                 | --                | 840               | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-061A<br>6/26/97 | MW-061A<br>7/15/97 | MW-061A<br>10/15/97 | MW-061A<br>6/18/98 | MW-062<br>9/1/91 | MW-062<br>12/1/91 | MW-062<br>4/1/92 | MW-062<br>7/1/92 | MW-062<br>10/1/92 |
|----------------------------------|-------------------------|--------------------|--------------------|---------------------|--------------------|------------------|-------------------|------------------|------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                 | --                 | --                  | --                 | --               | --                | --               | --               | --                |
| Ammonia (as N)                   |                         | --                 | --                 | 0.08                | --                 | --               | --                | --               | --               | --                |
| Bromide                          |                         | --                 | --                 | --                  | --                 | --               | --                | --               | --               | --                |
| Carbonate Alkalinity             |                         | --                 | --                 | --                  | --                 | --               | --                | --               | --               | --                |
| Chloride                         |                         | 12                 | 10                 | --                  | 4                  | --               | 247               | 218              | 236              | 285               |
| Cyanide                          |                         | --                 | --                 | --                  | 0.025              | --               | --                | --               | --               | --                |
| Fluoride                         |                         | --                 | --                 | --                  | 0.8                | --               | --                | --               | --               | --                |
| Hydroxide                        |                         | --                 | --                 | --                  | --                 | --               | --                | --               | --               | --                |
| Carbon Dioxide                   |                         | --                 | --                 | --                  | --                 | --               | --                | --               | --               | --                |
| Nitrate                          |                         | --                 | --                 | --                  | --                 | --               | --                | --               | --               | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                 | --                 | < 0.06              | --                 | --               | --                | --               | --               | --                |
| Orthophosphate                   |                         | --                 | --                 | 0.4                 | --                 | --               | --                | --               | --               | --                |
| pH***                            |                         | --                 | --                 | < 2.5               | --                 | --               | --                | --               | --               | --                |
| Phenols, total                   |                         | --                 | --                 | --                  | 7.3                | --               | --                | --               | --               | --                |
| Specific conductivity**          |                         | --                 | --                 | --                  | < 0.005            | --               | --                | --               | --               | --                |
| Sulfate                          |                         | --                 | --                 | --                  | --                 | 19               | --                | --               | --               | --                |
| Total dissolved solids (TDS)     |                         | --                 | --                 | --                  | 690                | 120              | --                | --               | --               | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-062<br>1/1/93 | MW-062<br>4/13/93 | MW-062<br>7/14/93 | MW-062<br>10/13/93 | MW-062<br>1/11/94 | MW-062<br>4/5/94 | MW-062<br>7/19/94 | MW-062<br>10/6/94 | MW-062<br>1/11/95 |
|----------------------------------|-------------------------|------------------|-------------------|-------------------|--------------------|-------------------|------------------|-------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Ammonia (as N)                   |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Bromide                          |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Carbonate Alkalinity             |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Chloride                         |                         | 202              | 207               | 459               | 181                | 160               | 139              | 129               | 130               | 152               |
| Cyanide                          |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Fluoride                         |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Hydroxide                        |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Carbon Dioxide                   |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Nitrate                          |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Orthophosphate                   |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| pH***                            |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Phenols, total                   |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Specific conductivity**          |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Sulfate                          |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |
| Total dissolved solids (TDS)     |                         | --               | --                | --                | --                 | --                | --               | --                | --                | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

## Appendix C

Historical General Chemistry Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-062<br>4/8/95 | MW-062<br>2/11/97 | MW-062<br>7/18/97 | MW-062<br>6/26/98 | MW-063<br>12/1/91 | MW-063<br>4/1/92 | MW-063<br>7/1/92 | MW-063<br>10/1/92 | MW-063<br>1/1/93 |
|----------------------------------|-------------------------|------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --               | --                | --                | --                | --                | --               | --               | --                | --               |
| Ammonia (as N)                   |                         | --               | --                | --                | --                | --                | --               | --               | --                | --               |
| Bromide                          |                         | --               | --                | --                | --                | --                | --               | --               | --                | --               |
| Carbonate Alkalinity             |                         | --               | --                | --                | --                | --                | --               | --               | --                | --               |
| Chloride                         | 128                     | 150              | 100               | 91                | 14                | 8                 | 7                | 1                | 3                 | 3                |
| Cyanide                          | --                      | --               | --                | < 0.005           | --                | --                | --               | --               | --                | --               |
| Fluoride                         | --                      | --               | --                | 0.8               | --                | --                | --               | --               | --                | --               |
| Hydroxide                        | --                      | --               | --                | --                | --                | --                | --               | --               | --                | --               |
| Carbon Dioxide                   | --                      | --               | --                | --                | --                | --                | --               | --               | --                | --               |
| Nitrate                          | --                      | --               | --                | --                | --                | --                | --               | --               | --                | --               |
| Nitrogen, Kjeldahl, total (as N) | --                      | --               | --                | --                | --                | --                | --               | --               | --                | --               |
| Orthophosphate                   | --                      | --               | --                | --                | --                | --                | --               | --               | --                | --               |
| pH***                            | --                      | --               | --                | 7.1               | --                | --                | --               | --               | --                | --               |
| Phenols, total                   | --                      | --               | --                | < 0.005           | --                | --                | --               | --               | --                | --               |
| Specific conductivity**          | --                      | --               | --                | --                | --                | --                | --               | --               | --                | --               |
| Sulfate                          | --                      | --               | --                | 140               | --                | --                | --               | --               | --                | --               |
| Total dissolved solids (TDS)     | --                      | --               | --                | 650               | --                | --                | --               | --               | --                | --               |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-063<br>4/13/93 | MW-063<br>7/13/93 | MW-063<br>10/12/93 | MW-063<br>1/11/94 | MW-063<br>4/6/94 | MW-063<br>7/18/94 | MW-063<br>10/4/94 | MW-063<br>1/9/95 | MW-063<br>4/7/95 |
|----------------------------------|-------------------------|-------------------|-------------------|--------------------|-------------------|------------------|-------------------|-------------------|------------------|------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --                 | --                | --               | --                | --                | --               | --               |
| Ammonia (as N)                   |                         | --                | --                | --                 | --                | --               | --                | --                | --               | --               |
| Bromide                          |                         | --                | --                | --                 | --                | --               | --                | --                | --               | --               |
| Carbonate Alkalinity             |                         | --                | --                | --                 | --                | --               | --                | --                | --               | --               |
| Chloride                         |                         | 5.6               | 3                 | 4                  | 5.7               | 5.5              | <                 | 6.2               | 9                | 6.9              |
| Cyanide                          |                         | --                | --                | --                 | --                | --               | --                | --                | --               | --               |
| Fluoride                         |                         | --                | --                | --                 | --                | --               | --                | --                | --               | --               |
| Hydroxide                        |                         | --                | --                | --                 | --                | --               | --                | --                | --               | --               |
| Carbon Dioxide                   |                         | --                | --                | --                 | --                | --               | --                | --                | --               | --               |
| Nitrate                          |                         | --                | --                | --                 | --                | --               | --                | --                | --               | --               |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                | --                 | --                | --               | --                | --                | --               | --               |
| Orthophosphate                   |                         | --                | --                | --                 | --                | --               | --                | --                | --               | --               |
| pH***                            |                         | --                | --                | --                 | --                | --               | --                | --                | --               | --               |
| Phenols, total                   |                         | --                | --                | --                 | --                | --               | --                | --                | --               | --               |
| Specific conductivity**          |                         | --                | --                | --                 | --                | --               | --                | --                | --               | --               |
| Sulfate                          |                         | --                | --                | --                 | --                | --               | --                | --                | --               | --               |
| Total dissolved solids (TDS)     |                         | --                | --                | --                 | --                | --               | --                | --                | --               | --               |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Parameter                        | Well ID<br>Date Sampled | MW-063<br>7/18/95 | MW-063<br>10/10/95 | MW-063<br>1/18/96 | MW-063<br>4/17/96 | MW-063<br>7/1/96 | MW-063<br>10/1/96 | MW-063<br>2/5/97 | MW-063<br>7/15/97 | MW-063<br>10/15/97 |
|----------------------------------|-------------------------|-------------------|--------------------|-------------------|-------------------|------------------|-------------------|------------------|-------------------|--------------------|
| Bicarbonate Alkalinity           |                         | --                | --                 | --                | --                | --               | --                | --               | --                | --                 |
| Ammonia (as N)                   |                         | --                | --                 | --                | --                | --               | --                | --               | --                | < 0.03             |
| Bromide                          |                         | --                | --                 | --                | --                | --               | --                | --               | --                | --                 |
| Carbonate Alkalinity             |                         | --                | --                 | --                | --                | --               | --                | --               | --                | --                 |
| Chloride                         |                         | 7                 | 12                 | 10                | 10.2              | 10               | 7                 | 7                | 9                 | --                 |
| Cyanide                          |                         | --                | --                 | --                | --                | --               | --                | --               | --                | --                 |
| Fluoride                         |                         | --                | --                 | --                | --                | --               | --                | --               | --                | --                 |
| Hydroxide                        |                         | --                | --                 | --                | --                | --               | --                | --               | --                | --                 |
| Carbon Dioxide                   |                         | --                | --                 | --                | --                | --               | --                | --               | --                | --                 |
| Nitrate                          |                         | --                | --                 | --                | --                | --               | --                | --               | --                | --                 |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                 | --                | --                | --               | --                | --               | --                | 6.6                |
| Orthophosphate                   |                         | --                | --                 | --                | --                | --               | --                | --               | --                | < 0.2              |
| pH***                            |                         | --                | --                 | --                | --                | --               | --                | --               | --                | 0.25               |
| Phenols, total                   |                         | --                | --                 | --                | --                | --               | --                | --               | --                | --                 |
| Specific conductivity**          |                         | --                | --                 | --                | --                | --               | --                | --               | --                | --                 |
| Sulfate                          |                         | --                | --                 | --                | --                | --               | --                | --               | --                | --                 |
| Total dissolved solids (TDS)     |                         | --                | --                 | --                | --                | --               | --                | --               | --                | --                 |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-063<br>6/25/98 | MW-063<br>10/11/98 | MW-064<br>12/1/91 | MW-064<br>4/1/92 | MW-064<br>7/1/92 | MW-064<br>10/1/92 | MW-064<br>1/1/93 | MW-064<br>4/13/93 | MW-064<br>7/13/93 |
|----------------------------------|-------------------------|-------------------|--------------------|-------------------|------------------|------------------|-------------------|------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --                 | --                | --               | --               | --                | --               | --                | --                |
| Ammonia (as N)                   |                         | --                | --                 | --                | --               | --               | --                | --               | --                | --                |
| Bromide                          |                         | --                | --                 | --                | --               | --               | --                | --               | --                | --                |
| Carbonate Alkalinity             |                         | --                | --                 | --                | --               | --               | --                | --               | --                | --                |
| Chloride                         |                         | 10                | --                 | 18                | 13               | 13               | 12                | 10.2             | 10                | 12                |
| Cyanide                          |                         | < 0.005           | --                 | --                | --               | --               | --                | --               | --                | --                |
| Fluoride                         |                         | 0.4               | --                 | --                | --               | --               | --                | --               | --                | --                |
| Hydroxide                        |                         | --                | --                 | --                | --               | --               | --                | --               | --                | --                |
| Carbon Dioxide                   |                         | --                | --                 | --                | --               | --               | --                | --               | --                | --                |
| Nitrate                          |                         | --                | --                 | --                | --               | --               | --                | --               | --                | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                 | --                | --               | --               | --                | --               | --                | --                |
| Orthophosphate                   |                         | --                | --                 | --                | --               | --               | --                | --               | --                | --                |
| pH***                            |                         | 7.4               | --                 | --                | --               | --               | --                | --               | --                | --                |
| Phenols, total                   |                         | <u>0.005</u>      | --                 | --                | --               | --               | --                | --               | --                | --                |
| Specific conductivity**          |                         | --                | --                 | --                | --               | --               | --                | --               | --                | --                |
| Sulfate                          |                         | 39                | 28.1               | --                | --               | --               | --                | --               | --                | --                |
| Total dissolved solids (TDS)     |                         | 370               | --                 | --                | --               | --               | --                | --               | --                | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-064<br>10/13/93 | MW-064<br>1/12/94 | MW-064<br>4/6/94 | MW-064<br>7/19/94 | MW-064<br>10/5/94 | MW-064<br>1/10/95 | MW-064<br>4/7/95 | MW-064<br>7/19/95 | MW-064<br>10/11/95 |
|----------------------------------|-------------------------|--------------------|-------------------|------------------|-------------------|-------------------|-------------------|------------------|-------------------|--------------------|
| Bicarbonate Alkalinity           |                         | --                 | --                | --               | --                | --                | --                | --               | --                | --                 |
| Ammonia (as N)                   |                         | --                 | --                | --               | --                | --                | --                | --               | --                | --                 |
| Bromide                          |                         | --                 | --                | --               | --                | --                | --                | --               | --                | --                 |
| Carbonate Alkalinity             |                         | --                 | --                | --               | --                | --                | --                | --               | --                | --                 |
| Chloride                         |                         | 8                  | 10                | 10               | < 5               | 10.2              | 20                | 12               | 11                | 12                 |
| Cyanide                          |                         | --                 | --                | --               | --                | --                | --                | --               | --                | --                 |
| Fluoride                         |                         | --                 | --                | --               | --                | --                | --                | --               | --                | --                 |
| Hydroxide                        |                         | --                 | --                | --               | --                | --                | --                | --               | --                | --                 |
| Carbon Dioxide                   |                         | --                 | --                | --               | --                | --                | --                | --               | --                | --                 |
| Nitrate                          |                         | --                 | --                | --               | --                | --                | --                | --               | --                | --                 |
| Nitrogen, Kjeldahl, total (as N) |                         | --                 | --                | --               | --                | --                | --                | --               | --                | --                 |
| Orthophosphate                   |                         | --                 | --                | --               | --                | --                | --                | --               | --                | --                 |
| pH***                            |                         | --                 | --                | --               | --                | --                | --                | --               | --                | --                 |
| Phenols, total                   |                         | --                 | --                | --               | --                | --                | --                | --               | --                | --                 |
| Specific conductivity**          |                         | --                 | --                | --               | --                | --                | --                | --               | --                | --                 |
| Sulfate                          |                         | --                 | --                | --               | --                | --                | --                | --               | --                | --                 |
| Total dissolved solids (TDS)     |                         | --                 | --                | --               | --                | --                | --                | --               | --                | --                 |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data  
May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-064<br>1/19/96 | MW-064<br>4/18/96 | MW-064<br>2/11/97 | MW-064<br>7/16/97 | MW-064<br>6/23/98 | MW-065<br>12/1/91 | MW-065<br>7/15/93 | MW-065<br>10/5/94 | MW-065<br>7/1/96 |
|----------------------------------|-------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --                | --                | --                | --                | --                | --                | --               |
| Ammonia (as N)                   |                         | --                | --                | --                | --                | --                | --                | --                | --                | --               |
| Bromide                          |                         | --                | --                | --                | --                | --                | --                | --                | --                | --               |
| Carbonate Alkalinity             |                         | --                | --                | --                | --                | --                | --                | --                | --                | --               |
| Chloride                         |                         | 12                | 11.6              | 11                | 12                | 15                | 3                 | 4                 | 5.9               | 5                |
| Cyanide                          |                         | --                | --                | --                | --                | < 0.005           | --                | --                | --                | --               |
| Fluoride                         |                         | --                | --                | --                | --                | 0.7               | --                | --                | --                | --               |
| Hydroxide                        |                         | --                | --                | --                | --                | --                | --                | --                | --                | --               |
| Carbon Dioxide                   |                         | --                | --                | --                | --                | --                | --                | --                | --                | --               |
| Nitrate                          |                         | --                | --                | --                | --                | --                | --                | --                | --                | --               |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                | --                | --                | --                | --                | --                | --                | --               |
| Orthophosphate                   |                         | --                | --                | --                | --                | --                | --                | --                | --                | --               |
| pH***                            |                         | --                | --                | --                | --                | 7.3               | --                | --                | --                | --               |
| Phenols, total                   |                         | --                | --                | --                | --                | < 0.005           | --                | --                | --                | --               |
| Specific conductivity**          |                         | --                | --                | --                | --                | --                | --                | --                | --                | --               |
| Sulfate                          |                         | --                | --                | --                | --                | < 5               | --                | --                | --                | --               |
| Total dissolved solids (TDS)     |                         | --                | --                | --                | --                | 600               | --                | --                | --                | --               |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-065<br>10/1/96 | MW-065<br>2/11/97 | MW-065<br>5/7/97 | MW-065A<br>12/1/91 | MW-065A<br>4/1/92 | MW-065A<br>7/1/92 | MW-065A<br>10/1/92 | MW-065A<br>1/1/93 | MW-065A<br>4/13/93 |
|----------------------------------|-------------------------|-------------------|-------------------|------------------|--------------------|-------------------|-------------------|--------------------|-------------------|--------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --               | --                 | --                | --                | --                 | --                | --                 |
| Ammonia (as N)                   |                         | --                | --                | --               | --                 | --                | --                | --                 | --                | --                 |
| Bromide                          |                         | --                | --                | --               | --                 | --                | --                | --                 | --                | --                 |
| Carbonate Alkalinity             |                         | --                | --                | --               | --                 | --                | --                | --                 | --                | --                 |
| Chloride                         | 3                       | 1.3               | 2                 | 22               | 33                 | 18                | 35                | 35                 | 26                | 26                 |
| Cyanide                          | --                      | --                | --                | --               | --                 | --                | --                | --                 | --                | --                 |
| Fluoride                         | --                      | --                | --                | --               | --                 | --                | --                | --                 | --                | --                 |
| Hydroxide                        | --                      | --                | --                | --               | --                 | --                | --                | --                 | --                | --                 |
| Carbon Dioxide                   | --                      | --                | --                | --               | --                 | --                | --                | --                 | --                | --                 |
| Nitrate                          | --                      | --                | --                | --               | --                 | --                | --                | --                 | --                | --                 |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                | --                | --               | --                 | --                | --                | --                 | --                | --                 |
| Orthophosphate                   | --                      | --                | --                | --               | --                 | --                | --                | --                 | --                | --                 |
| pH***                            | --                      | --                | --                | --               | --                 | --                | --                | --                 | --                | --                 |
| Phenols, total                   | --                      | --                | --                | --               | --                 | --                | --                | --                 | --                | --                 |
| Specific conductivity**          | --                      | --                | --                | --               | --                 | --                | --                | --                 | --                | --                 |
| Sulfate                          | --                      | --                | --                | --               | --                 | --                | --                | --                 | --                | --                 |
| Total dissolved solids (TDS)     | --                      | --                | --                | --               | --                 | --                | --                | --                 | --                | --                 |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-065A<br>7/13/93 | MW-065A<br>10/13/93 | MW-065A<br>1/11/94 | MW-065A<br>4/5/94 | MW-065A<br>7/19/94 | MW-065A<br>10/6/94 | MW-065A<br>1/11/95 | MW-065A<br>4/8/95 | MW-065A<br>1/20/96 |
|----------------------------------|-------------------------|--------------------|---------------------|--------------------|-------------------|--------------------|--------------------|--------------------|-------------------|--------------------|
| Bicarbonate Alkalinity           |                         | --                 | --                  | --                 | --                | --                 | --                 | --                 | --                | --                 |
| Ammonia (as N)                   |                         | --                 | --                  | --                 | --                | --                 | --                 | --                 | --                | --                 |
| Bromide                          |                         | --                 | --                  | --                 | --                | --                 | --                 | --                 | --                | --                 |
| Carbonate Alkalinity             |                         | --                 | --                  | --                 | --                | --                 | --                 | --                 | --                | --                 |
| Chloride                         | 19                      | 17                 | 18                  | 15                 | 10                | 18                 | 13                 | 93                 |                   |                    |
| Cyanide                          | --                      | --                 | --                  | --                 | --                | --                 | --                 | --                 | --                | --                 |
| Fluoride                         | --                      | --                 | --                  | --                 | --                | --                 | --                 | --                 | --                | --                 |
| Hydroxide                        | --                      | --                 | --                  | --                 | --                | --                 | --                 | --                 | --                | --                 |
| Carbon Dioxide                   | --                      | --                 | --                  | --                 | --                | --                 | --                 | --                 | --                | --                 |
| Nitrate                          | --                      | --                 | --                  | --                 | --                | --                 | --                 | --                 | --                | --                 |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                 | --                  | --                 | --                | --                 | --                 | --                 | --                | --                 |
| Orthophosphate                   | --                      | --                 | --                  | --                 | --                | --                 | --                 | --                 | --                | --                 |
| pH***                            | --                      | --                 | --                  | --                 | --                | --                 | --                 | --                 | --                | --                 |
| Phenols, total                   | --                      | --                 | --                  | --                 | --                | --                 | --                 | --                 | --                | --                 |
| Specific conductivity**          | --                      | --                 | --                  | --                 | --                | --                 | --                 | --                 | --                | --                 |
| Sulfate                          | --                      | --                 | --                  | --                 | --                | --                 | --                 | --                 | --                | --                 |
| Total dissolved solids (TDS)     | --                      | --                 | --                  | --                 | --                | --                 | --                 | --                 | --                | --                 |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-065A<br>4/18/96 | MW-065A<br>6/25/98 | MW-066<br>12/1/91 | MW-066<br>4/1/92 | MW-066<br>7/1/92 | MW-066<br>10/1/92 | MW-066<br>1/1/93 | MW-066<br>4/13/93 | MW-066<br>7/13/93 |
|----------------------------------|-------------------------|--------------------|--------------------|-------------------|------------------|------------------|-------------------|------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                 | --                 | --                | --               | --               | --                | --               | --                | --                |
| Ammonia (as N)                   |                         | --                 | --                 | --                | --               | --               | --                | --               | --                | --                |
| Bromide                          |                         | --                 | --                 | --                | --               | --               | --                | --               | --                | --                |
| Carbonate Alkalinity             |                         | --                 | --                 | --                | --               | --               | --                | --               | --                | --                |
| Chloride                         | 12.6                    |                    | 24                 | 9                 | 8                | 8                | 8                 | 12               | 8                 | 15                |
| Cyanide                          | --                      | --                 | < 0.005            | --                | --               | --               | --                | --               | --                | --                |
| Fluoride                         | --                      | --                 | 0.7                | --                | --               | --               | --                | --               | --                | --                |
| Hydroxide                        | --                      | --                 | --                 | --                | --               | --               | --                | --               | --                | --                |
| Carbon Dioxide                   | --                      | --                 | --                 | --                | --               | --               | --                | --               | --                | --                |
| Nitrate                          | --                      | --                 | --                 | --                | --               | --               | --                | --               | --                | --                |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                 | --                 | --                | --               | --               | --                | --               | --                | --                |
| Orthophosphate                   | --                      | --                 | --                 | --                | --               | --               | --                | --               | --                | --                |
| pH***                            | --                      | --                 | 7.2                | --                | --               | --               | --                | --               | --                | --                |
| Phenols, total                   | --                      | --                 | 0.005              | --                | --               | --               | --                | --               | --                | --                |
| Specific conductivity**          | --                      | --                 | --                 | --                | --               | --               | --                | --               | --                | --                |
| Sulfate                          | --                      | --                 | 250                | --                | --               | --               | --                | --               | --                | --                |
| Total dissolved solids (TDS)     | --                      | --                 | 550                | --                | --               | --               | --                | --               | --                | --                |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-066<br>10/12/93 | MW-066<br>1/11/94 | MW-066<br>4/7/94 | MW-066<br>7/19/94 | MW-066<br>10/4/94 | MW-066<br>1/9/95 | MW-066<br>4/11/95 | MW-066<br>7/19/95 | MW-066<br>10/10/95 |
|----------------------------------|-------------------------|--------------------|-------------------|------------------|-------------------|-------------------|------------------|-------------------|-------------------|--------------------|
| Bicarbonate Alkalinity           |                         | --                 | --                | --               | --                | --                | --               | --                | --                | --                 |
| Ammonia (as N)                   |                         | --                 | --                | --               | --                | --                | --               | --                | --                | --                 |
| Bromide                          |                         | --                 | --                | --               | --                | --                | --               | --                | --                | --                 |
| Carbonate Alkalinity             |                         | --                 | --                | --               | --                | --                | --               | --                | --                | --                 |
| Chloride                         |                         | 7                  | 9                 | 8.7              | < 5               | 8.8               | 6                | 8.9               | 8                 | 9                  |
| Cyanide                          |                         | --                 | --                | --               | --                | --                | --               | --                | --                | --                 |
| Fluoride                         |                         | --                 | --                | --               | --                | --                | --               | --                | --                | --                 |
| Hydroxide                        |                         | --                 | --                | --               | --                | --                | --               | --                | --                | --                 |
| Carbon Dioxide                   |                         | --                 | --                | --               | --                | --                | --               | --                | --                | --                 |
| Nitrate                          |                         | --                 | --                | --               | --                | --                | --               | --                | --                | --                 |
| Nitrogen, Kjeldahl, total (as N) |                         | --                 | --                | --               | --                | --                | --               | --                | --                | --                 |
| Orthophosphate                   |                         | --                 | --                | --               | --                | --                | --               | --                | --                | --                 |
| pH***                            |                         | --                 | --                | --               | --                | --                | --               | --                | --                | --                 |
| Phenols, total                   |                         | --                 | --                | --               | --                | --                | --               | --                | --                | --                 |
| Specific conductivity**          |                         | --                 | --                | --               | --                | --                | --               | --                | --                | --                 |
| Sulfate                          |                         | --                 | --                | --               | --                | --                | --               | --                | --                | --                 |
| Total dissolved solids (TDS)     |                         | --                 | --                | --               | --                | --                | --               | --                | --                | --                 |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-066<br>1/19/96 | MW-066<br>4/17/96 | MW-066<br>7/1/96 | MW-066<br>10/1/96 | MW-066<br>2/5/97 | MW-066<br>5/6/97 | MW-066<br>7/16/97 | MW-066<br>10/15/97 | MW-066<br>6/17/98 |
|----------------------------------|-------------------------|-------------------|-------------------|------------------|-------------------|------------------|------------------|-------------------|--------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --               | --                | --               | --               | --                | --                 | --                |
| Ammonia (as N)                   |                         | --                | --                | --               | --                | --               | --               | --                | < 0.03             | --                |
| Bromide                          |                         | --                | --                | --               | --                | --               | --               | --                | --                 | --                |
| Carbonate Alkalinity             |                         | --                | --                | --               | --                | --               | --               | --                | --                 | --                |
| Chloride                         | 10                      | --                | 9.6               | --               | 7                 | 9                | 9                | 8                 | --                 | 13                |
| Cyanide                          | --                      | --                | --                | --               | --                | --               | --               | --                | --                 | 0.761             |
| Fluoride                         | --                      | --                | --                | --               | --                | --               | --               | --                | --                 | 0.8               |
| Hydroxide                        | --                      | --                | --                | --               | --                | --               | --               | --                | --                 | --                |
| Carbon Dioxide                   | --                      | --                | --                | --               | --                | --               | --               | --                | --                 | --                |
| Nitrate                          | --                      | --                | --                | --               | --                | --               | --               | --                | 0.33               | --                |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                | --                | --               | --                | --               | --               | --                | < 0.2              | --                |
| Orthophosphate                   | --                      | --                | --                | --               | --                | --               | --               | --                | 0.22               | --                |
| pH***                            | --                      | --                | --                | --               | --                | --               | --               | --                | --                 | 7.2               |
| Phenols, total                   | --                      | --                | --                | --               | --                | --               | --               | --                | --                 | < 0.005           |
| Specific conductivity**          | --                      | --                | --                | --               | --                | --               | --               | --                | --                 | --                |
| Sulfate                          | --                      | --                | --                | --               | --                | --               | --               | --                | --                 | 430               |
| Total dissolved solids (TDS)     | --                      | --                | --                | --               | --                | --               | --               | --                | --                 | 760               |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-067<br>12/1/91 | MW-067<br>4/1/92 | MW-067<br>7/1/92 | MW-067<br>10/1/92 | MW-067<br>1/1/93 | MW-067<br>4/13/93 | MW-067<br>7/13/93 | MW-067<br>10/13/93 | MW-067<br>1/12/94 |
|----------------------------------|-------------------------|-------------------|------------------|------------------|-------------------|------------------|-------------------|-------------------|--------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Ammonia (as N)                   |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Bromide                          |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Carbonate Alkalinity             |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Chloride                         |                         | 7                 | 6                | 3                | 9                 | 4                | 8                 | 6                 | 9.5                | 8.6               |
| Cyanide                          |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Fluoride                         |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Hydroxide                        |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Carbon Dioxide                   |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Nitrate                          |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Orthophosphate                   |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| pH***                            |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Phenols, total                   |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Specific conductivity**          |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Sulfate                          |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |
| Total dissolved solids (TDS)     |                         | --                | --               | --               | --                | --               | --                | --                | --                 | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data  
May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-067<br>4/7/94 | MW-067<br>7/19/94 | MW-067<br>10/5/94 | MW-067<br>1/11/95 | MW-067<br>4/7/95 | MW-067<br>7/21/95 | MW-067<br>10/11/95 | MW-067<br>1/19/96 | MW-067<br>4/18/96 |
|----------------------------------|-------------------------|------------------|-------------------|-------------------|-------------------|------------------|-------------------|--------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Ammonia (as N)                   |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Bromide                          |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Carbonate Alkalinity             |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Chloride                         |                         | 7.6              | < 5               | 7.9               | < 5               | 13               | 6                 | 6                  | 11                | 7.4               |
| Cyanide                          |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Fluoride                         |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Hydroxide                        |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Carbon Dioxide                   |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Nitrate                          |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Orthophosphate                   |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| pH***                            |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Phenols, total                   |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Specific conductivity**          |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Sulfate                          |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |
| Total dissolved solids (TDS)     |                         | --               | --                | --                | --                | --               | --                | --                 | --                | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-067<br>7/1/96 | MW-067<br>2/10/97 | MW-067<br>7/16/97 | MW-067<br>6/24/98 | MW-068<br>12/1/91 | MW-068<br>4/1/92 | MW-068<br>7/1/92 | MW-068<br>10/1/92 | MW-068<br>1/1/93 |
|----------------------------------|-------------------------|------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --               | --                | --                | --                | --                | --               | --               | --                | --               |
| Ammonia (as N)                   |                         | --               | --                | --                | --                | --                | --               | --               | --                | --               |
| Bromide                          |                         | --               | --                | --                | --                | --                | --               | --               | --                | --               |
| Carbonate Alkalinity             |                         | --               | --                | --                | --                | --                | --               | --               | --                | --               |
| Chloride                         |                         | 7                | 9                 | 7                 | 11                | 39                | 82               | 15               | 30                | 27               |
| Cyanide                          |                         | --               | --                | --                | < 0.005           | --                | --               | --               | --                | --               |
| Fluoride                         |                         | --               | --                | --                | 0.7               | --                | --               | --               | --                | --               |
| Hydroxide                        |                         | --               | --                | --                | --                | --                | --               | --               | --                | --               |
| Carbon Dioxide                   |                         | --               | --                | --                | --                | --                | --               | --               | --                | --               |
| Nitrate                          |                         | --               | --                | --                | --                | --                | --               | --               | --                | --               |
| Nitrogen, Kjeldahl, total (as N) |                         | --               | --                | --                | --                | --                | --               | --               | --                | --               |
| Orthophosphate                   |                         | --               | --                | --                | --                | --                | --               | --               | --                | --               |
| pH***                            |                         | --               | --                | --                | 7.3               | --                | --               | --               | --                | --               |
| Phenols, total                   |                         | --               | --                | --                | 0.005             | --                | --               | --               | --                | --               |
| Specific conductivity**          |                         | --               | --                | --                | --                | --                | --               | --               | --                | --               |
| Sulfate                          |                         | --               | --                | --                | 140               | --                | --               | --               | --                | --               |
| Total dissolved solids (TDS)     |                         | --               | --                | --                | 480               | --                | --               | --               | --                | --               |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-068<br>4/13/93 | MW-068<br>7/13/93 | MW-068<br>10/13/93 | MW-068<br>1/11/94 | MW-068<br>4/5/94 | MW-068<br>7/19/94 | MW-068<br>10/6/94 | MW-068<br>1/11/95 | MW-068<br>10/17/97 |
|----------------------------------|-------------------------|-------------------|-------------------|--------------------|-------------------|------------------|-------------------|-------------------|-------------------|--------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --                 |
| Ammonia (as N)                   |                         | --                | --                | --                 | --                | --               | --                | --                | --                | 0.03               |
| Bromide                          |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --                 |
| Carbonate Alkalinity             |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --                 |
| Chloride                         |                         | 27                | 28                | 27                 | 31                | 30               | 29                | 32                | 34                | --                 |
| Cyanide                          |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --                 |
| Fluoride                         |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --                 |
| Hydroxide                        |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --                 |
| Carbon Dioxide                   |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --                 |
| Nitrate                          |                         | --                | --                | --                 | --                | --               | --                | --                | --                | 0.08               |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                | --                 | --                | --               | --                | --                | --                | 1.8                |
| Orthophosphate                   |                         | --                | --                | --                 | --                | --               | --                | --                | --                | 0.41               |
| pH***                            |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --                 |
| Phenols, total                   |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --                 |
| Specific conductivity**          |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --                 |
| Sulfate                          |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --                 |
| Total dissolved solids (TDS)     |                         | --                | --                | --                 | --                | --               | --                | --                | --                | --                 |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data  
May 1991 - October 1998  
Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-068<br>6/26/98 | MW-068<br>10/12/98 | MW-069<br>12/1/91 | MW-069<br>7/1/92 | MW-069<br>10/1/92 | MW-069<br>2/7/97 | MW-069<br>7/18/97 | MW-069<br>6/29/98 | MW-070<br>12/1/91 |
|----------------------------------|-------------------------|-------------------|--------------------|-------------------|------------------|-------------------|------------------|-------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --                 | --                | --               | --                | --               | --                | --                | --                |
| Ammonia (as N)                   |                         | --                | --                 | --                | --               | --                | --               | --                | --                | --                |
| Bromide                          |                         | --                | --                 | --                | --               | --                | --               | --                | --                | --                |
| Carbonate Alkalinity             |                         | --                | --                 | --                | --               | --                | --               | --                | --                | --                |
| Chloride                         |                         | 29                | --                 | 154               | 15               | 43                | 70               | 64                | 120               | 10                |
| Cyanide                          |                         | < 0.005           | --                 | --                | --               | --                | --               | --                | < 0.005           | --                |
| Fluoride                         |                         | 0.6               | --                 | --                | --               | --                | --               | --                | 0.3               | --                |
| Hydroxide                        |                         | --                | --                 | --                | --               | --                | --               | --                | --                | --                |
| Carbon Dioxide                   |                         | --                | --                 | --                | --               | --                | --               | --                | --                | --                |
| Nitrate                          |                         | --                | --                 | --                | --               | --                | --               | --                | --                | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                 | --                | --               | --                | --               | --                | --                | --                |
| Orthophosphate                   |                         | --                | --                 | --                | --               | --                | --               | --                | --                | --                |
| pH***                            |                         | 7.3               | --                 | --                | --               | --                | --               | --                | 6.9               | --                |
| Phenols, total                   |                         | 0.025             | --                 | --                | --               | --                | --               | --                | 0.015             | --                |
| Specific conductivity**          |                         | --                | --                 | --                | --               | --                | --               | --                | --                | --                |
| Sulfate                          |                         | 100               | 70                 | --                | --               | --                | --               | --                | < 5               | --                |
| Total dissolved solids (TDS)     |                         | 480               | --                 | --                | --               | --                | --               | --                | 860               | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-070<br>4/1/92 | MW-070<br>7/1/92 | MW-070<br>10/1/92 | MW-070<br>1/1/93 | MW-070<br>4/14/93 | MW-070<br>7/13/93 | MW-070<br>10/12/93 | MW-070<br>1/11/94 | MW-070<br>4/6/94 |
|----------------------------------|-------------------------|------------------|------------------|-------------------|------------------|-------------------|-------------------|--------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Ammonia (as N)                   |                         | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Bromide                          |                         | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Carbonate Alkalinity             |                         | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Chloride                         | 8                       | 9.2              | 17               | 8                 | 8                | 8                 | 11                | 10                 | 9.5               | 9.5              |
| Cyanide                          | --                      | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Fluoride                         | --                      | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Hydroxide                        | --                      | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Carbon Dioxide                   | --                      | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Nitrate                          | --                      | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Nitrogen, Kjeldahl, total (as N) | --                      | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Orthophosphate                   | --                      | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| pH***                            | --                      | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Phenols, total                   | --                      | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Specific conductivity**          | --                      | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Sulfate                          | --                      | --               | --               | --                | --               | --                | --                | --                 | --                | --               |
| Total dissolved solids (TDS)     | --                      | --               | --               | --                | --               | --                | --                | --                 | --                | --               |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

**Appendix C**

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-070<br>7/18/94 | MW-070<br>10/4/94 | MW-070<br>1/9/95 | MW-070<br>4/5/95 | MW-070<br>7/18/95 | MW-070<br>10/10/95 | MW-070<br>1/18/96 | MW-070<br>4/17/96 | MW-070<br>7/1/96 |
|----------------------------------|-------------------------|-------------------|-------------------|------------------|------------------|-------------------|--------------------|-------------------|-------------------|------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --               | --               | --                | --                 | --                | --                | --               |
| Ammonia (as N)                   |                         | --                | --                | --               | --               | --                | --                 | --                | --                | --               |
| Bromide                          |                         | --                | --                | --               | --               | --                | --                 | --                | --                | --               |
| Carbonate Alkalinity             |                         | --                | --                | --               | --               | --                | --                 | --                | --                | --               |
| Chloride                         |                         | 8                 | 9.5               | 9                | 9.7              | 9                 | 10                 | 11                | 9.7               | 8                |
| Cyanide                          |                         | --                | --                | --               | --               | --                | --                 | --                | --                | --               |
| Fluoride                         |                         | --                | --                | --               | --               | --                | --                 | --                | --                | --               |
| Hydroxide                        |                         | --                | --                | --               | --               | --                | --                 | --                | --                | --               |
| Carbon Dioxide                   |                         | --                | --                | --               | --               | --                | --                 | --                | --                | --               |
| Nitrate                          |                         | --                | --                | --               | --               | --                | --                 | --                | --                | --               |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                | --               | --               | --                | --                 | --                | --                | --               |
| Orthophosphate                   |                         | --                | --                | --               | --               | --                | --                 | --                | --                | --               |
| pH***                            |                         | --                | --                | --               | --               | --                | --                 | --                | --                | --               |
| Phenols, total                   |                         | --                | --                | --               | --               | --                | --                 | --                | --                | --               |
| Specific conductivity**          |                         | --                | --                | --               | --               | --                | --                 | --                | --                | --               |
| Sulfate                          |                         | --                | --                | --               | --               | --                | --                 | --                | --                | --               |
| Total dissolved solids (TDS)     |                         | --                | --                | --               | --               | --                | --                 | --                | --                | --               |

**Notes:**

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-070<br>10/1/96 | MW-070<br>2/5/97 | MW-070<br>10/15/97 | MW-070<br>6/16/98 | MW-071<br>9/1/93 | MW-071<br>10/12/93 | MW-071<br>1/11/94 | MW-071<br>4/6/94 | MW-071<br>7/18/94 |
|----------------------------------|-------------------------|-------------------|------------------|--------------------|-------------------|------------------|--------------------|-------------------|------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --               | --                 | --                | --               | --                 | --                | --               | --                |
| Ammonia (as N)                   |                         | --                | --               | < 0.03             | --                | --               | --                 | --                | --               | --                |
| Bromide                          |                         | --                | --               | --                 | --                | --               | --                 | --                | --               | --                |
| Carbonate Alkalinity             |                         | --                | --               | --                 | --                | --               | --                 | --                | --               | --                |
| Chloride                         |                         | 10                | 10               | --                 | 12                | 9                | 15                 | 18                | 17               | < 5               |
| Cyanide                          |                         | --                | --               | --                 | < 0.005           | --               | --                 | --                | --               | --                |
| Fluoride                         |                         | --                | --               | --                 | 0.6               | --               | --                 | --                | --               | --                |
| Hydroxide                        |                         | --                | --               | --                 | --                | --               | --                 | --                | --               | --                |
| Carbon Dioxide                   |                         | --                | --               | --                 | --                | --               | --                 | --                | --               | --                |
| Nitrate                          |                         | --                | --               | 2.7                | --                | --               | --                 | --                | --               | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --               | < 0.2              | --                | --               | --                 | --                | --               | --                |
| Orthophosphate                   |                         | --                | --               | 0.3                | --                | --               | --                 | --                | --               | --                |
| pH***                            |                         | --                | --               | --                 | 7.5               | --               | --                 | --                | --               | --                |
| Phenols, total                   |                         | --                | --               | --                 | < 0.005           | --               | --                 | --                | --               | --                |
| Specific conductivity**          |                         | --                | --               | --                 | --                | --               | --                 | --                | --               | --                |
| Sulfate                          |                         | --                | --               | --                 | 80                | --               | --                 | --                | --               | --                |
| Total dissolved solids (TDS)     |                         | --                | --               | --                 | 370               | --               | --                 | --                | --               | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-071<br>10/4/94 | MW-071<br>1/10/95 | MW-071<br>6/23/95 | MW-071<br>7/18/95 | MW-071<br>10/10/95 | MW-071<br>1/18/96 | MW-071<br>4/17/96 | MW-071<br>7/1/96 | MW-071<br>10/1/96 |
|----------------------------------|-------------------------|-------------------|-------------------|-------------------|-------------------|--------------------|-------------------|-------------------|------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --                | --                | --                 | --                | --                | --               | --                |
| Ammonia (as N)                   |                         | --                | --                | --                | --                | --                 | --                | --                | --               | --                |
| Bromide                          |                         | --                | --                | --                | --                | --                 | --                | --                | --               | --                |
| Carbonate Alkalinity             |                         | --                | --                | --                | --                | --                 | --                | --                | --               | --                |
| Chloride                         |                         | 22                | < 5               | 16                | 22                | 21                 | 18                | 23                | 26               | 30                |
| Cyanide                          |                         | --                | --                | --                | --                | --                 | --                | --                | --               | --                |
| Fluoride                         |                         | --                | --                | --                | --                | --                 | --                | --                | --               | --                |
| Hydroxide                        |                         | --                | --                | --                | --                | --                 | --                | --                | --               | --                |
| Carbon Dioxide                   |                         | --                | --                | --                | --                | --                 | --                | --                | --               | --                |
| Nitrate                          |                         | --                | --                | --                | --                | --                 | --                | --                | --               | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                | --                | --                | --                 | --                | --                | --               | --                |
| Orthophosphate                   |                         | --                | --                | --                | --                | --                 | --                | --                | --               | --                |
| pH***                            |                         | --                | --                | --                | --                | --                 | --                | --                | --               | --                |
| Phenols, total                   |                         | --                | --                | --                | --                | --                 | --                | --                | --               | --                |
| Specific conductivity**          |                         | --                | --                | --                | --                | --                 | --                | --                | --               | --                |
| Sulfate                          |                         | --                | --                | --                | --                | --                 | --                | --                | --               | --                |
| Total dissolved solids (TDS)     |                         | --                | --                | --                | --                | --                 | --                | --                | --               | --                |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-071<br>2/9/97 | MW-071<br>5/6/97 | MW-071<br>7/17/97 | MW-071<br>10/16/97 | MW-071<br>6/19/98 | MW-071<br>10/11/98 | MW-072<br>4/5/94 | MW-072<br>7/19/94 | MW-072<br>1/11/95 |
|----------------------------------|-------------------------|------------------|------------------|-------------------|--------------------|-------------------|--------------------|------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --               | --               | --                | --                 | --                | --                 | --               | --                | --                |
| Ammonia (as N)                   |                         | --               | --               | --                | 0.63               | --                | --                 | --               | --                | --                |
| Bromide                          |                         | --               | --               | --                | --                 | --                | --                 | --               | --                | --                |
| Carbonate Alkalinity             |                         | --               | --               | --                | --                 | --                | --                 | --               | --                | --                |
| Chloride                         | 24                      | 17               | 16               | 16                | --                 | 4                 | --                 | 32               | 32                | 52                |
| Cyanide                          | --                      | --               | --               | --                | --                 | < 0.005           | --                 | --               | --                | --                |
| Fluoride                         | --                      | --               | --               | --                | --                 | 2.2               | --                 | --               | --                | --                |
| Hydroxide                        | --                      | --               | --               | --                | --                 | --                | --                 | --               | --                | --                |
| Carbon Dioxide                   | --                      | --               | --               | --                | --                 | --                | --                 | --               | --                | --                |
| Nitrate                          | --                      | --               | --               | --                | 0.06               | --                | --                 | --               | --                | --                |
| Nitrogen, Kjeldahl, total (as N) | --                      | --               | --               | --                | 0.6                | --                | --                 | --               | --                | --                |
| Orthophosphate                   | --                      | --               | --               | --                | 0.18               | --                | --                 | --               | --                | --                |
| pH***                            | --                      | --               | --               | --                | --                 | 7.2               | --                 | --               | --                | --                |
| Phenols, total                   | --                      | --               | --               | --                | --                 | < 0.005           | --                 | --               | --                | --                |
| Specific conductivity**          | --                      | --               | --               | --                | --                 | --                | --                 | --               | --                | --                |
| Sulfate                          | --                      | --               | --               | --                | --                 | 650               | 550                | --               | --                | --                |
| Total dissolved solids (TDS)     | --                      | --               | --               | --                | --                 | 1100              | --                 | --               | --                | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

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| Parameter                        | Well ID<br>Date Sampled | MW-072<br>6/30/98 | MW-073<br>6/30/98 | MW-074<br>7/18/97 | MW-074<br>6/24/98 | MW-075<br>6/30/98 | MW-076<br>6/29/98 | MW-077<br>7/21/95 | MW-077<br>1/20/96 | MW-077<br>4/19/96 |
|----------------------------------|-------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Ammonia (as N)                   |                         | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Bromide                          |                         | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Carbonate Alkalinity             |                         | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Chloride                         |                         | 49                | 620.3             | 260.7             | 340.3             | 54                | 23                | 110               | 120               | 120               |
| Cyanide                          |                         | < 0.005           | < 0.005           | --                | < 0.005           | < 0.005           | < 0.005           | --                | --                | --                |
| Fluoride                         |                         | 0.8               | 1.3               | --                | 1.1               | 1.2               | 0.5               | --                | --                | --                |
| Hydroxide                        |                         | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Carbon Dioxide                   |                         | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Nitrate                          |                         | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Orthophosphate                   |                         | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| pH***                            |                         | 6.9               | 6.9               | --                | 7                 | 7.3               | 7.3               | --                | --                | --                |
| Phenols, total                   |                         | 0.015             | < 0.005           | --                | 0.025             | 0.0773            | 0.0083            | --                | --                | --                |
| Specific conductivity**          |                         | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Sulfate                          |                         | 530               | 2800              | --                | 13                | 390               | 51                | --                | --                | --                |
| Total dissolved solids (TDS)     |                         | 890               | 37003             | --                | 15003             | 870               | 400               | --                | --                | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

## Appendix C

Historical General Chemistry Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-077<br>7/1/96 | MW-077<br>10/1/96 | MW-077<br>5/7/97 | MW-077<br>7/18/97 | MW-078<br>10/1/96 | MW-078<br>2/10/97 | MW-078<br>5/7/97 | MW-078<br>7/17/97 | MW-078<br>6/19/98 |
|----------------------------------|-------------------------|------------------|-------------------|------------------|-------------------|-------------------|-------------------|------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --               | --                | --               | --                | --                | --                | --               | --                | --                |
| Ammonia (as N)                   |                         | --               | --                | --               | --                | --                | --                | --               | --                | --                |
| Bromide                          |                         | --               | --                | --               | --                | --                | --                | --               | --                | --                |
| Carbonate Alkalinity             |                         | --               | --                | --               | --                | --                | --                | --               | --                | --                |
| Chloride                         | 100                     |                  | 140               | 150              | 150               | 31                | 75                | 59               | 48                | 47                |
| Cyanide                          | --                      | --               | --                | --               | --                | --                | --                | --               | --                | < 0.005           |
| Fluoride                         | --                      | --               | --                | --               | --                | --                | --                | --               | --                | < 0.2             |
| Hydroxide                        | --                      | --               | --                | --               | --                | --                | --                | --               | --                | --                |
| Carbon Dioxide                   | --                      | --               | --                | --               | --                | --                | --                | --               | --                | --                |
| Nitrate                          | --                      | --               | --                | --               | --                | --                | --                | --               | --                | --                |
| Nitrogen, Kjeldahl, total (as N) | --                      | --               | --                | --               | --                | --                | --                | --               | --                | --                |
| Orthophosphate                   | --                      | --               | --                | --               | --                | --                | --                | --               | --                | --                |
| pH***                            | --                      | --               | --                | --               | --                | --                | --                | --               | --                | 7.1               |
| Phenols, total                   | --                      | --               | --                | --               | --                | --                | --                | --               | --                | < 0.005           |
| Specific conductivity**          | --                      | --               | --                | --               | --                | --                | --                | --               | --                | --                |
| Sulfate                          | --                      | --               | --                | --               | --                | --                | --                | --               | --                | < 5               |
| Total dissolved solids (TDS)     | --                      | --               | --                | --               | --                | --                | --                | --               | --                | 490               |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-079<br>1/11/95 | MW-079<br>4/6/95 | MW-079<br>7/21/95 | MW-079<br>10/10/95 | MW-079<br>1/18/96 | MW-079<br>4/19/96 | MW-079<br>7/1/96 | MW-079<br>10/1/96 | MW-079<br>2/10/97 |
|----------------------------------|-------------------------|-------------------|------------------|-------------------|--------------------|-------------------|-------------------|------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                | --               | --                | --                 | --                | --                | --               | --                | --                |
| Ammonia (as N)                   |                         | --                | --               | --                | --                 | --                | --                | --               | --                | --                |
| Bromide                          |                         | --                | --               | --                | --                 | --                | --                | --               | --                | --                |
| Carbonate Alkalinity             |                         | --                | --               | --                | --                 | --                | --                | --               | --                | --                |
| Chloride                         | 36                      | --                | 33               | 31                | 30                 | 23                | 30                | 17               | 20                | 24                |
| Cyanide                          | --                      | --                | --               | --                | --                 | --                | --                | --               | --                | --                |
| Fluoride                         | --                      | --                | --               | --                | --                 | --                | --                | --               | --                | --                |
| Hydroxide                        | --                      | --                | --               | --                | --                 | --                | --                | --               | --                | --                |
| Carbon Dioxide                   | --                      | --                | --               | --                | --                 | --                | --                | --               | --                | --                |
| Nitrate                          | --                      | --                | --               | --                | --                 | --                | --                | --               | --                | --                |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                | --               | --                | --                 | --                | --                | --               | --                | --                |
| Orthophosphate                   | --                      | --                | --               | --                | --                 | --                | --                | --               | --                | --                |
| pH***                            | --                      | --                | --               | --                | --                 | --                | --                | --               | --                | --                |
| Phenols, total                   | --                      | --                | --               | --                | --                 | --                | --                | --               | --                | --                |
| Specific conductivity**          | --                      | --                | --               | --                | --                 | --                | --                | --               | --                | --                |
| Sulfate                          | --                      | --                | --               | --                | --                 | --                | --                | --               | --                | --                |
| Total dissolved solids (TDS)     | --                      | --                | --               | --                | --                 | --                | --                | --               | --                | --                |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

Historical General Chemistry Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-079<br>5/7/97 | MW-079<br>7/17/97 | MW-081<br>6/29/98 | MW-082<br>10/11/95 | MW-082<br>6/25/98 | MW-082<br>10/12/98 | MW-083<br>6/25/98 | MW-084<br>6/23/98 | MW-085<br>6/23/98 |
|----------------------------------|-------------------------|------------------|-------------------|-------------------|--------------------|-------------------|--------------------|-------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --               | --                | --                | --                 | --                | --                 | --                | --                | --                |
| Ammonia (as N)                   |                         | --               | --                | --                | --                 | --                | --                 | --                | --                | --                |
| Bromide                          |                         | --               | --                | --                | --                 | --                | --                 | --                | --                | --                |
| Carbonate Alkalinity             |                         | --               | --                | --                | --                 | --                | --                 | --                | --                | --                |
| Chloride                         | 24                      | 24               | 24                | 16                | 76                 | 72                | --                 | 49                | 7                 | 120               |
| Cyanide                          | --                      | --               | --                | < 0.005           | --                 | < 0.005           | --                 | < 0.005           | < 0.005           | < 0.005           |
| Fluoride                         | --                      | --               | --                | 0.7               | --                 | 0.7               | --                 | 0.7               | 0.5               | 1.3               |
| Hydroxide                        | --                      | --               | --                | --                | --                 | --                | --                 | --                | --                | --                |
| Carbon Dioxide                   | --                      | --               | --                | --                | --                 | --                | --                 | --                | --                | --                |
| Nitrate                          | --                      | --               | --                | --                | --                 | --                | --                 | --                | --                | --                |
| Nitrogen, Kjeldahl, total (as N) | --                      | --               | --                | --                | --                 | --                | --                 | --                | --                | --                |
| Orthophosphate                   | --                      | --               | --                | --                | --                 | --                | --                 | --                | --                | --                |
| pH***                            | --                      | --               | --                | 7.4               | --                 | 7.1               | --                 | 7.2               | 7.5               | 7.5               |
| Phenols, total                   | --                      | --               | --                | < 0.005           | --                 | 0.006             | --                 | < 0.005           | 0.008             | 0.034             |
| Specific conductivity**          | --                      | --               | --                | --                | --                 | --                | --                 | --                | --                | --                |
| Sulfate                          | --                      | --               | --                | 450               | --                 | 390               | 190                | 270               | < 5               | < 5               |
| Total dissolved solids (TDS)     | --                      | --               | --                | 800               | --                 | 730               | --                 | 640               | 370               | 1100              |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

## Appendix C

Historical General Chemistry Analytical Data  
 May 1991 - October 1998  
 Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-086<br>10/17/97 | MW-086<br>6/26/98 | MW-087<br>8/1/96 | MW-087<br>8/22/96 | MW-087<br>10/1/96 | MW-087<br>2/9/97 | MW-087<br>5/6/97 | MW-087<br>10/16/97 | MW-087<br>6/19/98 |
|----------------------------------|-------------------------|--------------------|-------------------|------------------|-------------------|-------------------|------------------|------------------|--------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                 | --                | --               | --                | --                | 222              | --               | --                 | --                |
| Ammonia (as N)                   |                         | 2.77               | --                | --               | --                | --                | --               | --               | < 0.03             | --                |
| Bromide                          |                         | --                 | --                | --               | --                | --                | < 0.3            | --               | --                 | --                |
| Carbonate Alkalinity             |                         | --                 | --                | --               | --                | --                | < 1              | --               | --                 | --                |
| Chloride                         |                         | --                 | 330               | --               | 11                | 12                | 11               | 13               | --                 | 13                |
| Cyanide                          |                         | --                 | < 0.005           | --               | --                | --                | --               | --               | --                 | < 0.005           |
| Fluoride                         |                         | --                 | 1.1               | --               | --                | --                | 0.63             | --               | --                 | 0.9               |
| Hydroxide                        |                         | --                 | --                | --               | --                | --                | < 1              | --               | --                 | --                |
| Carbon Dioxide                   |                         | --                 | --                | --               | --                | --                | --               | --               | --                 | --                |
| Nitrate                          |                         | 1.91               | --                | --               | --                | --                | --               | --               | 0.52               | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | 14                 | --                | --               | --                | --                | --               | --               | < 0.2              | --                |
| Orthophosphate                   |                         | 0.5                | --                | --               | --                | --                | --               | --               | 0.06               | --                |
| pH***                            |                         | --                 | 7<br>(0.068)      | --               | --                | --                | 7.8              | --               | --                 | 7.4               |
| Phenols, total                   |                         | --                 | --                | --               | --                | --                | --               | --               | --                 | < 0.005           |
| Specific conductivity**          |                         | --                 | --                | --               | --                | --                | --               | --               | --                 | --                |
| Sulfate                          |                         | --                 | 29<br>(1500)      | --               | --                | --                | 814              | --               | --                 | 360               |
| Total dissolved solids (TDS)     |                         | --                 | --                | 810              | --                | --                | 580              | --               | --                 | 710               |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

## Appendix C

Historical General Chemistry Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-087<br>10/12/98 | MW-087A<br>10/1/96 | MW-087A<br>2/9/97 | MW-087A<br>5/7/97 | MW-087A<br>10/16/97 | MW-087A<br>6/19/98 | MW-088<br>8/1/96 | MW-088<br>8/22/96 | MW-088<br>10/1/96 |
|----------------------------------|-------------------------|--------------------|--------------------|-------------------|-------------------|---------------------|--------------------|------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                 | --                 | 352               | --                | --                  | --                 | --               | --                | --                |
| Ammonia (as N)                   |                         | --                 | --                 | --                | --                | 0.17                | --                 | --               | --                | --                |
| Bromide                          |                         | --                 | --                 | 1.2               | --                | --                  | --                 | --               | --                | --                |
| Carbonate Alkalinity             |                         | --                 | --                 | < 1               | --                | --                  | --                 | --               | --                | --                |
| Chloride                         |                         | --                 | 110                | 150               | 140               | --                  | 160                | --               | 35                | 25                |
| Cyanide                          |                         | --                 | --                 | --                | --                | --                  | < 0.005            | --               | --                | --                |
| Fluoride                         |                         | --                 | --                 | 1.9               | --                | --                  | 2.4                | --               | --                | --                |
| Hydroxide                        |                         | --                 | --                 | < 1               | --                | --                  | --                 | --               | --                | --                |
| Carbon Dioxide                   |                         | --                 | --                 | --                | --                | --                  | --                 | --               | --                | --                |
| Nitrate                          |                         | --                 | --                 | --                | --                | < 0.06              | --                 | --               | --                | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                 | --                 | --                | --                | 0.9                 | --                 | --               | --                | --                |
| Orthophosphate                   |                         | --                 | --                 | --                | --                | 0.09                | --                 | --               | --                | --                |
| pH***                            |                         | --                 | --                 | 7.2               | --                | --                  | 7.7                | --               | --                | --                |
| Phenols, total                   |                         | --                 | --                 | --                | --                | --                  | < 0.005            | --               | --                | --                |
| Specific conductivity**          |                         | --                 | --                 | 3350              | --                | --                  | --                 | --               | --                | --                |
| Sulfate                          |                         | 260                | --                 | 1900              | --                | --                  | 2200               | --               | --                | --                |
| Total dissolved solids (TDS)     |                         | --                 | --                 | 3200              | --                | --                  | 3400               | --               | --                | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-088<br>2/5/97 | MW-088<br>4/30/97 | MW-088<br>10/15/97 | MW-088<br>6/18/98 | MW-089<br>8/1/96 | MW-089<br>8/22/96 | MW-089<br>10/1/96 | MW-089<br>2/5/97 | MW-089<br>4/30/97 |
|----------------------------------|-------------------------|------------------|-------------------|--------------------|-------------------|------------------|-------------------|-------------------|------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --               | --                | --                 | --                | --               | --                | --                | --               | --                |
| Ammonia (as N)                   |                         | --               | --                | 1.2                | --                | --               | --                | --                | --               | --                |
| Bromide                          |                         | --               | --                | --                 | --                | --               | --                | --                | --               | --                |
| Carbonate Alkalinity             |                         | --               | --                | --                 | --                | --               | --                | --                | --               | --                |
| Chloride                         |                         | 30               | 26                | --                 | 22                | --               | 63                | 63                | 60               | 58                |
| Cyanide                          |                         | --               | --                | --                 | < 0.005           | --               | --                | --                | --               | --                |
| Fluoride                         |                         | 1.13             | --                | --                 | 1.1               | --               | --                | --                | 0.8              | --                |
| Hydroxide                        |                         | --               | --                | --                 | --                | --               | --                | --                | --               | --                |
| Carbon Dioxide                   |                         | --               | --                | --                 | --                | --               | --                | --                | --               | --                |
| Nitrate                          |                         | --               | --                | < 0.06             | --                | --               | --                | --                | --               | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --               | --                | 1.1                | --                | --               | --                | --                | --               | --                |
| Orthophosphate                   |                         | --               | --                | < 0.5              | --                | --               | --                | --                | --               | --                |
| pH***                            |                         | --               | --                | --                 | 7.2               | --               | --                | --                | --               | --                |
| Phenols, total                   |                         | --               | --                | --                 | < 0.005           | --               | --                | --                | --               | --                |
| Specific conductivity**          |                         | --               | --                | --                 | --                | --               | --                | --                | --               | --                |
| Sulfate                          |                         | 390              | --                | --                 | 450               | --               | --                | --                | 250              | --                |
| Total dissolved solids (TDS)     |                         | 970              | --                | --                 | 840               | 900              | --                | --                | 840              | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-089<br>10/15/97 | MW-089<br>6/17/98 | MW-090<br>2/10/97 | MW-090<br>5/7/97 | MW-090<br>7/17/97 | MW-090<br>6/17/98 | MW-091<br>2/11/97 | MW-094<br>10/17/97 | MW-094<br>6/26/98 |
|----------------------------------|-------------------------|--------------------|-------------------|-------------------|------------------|-------------------|-------------------|-------------------|--------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                 | --                | 370               | --               | --                | --                | 510               | --                 | --                |
| Ammonia (as N)                   |                         | < 0.03             | --                | --                | --               | --                | --                | --                | < 0.03             | --                |
| Bromide                          |                         | --                 | --                | --                | --               | --                | --                | 0.5               | --                 | --                |
| Carbonate Alkalinity             |                         | --                 | --                | < 1               | --               | --                | --                | < 1               | --                 | --                |
| Chloride                         |                         | --                 | 61                | 26                | 25               | 19                | 35                | 80                | --                 | 24                |
| Cyanide                          |                         | --                 | 0.247             | --                | --               | --                | < 0.005           | --                | --                 | < 0.005           |
| Fluoride                         |                         | --                 | 0.7               | 0.36              | --               | --                | 0.5               | 0.19              | --                 | 0.7               |
| Hydroxide                        |                         | --                 | --                | < 1               | --               | --                | --                | < 1               | --                 | --                |
| Carbon Dioxide                   |                         | --                 | --                | --                | --               | --                | --                | --                | --                 | --                |
| Nitrate                          |                         | < 0.06             | --                | --                | --               | --                | --                | --                | 2.4                | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | < 0.2              | --                | --                | --               | --                | --                | --                | < 0.2              | --                |
| Orthophosphate                   |                         | 0.24               | --                | --                | --               | --                | --                | --                | < 0.05             | --                |
| pH***                            |                         | --                 | 7.1               | 7.4               | --               | --                | 7.5               | 7.5               | --                 | 7.3               |
| Phenols, total                   |                         | --                 | < 0.005           | --                | --               | --                | < 0.005           | --                | --                 | 0.008             |
| Specific conductivity**          |                         | --                 | --                | 749               | --               | --                | --                | 1010              | --                 | --                |
| Sulfate                          |                         | --                 | 340               | 25                | --               | --                | 130               | < 5               | --                 | 240               |
| Total dissolved solids (TDS)     |                         | --                 | 780               | 460               | --               | --                | 530               | 590               | --                 | 600               |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-095<br>4/30/97 | MW-095<br>6/22/98 | MW-095<br>10/12/98 | MW-096<br>4/30/97 | MW-096<br>10/16/97 | MW-096<br>6/21/98 | MW-097<br>4/30/97 | MW-097<br>10/17/97 | MW-097<br>6/21/98 |
|----------------------------------|-------------------------|-------------------|-------------------|--------------------|-------------------|--------------------|-------------------|-------------------|--------------------|-------------------|
| Bicarbonate Alkalinity           |                         | 310               | --                | --                 | 300               | --                 | --                | 270               | --                 | --                |
| Ammonia (as N)                   |                         | --                | --                | --                 | --                | < 0.03             | --                | --                | < 0.03             | --                |
| Bromide                          |                         | < 0.3             | --                | --                 | < 0.3             | --                 | --                | < 0.3             | --                 | --                |
| Carbonate Alkalinity             |                         | 1                 | --                | --                 | < 1               | --                 | --                | 1                 | --                 | --                |
| Chloride                         |                         | --                | 5                 | --                 | --                | --                 | 14                | --                | --                 | 8                 |
| Cyanide                          |                         | --                | < 0.005           | --                 | --                | --                 | < 0.005           | --                | --                 | < 0.005           |
| Fluoride                         |                         | 0.4               | 0.4               | --                 | 0.8               | --                 | 0.4               | 0.5               | --                 | 0.7               |
| Hydroxide                        |                         | < 1               | --                | --                 | < 1               | --                 | --                | < 1               | --                 | --                |
| Carbon Dioxide                   |                         | 31                | --                | --                 | 48                | --                 | --                | 27                | --                 | --                |
| Nitrate                          |                         | --                | --                | --                 | --                | 0.38               | --                | --                | 1.71               | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                | --                | --                 | --                | < 0.2              | --                | --                | < 0.2              | --                |
| Orthophosphate                   |                         | --                | --                | --                 | --                | 0.08               | --                | --                | 0.43               | --                |
| pH***                            |                         | 7.3               | 7.5               | --                 | 7.1               | --                 | 7.2               | 7.3               | --                 | 7.2               |
| Phenols, total                   |                         | --                | < 0.005           | --                 | --                | --                 | < 0.005           | --                | --                 | < 0.005           |
| Specific conductivity**          |                         | --                | --                | --                 | --                | --                 | --                | --                | --                 | --                |
| Sulfate                          |                         | 19                | 21                | 19                 | 160               | --                 | 210               | 150               | --                 | 190               |
| Total dissolved solids (TDS)     |                         | 370               | 360               | --                 | 560               | --                 | 560               | 550               | --                 | 520               |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

## Appendix C

Historical General Chemistry Analytical Data  
 May 1991 - October 1998  
 Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-097<br>10/12/98 | MW-098<br>4/30/97 | MW-098<br>6/29/98 | MW-104<br>7/17/97 | MW-104<br>6/21/98 | MW-106<br>2/11/97 | MW-106<br>5/7/97 | MW-106<br>7/18/97 | MW-106<br>6/18/98 |
|----------------------------------|-------------------------|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|-------------------|-------------------|
| Bicarbonate Alkalinity           |                         | --                 | 240               | --                | 268               | --                | 315               | --               | --                | --                |
| Ammonia (as N)                   |                         | --                 | --                | --                | --                | --                | --                | --               | --                | --                |
| Bromide                          |                         | --                 | < 0.3             | --                | < 0.3             | --                | < 0.3             | --               | --                | --                |
| Carbonate Alkalinity             |                         | --                 | 1                 | --                | < 1               | --                | < 1               | --               | --                | --                |
| Chloride                         |                         | --                 | --                | 14                | 11.6              | 14                | 10                | 4                | 5                 | 4                 |
| Cyanide                          |                         | --                 | --                | < 0.005           | --                | < 0.005           | --                | --               | --                | < 0.005           |
| Fluoride                         |                         | --                 | 0.4               | 0.3               | 0.8               | 1.4               | 0.24              | --               | --                | 0.3               |
| Hydroxide                        |                         | --                 | < 1               | --                | < 1               | --                | < 1               | --               | --                | --                |
| Carbon Dioxide                   |                         | --                 | 19                | --                | 0.72              | --                | --                | --               | --                | --                |
| Nitrate                          |                         | --                 | --                | --                | --                | --                | --                | --               | --                | --                |
| Nitrogen, Kjeldahl, total (as N) |                         | --                 | --                | --                | --                | --                | --                | --               | --                | --                |
| Orthophosphate                   |                         | --                 | --                | --                | --                | --                | --                | --               | --                | --                |
| pH***                            |                         | --                 | 7.4               | 7.6               | 7.6               | 7.3               | 7.4               | --               | --                | 7.3               |
| Phenols, total                   |                         | --                 | --                | 0.013             | --                | < 0.005           | --                | --               | --                | < 0.005           |
| Specific conductivity**          |                         | --                 | --                | --                | 815               | --                | 636               | --               | --                | --                |
| Sulfate                          | 200                     | --                 | 25                | 32                | 200               | 230               | 37                | --               | --                | 33                |
| Total dissolved solids (TDS)     | --                      | --                 | 330               | 310               | 580               | 560               | 430               | --               | --                | 380               |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | MW-108<br>7/17/97 | MW-108<br>6/22/98 | MW-110<br>6/30/98 | MW-111<br>6/29/98 | PIPELINE 4<br>5/1/91 | SUMP-16A<br>5/1/91 | SUMP-16A<br>7/1/91 | SUMP-16A<br>9/1/91 | SUMP-16A<br>12/1/91 |
|----------------------------------|-------------------------|-------------------|-------------------|-------------------|-------------------|----------------------|--------------------|--------------------|--------------------|---------------------|
| Bicarbonate Alkalinity           |                         | 297               | --                | --                | --                | --                   | --                 | --                 | --                 | --                  |
| Ammonia (as N)                   |                         | --                | --                | --                | --                | --                   | --                 | --                 | --                 | --                  |
| Bromide                          | < 0.3                   | --                | --                | --                | --                | --                   | --                 | --                 | --                 | --                  |
| Carbonate Alkalinity             | < 1                     | --                | --                | --                | --                | --                   | --                 | --                 | --                 | --                  |
| Chloride                         | 3.2                     | 5                 | 5                 | 54                | 100               | 9000                 | 190                | 49                 | --                 | 683                 |
| Cyanide                          | --                      | < 0.005           | < 0.005           | < 0.005           | < 0.005           | --                   | --                 | --                 | --                 | --                  |
| Fluoride                         | 0.4                     | 0.4               | 0.4               | 0.7               | 0.7               | --                   | --                 | --                 | --                 | --                  |
| Hydroxide                        | < 1                     | --                | --                | --                | --                | --                   | --                 | --                 | --                 | --                  |
| Carbon Dioxide                   | --                      | --                | --                | --                | --                | --                   | --                 | --                 | --                 | --                  |
| Nitrate                          | 2.6                     | --                | --                | --                | --                | --                   | --                 | --                 | --                 | --                  |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                | --                | --                | --                | --                   | --                 | --                 | --                 | --                  |
| Orthophosphate                   | --                      | --                | --                | --                | --                | --                   | --                 | --                 | --                 | --                  |
| pH***                            | 7.6                     | 7.4               | 7.4               | 7.2               | 7.2               | --                   | --                 | --                 | --                 | --                  |
| Phenols, total                   | --                      | < 0.005           | < 0.005           | 0.01              | < 0.005           | --                   | --                 | --                 | --                 | --                  |
| Specific conductivity**          | 585                     | --                | --                | --                | --                | --                   | --                 | --                 | --                 | --                  |
| Sulfate                          | 33                      | 35                | 35                | 130               | 310               | 1860                 | --                 | --                 | < 10               | --                  |
| Total dissolved solids (TDS)     | 360                     | 340               | 340               | 600               | 900               | 18500                | 876                | --                 | 263                | --                  |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | SUMP-16A<br>4/1/92 | SUMP-16A<br>7/1/92 | SUMP-16A<br>10/1/92 | SUMP-16A<br>1/1/93 | SUMP-16A<br>4/14/93 | SUMP-16A<br>10/5/94 | SUMP-16A<br>1/11/95 | SUMP-16A<br>10/12/95 | SUMP-16A<br>7/1/96 |
|----------------------------------|-------------------------|--------------------|--------------------|---------------------|--------------------|---------------------|---------------------|---------------------|----------------------|--------------------|
| Bicarbonate Alkalinity           |                         | --                 | --                 | --                  | --                 | --                  | --                  | --                  | --                   | --                 |
| Ammonia (as N)                   |                         | --                 | --                 | --                  | --                 | --                  | --                  | --                  | --                   | --                 |
| Bromide                          |                         | --                 | --                 | --                  | --                 | --                  | --                  | --                  | --                   | --                 |
| Carbonate Alkalinity             |                         | --                 | --                 | --                  | --                 | --                  | --                  | --                  | --                   | --                 |
| Chloride                         |                         | 522                | 82                 | 225                 | 229                | 218                 | 128                 | 90                  | 63                   | 14                 |
| Cyanide                          |                         | --                 | --                 | --                  | --                 | --                  | --                  | --                  | --                   | --                 |
| Fluoride                         |                         | --                 | --                 | --                  | --                 | --                  | --                  | --                  | --                   | --                 |
| Hydroxide                        |                         | --                 | --                 | --                  | --                 | --                  | --                  | --                  | --                   | --                 |
| Carbon Dioxide                   |                         | --                 | --                 | --                  | --                 | --                  | --                  | --                  | --                   | --                 |
| Nitrate                          |                         | --                 | --                 | --                  | --                 | --                  | --                  | --                  | --                   | --                 |
| Nitrogen, Kjeldahl, total (as N) |                         | --                 | --                 | --                  | --                 | --                  | --                  | --                  | --                   | --                 |
| Orthophosphate                   |                         | --                 | --                 | --                  | --                 | --                  | --                  | --                  | --                   | --                 |
| pH***                            |                         | --                 | --                 | --                  | --                 | --                  | --                  | --                  | --                   | --                 |
| Phenols, total                   |                         | --                 | --                 | --                  | --                 | --                  | --                  | --                  | --                   | --                 |
| Specific conductivity**          |                         | --                 | --                 | --                  | --                 | --                  | --                  | --                  | --                   | --                 |
| Sulfate                          |                         | --                 | --                 | --                  | --                 | --                  | --                  | --                  | --                   | --                 |
| Total dissolved solids (TDS)     |                         | --                 | --                 | --                  | --                 | --                  | --                  | --                  | --                   | --                 |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | SHAL-ZONE-MAX<br>4/1/92 | SHAL-ZONE-MAX<br>7/1/92 | SHAL-ZONE-MAX<br>10/1/92 | SHAL-ZONE-MAX<br>1/1/93 | SHAL-ZONE-MAX<br>4/1/93 | SHAL-ZONE-MAX<br>7/1/93 | SHAL-ZONE-MAX<br>10/1/93 |
|----------------------------------|-------------------------|-------------------------|-------------------------|--------------------------|-------------------------|-------------------------|-------------------------|--------------------------|
| Bicarbonate Alkalinity           |                         | --                      | --                      | --                       | --                      | --                      | --                      | --                       |
| Ammonia (as N)                   |                         | --                      | --                      | --                       | --                      | --                      | --                      | --                       |
| Bromide                          |                         | --                      | --                      | --                       | --                      | --                      | --                      | --                       |
| Carbonate Alkalinity             |                         | --                      | --                      | --                       | --                      | --                      | --                      | --                       |
| Chloride                         |                         | 4240 <sup>*</sup>       | 455 <sup>*</sup>        | 420 <sup>*</sup>         | 544 <sup>*</sup>        | 495 <sup>*</sup>        | 445 <sup>*</sup>        | 543 <sup>*</sup>         |
| Cyanide                          |                         | --                      | --                      | --                       | --                      | --                      | --                      | --                       |
| Fluoride                         |                         | --                      | --                      | --                       | --                      | --                      | --                      | --                       |
| Hydroxide                        |                         | --                      | --                      | --                       | --                      | --                      | --                      | --                       |
| Carbon Dioxide                   |                         | --                      | --                      | --                       | --                      | --                      | --                      | --                       |
| Nitrate                          |                         | --                      | --                      | --                       | --                      | --                      | --                      | --                       |
| Nitrogen, Kjeldahl, total (as N) |                         | --                      | --                      | --                       | --                      | --                      | --                      | --                       |
| Orthophosphate                   |                         | --                      | --                      | --                       | --                      | --                      | --                      | --                       |
| pH***                            |                         | --                      | --                      | --                       | --                      | --                      | --                      | --                       |
| Phenols, total                   |                         | --                      | --                      | --                       | --                      | --                      | --                      | --                       |
| Specific conductivity**          |                         | --                      | --                      | --                       | --                      | --                      | --                      | --                       |
| Sulfate                          |                         | --                      | --                      | --                       | --                      | --                      | --                      | --                       |
| Total dissolved solids (TDS)     |                         | --                      | --                      | --                       | --                      | --                      | --                      | --                       |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

- \* Measured in standard units (su)
- \*\* Measured in micro-mhos per centimeter (umho/cm)
- Not analyzed or not reported.
- < Constituent not detected above noted laboratory detection limit.

## Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | SHAL-ZONE-MAX<br>1/1/94 | SHAL-ZONE-MAX<br>4/1/94 | SHAL-ZONE-MAX<br>7/1/94 | SHAL-ZONE-MAX<br>10/1/94 | SHAL-ZONE-MAX<br>1/1/95 | SHAL-ZONE-MAX<br>4/1/95 | SUMP-A10<br>4/1/91 | SUMP-A10<br>5/1/91 |
|----------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------------------|-------------------------|-------------------------|--------------------|--------------------|
| Bicarbonate Alkalinity           |                         | --                      | --                      | --                      | --                       | --                      | --                      | --                 | --                 |
| Ammonia (as N)                   |                         | --                      | --                      | --                      | --                       | --                      | --                      | --                 | --                 |
| Bromide                          |                         | --                      | --                      | --                      | --                       | --                      | --                      | --                 | --                 |
| Carbonate Alkalinity             |                         | --                      | --                      | --                      | --                       | --                      | --                      | --                 | --                 |
| Chloride                         |                         | (490)                   | (450)                   | (430)                   | (400)                    | (439)                   | (439)                   | (17000)            | (8750)             |
| Cyanide                          |                         | --                      | --                      | --                      | --                       | --                      | --                      | --                 | --                 |
| Fluoride                         |                         | --                      | --                      | --                      | --                       | --                      | --                      | --                 | --                 |
| Hydroxide                        |                         | --                      | --                      | --                      | --                       | --                      | --                      | --                 | --                 |
| Carbon Dioxide                   |                         | --                      | --                      | --                      | --                       | --                      | --                      | --                 | --                 |
| Nitrate                          |                         | --                      | --                      | --                      | --                       | --                      | --                      | --                 | --                 |
| Nitrogen, Kjeldahl, total (as N) |                         | --                      | --                      | --                      | --                       | --                      | --                      | --                 | --                 |
| Orthophosphate                   |                         | --                      | --                      | --                      | --                       | --                      | --                      | --                 | --                 |
| pH***                            |                         | --                      | --                      | --                      | --                       | --                      | --                      | --                 | --                 |
| Phenols, total                   |                         | --                      | --                      | --                      | --                       | --                      | --                      | --                 | --                 |
| Specific conductivity**          |                         | --                      | --                      | --                      | --                       | --                      | --                      | --                 | --                 |
| Sulfate                          |                         | --                      | --                      | --                      | --                       | --                      | --                      | --                 | --                 |
| Total dissolved solids (TDS)     |                         | --                      | --                      | --                      | --                       | --                      | --                      | --                 | --                 |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

## Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | SUMP-A10<br>10/5/94 | SUMP-A10<br>10/12/95 | SW-01<br>7/1/91 | SW-01<br>4/1/92 | SW-01<br>7/1/92 | SW-01<br>10/1/92 | SW-01<br>4/15/93 | SW-01<br>5/12/93 | SW-02<br>5/12/93 |
|----------------------------------|-------------------------|---------------------|----------------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|------------------|
| Bicarbonate Alkalinity           |                         | --                  | --                   | --              | --              | --              | --               | --               | --               | --               |
| Ammonia (as N)                   |                         | --                  | --                   | --              | --              | --              | --               | --               | --               | --               |
| Bromide                          |                         | --                  | --                   | --              | --              | --              | --               | --               | --               | --               |
| Carbonate Alkalinity             |                         | --                  | --                   | --              | --              | --              | --               | --               | --               | --               |
| Chloride                         | 4.2                     | --                  | 3                    | 19              | 16              | 19              | 25               | 20               | 19.5             | 522.3            |
| Cyanide                          | --                      | --                  | --                   | --              | --              | --              | --               | --               | --               | --               |
| Fluoride                         | --                      | --                  | --                   | 1.3             | --              | --              | --               | --               | --               | --               |
| Hydroxide                        | --                      | --                  | --                   | --              | --              | --              | --               | --               | --               | --               |
| Carbon Dioxide                   | --                      | --                  | --                   | --              | --              | --              | --               | --               | --               | --               |
| Nitrate                          | --                      | --                  | --                   | 3               | --              | --              | --               | --               | --               | --               |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                  | --                   | --              | --              | --              | --               | --               | --               | --               |
| Orthophosphate                   | --                      | --                  | --                   | --              | --              | --              | --               | --               | --               | --               |
| pH***                            | --                      | --                  | --                   | --              | --              | --              | --               | --               | --               | --               |
| Phenols, total                   | --                      | --                  | --                   | --              | --              | --              | --               | --               | --               | --               |
| Specific conductivity**          | --                      | --                  | --                   | --              | --              | --              | --               | --               | --               | --               |
| Sulfate                          | --                      | --                  | --                   | 164             | --              | --              | --               | --               | --               | --               |
| Total dissolved solids (TDS)     | --                      | --                  | --                   | 583             | --              | --              | --               | --               | --               | --               |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data  
May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | SW-02<br>1/11/95 | SW-02<br>6/24/98 | SW-03<br>7/1/96 | SW-03<br>10/1/96 | SW-03<br>6/24/98 | TH-21A<br>5/1/91 | TH-21A<br>7/1/91 | TH-A11<br>4/1/91 | TH-A11<br>7/1/91 |
|----------------------------------|-------------------------|------------------|------------------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Bicarbonate Alkalinity           |                         | --               | --               | --              | --               | --               | --               | --               | --               | --               |
| Ammonia (as N)                   |                         | --               | --               | --              | --               | --               | --               | --               | --               | --               |
| Bromide                          |                         | --               | --               | --              | --               | --               | --               | --               | --               | --               |
| Carbonate Alkalinity             |                         | --               | --               | --              | --               | --               | --               | --               | --               | --               |
| Chloride                         | 81                      | --               | 150              | 24              | 24               | 9                | 8250*            | 636*             | 12800*           | 1470*            |
| Cyanide                          | --                      | --               | < 0.005          | --              | --               | < 0.005          | --               | --               | --               | --               |
| Fluoride                         | --                      | --               | 0.5              | --              | --               | 0.7              | --               | --               | --               | --               |
| Hydroxide                        | --                      | --               | --               | --              | --               | --               | --               | --               | --               | --               |
| Carbon Dioxide                   | --                      | --               | --               | --              | --               | --               | --               | --               | --               | --               |
| Nitrate                          | --                      | --               | --               | --              | --               | --               | --               | --               | --               | --               |
| Nitrogen, Kjeldahl, total (as N) | --                      | --               | --               | --              | --               | --               | --               | --               | --               | --               |
| Orthophosphate                   | --                      | --               | --               | --              | --               | --               | --               | --               | --               | --               |
| pH***                            | --                      | --               | 7.2              | --              | --               | 7.5              | --               | --               | --               | --               |
| Phenols, total                   | --                      | --               | < 0.005          | --              | --               | < 0.005          | --               | --               | --               | --               |
| Specific conductivity**          | --                      | --               | --               | --              | --               | --               | --               | --               | --               | --               |
| Sulfate                          | --                      | --               | 120              | --              | --               | 110              | --               | --               | 613              | --               |
| Total dissolved solids (TDS)     | --                      | --               | 730              | --              | --               | 410              | 16000*           | --               | 26200*           | --               |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | TH-A11<br>9/1/91 | TH-A11<br>12/1/91 | TH-A11<br>4/1/92 | TH-A11<br>7/1/92 | TH-A11<br>10/1/92 | UIHS_ARROYO<br>4/1/92 | UIHS_ARROYO<br>7/1/92 | UIHS_ARROYO<br>10/1/92 | UIHS_ARROYO<br>1/1/93 |
|----------------------------------|-------------------------|------------------|-------------------|------------------|------------------|-------------------|-----------------------|-----------------------|------------------------|-----------------------|
| Bicarbonate Alkalinity           |                         | --               | --                | --               | --               | --                | --                    | --                    | --                     | --                    |
| Ammonia (as N)                   |                         | --               | --                | --               | --               | --                | --                    | --                    | --                     | --                    |
| Bromide                          |                         | --               | --                | --               | --               | --                | --                    | --                    | --                     | --                    |
| Carbonate Alkalinity             |                         | --               | --                | --               | --               | --                | --                    | --                    | --                     | --                    |
| Chloride                         |                         | --               | (670)             | (433)            | 60               | 124               | 16.2                  | 8.5                   | 13.5                   | 11.4                  |
| Cyanide                          |                         | --               | --                | --               | --               | --                | --                    | --                    | --                     | --                    |
| Fluoride                         |                         | --               | --                | --               | --               | --                | --                    | --                    | --                     | --                    |
| Hydroxide                        |                         | --               | --                | --               | --               | --                | --                    | --                    | --                     | --                    |
| Carbon Dioxide                   |                         | --               | --                | --               | --               | --                | --                    | --                    | --                     | --                    |
| Nitrate                          |                         | --               | --                | --               | --               | --                | --                    | --                    | --                     | --                    |
| Nitrogen, Kjeldahl, total (as N) |                         | --               | --                | --               | --               | --                | --                    | --                    | --                     | --                    |
| Orthophosphate                   |                         | --               | --                | --               | --               | --                | --                    | --                    | --                     | --                    |
| pH***                            |                         | --               | --                | --               | --               | --                | --                    | --                    | --                     | --                    |
| Phenols, total                   |                         | --               | --                | --               | --               | --                | --                    | --                    | --                     | --                    |
| Specific conductivity**          |                         | --               | --                | --               | --               | --                | --                    | --                    | --                     | --                    |
| Sulfate                          |                         | --               | --                | --               | --               | --                | --                    | --                    | --                     | --                    |
| Total dissolved solids (TDS)     |                         | < 10<br>(1050)   | --                | --               | --               | --                | --                    | --                    | --                     | --                    |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | UIHS_ARROYO<br>4/15/93 | UIHS_ARROYO<br>5/12/93 | UIHS_ARROYO<br>6/28/93 | UIHS_ARROYO<br>7/15/93 | UIHS_ARROYO<br>8/3/93 | UIHS_ARROYO<br>9/21/93 | UIHS_ARROYO<br>10/14/93 | UIHS_ARROYO<br>11/10/93 | UIHS_ARROYO<br>12/6/93 |
|----------------------------------|-------------------------|------------------------|------------------------|------------------------|------------------------|-----------------------|------------------------|-------------------------|-------------------------|------------------------|
| Bicarbonate Alkalinity           |                         | --                     | --                     | --                     | --                     | --                    | --                     | --                      | --                      | --                     |
| Ammonia (as N)                   |                         | --                     | --                     | --                     | --                     | --                    | --                     | --                      | --                      | --                     |
| Bromide                          |                         | --                     | --                     | --                     | --                     | --                    | --                     | --                      | --                      | --                     |
| Carbonate Alkalinity             |                         | --                     | --                     | --                     | --                     | --                    | --                     | --                      | --                      | --                     |
| Chloride                         |                         | 13.5                   | 11                     | 11.4                   | 12.9                   | 11.8                  | 11.5                   | 10.3                    | 493                     | 10.7                   |
| Cyanide                          |                         | --                     | --                     | --                     | --                     | --                    | --                     | --                      | --                      | --                     |
| Fluoride                         |                         | --                     | --                     | --                     | --                     | --                    | --                     | --                      | --                      | --                     |
| Hydroxide                        |                         | --                     | --                     | --                     | --                     | --                    | --                     | --                      | --                      | --                     |
| Carbon Dioxide                   |                         | --                     | --                     | --                     | --                     | --                    | --                     | --                      | --                      | --                     |
| Nitrate                          |                         | --                     | --                     | --                     | --                     | --                    | --                     | --                      | --                      | --                     |
| Nitrogen, Kjeldahl, total (as N) |                         | --                     | --                     | --                     | --                     | --                    | --                     | --                      | --                      | --                     |
| Orthophosphate                   |                         | --                     | --                     | --                     | --                     | --                    | --                     | --                      | --                      | --                     |
| pH***                            |                         | --                     | --                     | --                     | --                     | --                    | --                     | --                      | --                      | --                     |
| Phenols, total                   |                         | --                     | --                     | --                     | --                     | --                    | --                     | --                      | --                      | --                     |
| Specific conductivity**          |                         | --                     | --                     | --                     | --                     | --                    | --                     | --                      | --                      | --                     |
| Sulfate                          |                         | --                     | --                     | --                     | --                     | --                    | --                     | --                      | --                      | --                     |
| Total dissolved solids (TDS)     |                         | --                     | --                     | --                     | --                     | --                    | --                     | --                      | --                      | --                     |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | UIHS_ARROYO<br>1/13/94 | UIHS_ARROYO<br>2/9/94 | UIHS_ARROYO<br>3/16/94 | UIHS_ARROYO<br>4/5/94 | UIHS_ARROYO<br>5/19/94 | UIHS_ARROYO<br>6/23/94 | UIHS_ARROYO<br>7/21/94 | UIHS_ARROYO<br>8/24/94 | UIHS_ARROYO<br>9/20/94 |
|----------------------------------|-------------------------|------------------------|-----------------------|------------------------|-----------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| Bicarbonate Alkalinity           |                         | --                     | --                    | --                     | --                    | --                     | --                     | --                     | --                     | --                     |
| Ammonia (as N)                   |                         | --                     | --                    | --                     | --                    | --                     | --                     | --                     | --                     | --                     |
| Bromide                          |                         | --                     | --                    | --                     | --                    | --                     | --                     | --                     | --                     | --                     |
| Carbonate Alkalinity             |                         | --                     | --                    | --                     | --                    | --                     | --                     | --                     | --                     | --                     |
| Chloride                         | 11                      | 11                     | 11.6                  | 13                     | 14                    | 12.2                   | 13                     | 8                      | 12.7                   | 11                     |
| Cyanide                          | --                      | --                     | --                    | --                     | --                    | --                     | --                     | --                     | --                     | --                     |
| Fluoride                         | --                      | --                     | --                    | --                     | --                    | --                     | --                     | --                     | --                     | --                     |
| Hydroxide                        | --                      | --                     | --                    | --                     | --                    | --                     | --                     | --                     | --                     | --                     |
| Carbon Dioxide                   | --                      | --                     | --                    | --                     | --                    | --                     | --                     | --                     | --                     | --                     |
| Nitrate                          | --                      | --                     | --                    | --                     | --                    | --                     | --                     | --                     | --                     | --                     |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                     | --                    | --                     | --                    | --                     | --                     | --                     | --                     | --                     |
| Orthophosphate                   | --                      | --                     | --                    | --                     | --                    | --                     | --                     | --                     | --                     | --                     |
| pH***                            | --                      | --                     | --                    | --                     | --                    | --                     | --                     | --                     | --                     | --                     |
| Phenols, total                   | --                      | --                     | --                    | --                     | --                    | --                     | --                     | --                     | --                     | --                     |
| Specific conductivity**          | --                      | --                     | --                    | --                     | --                    | --                     | --                     | --                     | --                     | --                     |
| Sulfate                          | --                      | --                     | --                    | --                     | --                    | --                     | --                     | --                     | --                     | --                     |
| Total dissolved solids (TDS)     | --                      | --                     | --                    | --                     | --                    | --                     | --                     | --                     | --                     | --                     |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | UIHS_ARROYO<br>10/6/94 | UIHS_ARROYO<br>11/30/94 | UIHS_ARROYO<br>12/16/94 | UIHS_ARROYO<br>1/11/95 | UIHS_ARROYO<br>3/9/95 | UIHS_ARROYO<br>4/7/95 | UIHS_ARROYO<br>5/18/95 | UIHS_ARROYO<br>7/21/95 | UIHS_ARROYO<br>10/12/95 |
|----------------------------------|-------------------------|------------------------|-------------------------|-------------------------|------------------------|-----------------------|-----------------------|------------------------|------------------------|-------------------------|
| Bicarbonate Alkalinity           |                         | --                     | --                      | --                      | --                     | --                    | --                    | --                     | --                     | --                      |
| Ammonia (as N)                   |                         | --                     | --                      | --                      | --                     | --                    | --                    | --                     | --                     | --                      |
| Bromide                          |                         | --                     | --                      | --                      | --                     | --                    | --                    | --                     | --                     | --                      |
| Carbonate Alkalinity             |                         | --                     | --                      | --                      | --                     | --                    | --                    | --                     | --                     | --                      |
| Chloride                         | 13                      | --                     | 11.1                    | 12.2                    | 10                     | 11.5                  | 13                    | 9                      | 12                     | 14                      |
| Cyanide                          | --                      | --                     | --                      | --                      | --                     | --                    | --                    | --                     | --                     | --                      |
| Fluoride                         | --                      | --                     | --                      | --                      | --                     | --                    | --                    | --                     | --                     | --                      |
| Hydroxide                        | --                      | --                     | --                      | --                      | --                     | --                    | --                    | --                     | --                     | --                      |
| Carbon Dioxide                   | --                      | --                     | --                      | --                      | --                     | --                    | --                    | --                     | --                     | --                      |
| Nitrate                          | --                      | --                     | --                      | --                      | --                     | --                    | --                    | --                     | --                     | --                      |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                     | --                      | --                      | --                     | --                    | --                    | --                     | --                     | --                      |
| Orthophosphate                   | --                      | --                     | --                      | --                      | --                     | --                    | --                    | --                     | --                     | --                      |
| pH***                            | --                      | --                     | --                      | --                      | --                     | --                    | --                    | --                     | --                     | --                      |
| Phenols, total                   | --                      | --                     | --                      | --                      | --                     | --                    | --                    | --                     | --                     | --                      |
| Specific conductivity**          | --                      | --                     | --                      | --                      | --                     | --                    | --                    | --                     | --                     | --                      |
| Sulfate                          | --                      | --                     | --                      | --                      | --                     | --                    | --                    | --                     | --                     | --                      |
| Total dissolved solids (TDS)     | --                      | --                     | --                      | --                      | --                     | --                    | --                    | --                     | --                     | --                      |

## Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

< Constituent not detected above noted laboratory detection limit.

# Appendix C

## Historical General Chemistry Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter                        | Well ID<br>Date Sampled | UIHS_ARROYO<br>1/19/96 | UIHS_ARROYO<br>4/24/96 | UIHS_ARROYO<br>7/1/96 | UIHS_ARROYO<br>10/1/96 | UIHS_ARROYO<br>2/10/97 | UIHS_ARROYO<br>6/26/98 |
|----------------------------------|-------------------------|------------------------|------------------------|-----------------------|------------------------|------------------------|------------------------|
| Bicarbonate Alkalinity           |                         | --                     | --                     | --                    | --                     | --                     | --                     |
| Ammonia (as N)                   |                         | --                     | --                     | --                    | --                     | --                     | --                     |
| Bromide                          |                         | --                     | --                     | --                    | --                     | --                     | --                     |
| Carbonate Alkalinity             |                         | --                     | --                     | --                    | --                     | --                     | --                     |
| Chloride                         | 10                      | 10.9                   | 10                     | 8                     | 11                     | 13                     | < 0.005                |
| Cyanide                          | --                      | --                     | --                     | --                    | --                     | --                     | 0.7                    |
| Fluoride                         | --                      | --                     | --                     | --                    | --                     | --                     | --                     |
| Hydroxide                        | --                      | --                     | --                     | --                    | --                     | --                     | --                     |
| Carbon Dioxide                   | --                      | --                     | --                     | --                    | --                     | --                     | --                     |
| Nitrate                          | --                      | --                     | --                     | --                    | --                     | --                     | --                     |
| Nitrogen, Kjeldahl, total (as N) | --                      | --                     | --                     | --                    | --                     | --                     | --                     |
| Orthophosphate                   | --                      | --                     | --                     | --                    | --                     | --                     | 7.2                    |
| pH***                            | --                      | --                     | --                     | --                    | --                     | --                     | 0.006                  |
| Phenols, total                   | --                      | --                     | --                     | --                    | --                     | --                     | --                     |
| Specific conductivity**          | --                      | --                     | --                     | --                    | --                     | --                     | 590                    |
| Sulfate                          | --                      | --                     | --                     | --                    | --                     | --                     | 940                    |
| Total dissolved solids (TDS)     | --                      | --                     | --                     | --                    | --                     | --                     | --                     |

### Notes:

Concentrations listed in milligrams per liter (mg/L), except where noted otherwise.

\* Measured in standard units (su)

\*\* Measured in micro-mhos per centimeter (umho/cm)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit.

Historical Radionuclide Analytical  
Data  
May 1991 - October 1998

## Appendix C

## Historical Radionuclide Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter      | Well ID<br>Date Sampled | LYMAN<br>06/29/98 | MW-013<br>06/21/98 | MW-014<br>06/22/98 | MW-041<br>06/19/98 | MW-043<br>09/27/91 | MW-043<br>06/22/98 | MW-044<br>06/22/98 | MW-045<br>09/27/91 |
|----------------|-------------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Radium 226     |                         | 0.25              | 0.87               | 0.47               | 0.99               | NA/R               | 2.36               | 0.63               | --                 |
| Radium 228     |                         | 3.25              | 1.65               | 13.25              | 5.25               | NA/R               | 3.54               | 1.2                | --                 |
| Radium 226&228 |                         | 3.50              | 0.87               | 13.72              | 6.24               | < 0.2              | 5.90               | 0.63               | 3.8                |
| Uranium        |                         | --                | --                 | --                 | --                 | (4.3)              | --                 | --                 | (15.3)             |

| Parameter      | Well ID<br>Date Sampled | MW-046<br>06/21/98 | MW-049<br>09/27/91 | MW-049<br>06/21/98 | MW-050<br>09/27/91 | MW-050<br>06/19/98 | MW-054<br>06/25/98 | MW-055<br>06/25/98 | MW-057<br>06/25/98 |
|----------------|-------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Radium 226     |                         | 0.79               | --                 | 3.53               | --                 | 4.79               | 10.45              | 6.74               | 0.52               |
| Radium 228     |                         | 12.81              | --                 | 8.23               | --                 | 5.67               | 6.60               | 3.21               | 2.54               |
| Radium 226&228 |                         | 13.60              | < 0.2              | 11.76              | 2.3                | 10.46              | 17.05              | 9.95               | 3.06               |
| Uranium        |                         | --                 | 2.7                | --                 | (40.6)             | --                 | --                 | --                 | --                 |

| Parameter      | Well ID<br>Date Sampled | MW-058<br>06/22/98 | MW-059<br>06/24/98 | MW-060<br>06/21/98 | MW-061<br>09/27/91 | MW-061<br>06/18/98 | MW-061A<br>06/18/98 | MW-062<br>06/26/98 | MW-063<br>06/25/98 |
|----------------|-------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|--------------------|--------------------|
| Radium 226     |                         | 0.49               | 1.36               | 0.54               | --                 | 3.79               | 0.38                | 0.91               | 0.40               |
| Radium 228     |                         | 3.65               | 1.42               | 4.62               | --                 | 3.60               | 5.68                | 2.80               | 1.28               |
| Radium 226&228 |                         | 4.14               | 1.36               | 5.16               | 6.4                | 7.4                | 6.06                | 3.7                | 0.40               |
| Uranium        |                         | --                 | --                 | --                 | 0.7                | --                 | --                  | --                 | --                 |

## Notes:

Concentrations listed in picocuries per liter (pCi/L)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit

## Appendix C

## Historical Radionuclide Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter      | Well ID<br>Date Sampled | MW-064<br>06/23/98 | MW-065A<br>06/25/98 | MW-066<br>06/17/98 | MW-067<br>06/24/98 | MW-068<br>06/26/98 | MW-069<br>06/29/98 | MW-070<br>06/16/98 | MW-071<br>06/19/98 |
|----------------|-------------------------|--------------------|---------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Radium 226     |                         | 0.51               | 0.67                | 0.47               | 1.09               | 0.30               | 1.03               | 0.20               | 0.79               |
| Radium 228     |                         | 3.96               | 0.71                | 2.34               | 1.89               | 3.35               | 1.36               | 2.55               | 1.63               |
| Radium 226&228 |                         | 4.47               | 0.67                | 0.47               | 2.98               | 3.7                | 1.03               | 2.8                | 0.79               |
| Uranium        |                         | --                 | --                  | --                 | --                 | --                 | --                 | --                 | --                 |

| Parameter      | Well ID<br>Date Sampled | MW-072<br>06/30/98 | MW-073<br>06/30/98 | MW-074<br>06/24/98 | MW-075<br>06/30/98 | MW-076<br>06/29/98 | MW-078<br>06/19/98 | MW-081<br>06/29/98 | MW-082<br>06/25/98 |
|----------------|-------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Radium 226     |                         | 0.70               | 7.26               | 1.20               | 1.28               | 1.14               | 11.16              | 0.54               | 0.30               |
| Radium 228     |                         | 3.22               | 5.99               | 16.96              | 2.22               | 4.32               | 4.45               | 2.78               | -4.38              |
| Radium 226&228 |                         | 3.9                | 13.25              | 18.2               | 3.50               | 5.46               | 15.61              | 3.32               | 0.30               |
| Uranium        |                         | --                 | --                 | --                 | --                 | --                 | --                 | --                 | --                 |

| Parameter      | Well ID<br>Date Sampled | MW-083<br>06/25/98 | MW-084<br>06/23/98 | MW-085<br>06/23/98 | MW-086<br>06/26/98 | MW-087<br>06/19/98 | MW-087A<br>06/19/98 | MW-088<br>06/16/98 | MW-089<br>06/17/98 |
|----------------|-------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|--------------------|--------------------|
| Radium 226     |                         | 0.25               | 1.10               | 6.40               | 1.75               | 0.18               | 1.94                | 1.07               | 0.19               |
| Radium 228     |                         | 0.89               | 2.28               | 5.81               | 0.82               | 0.84               | 0.15                | 1.82               | 0.67               |
| Radium 226&228 |                         | 0.25               | 3.4                | 12.2               | 1.75               | 1.02               | 1.94                | 1.07               | 0.19               |
| Uranium        |                         | --                 | --                 | --                 | --                 | --                 | --                  | --                 | --                 |

## Notes:

Concentrations listed in picocuries per liter (pCi/L)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit

## Appendix C

## Historical Radionuclide Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Parameter      | Well ID<br>Date Sampled | MW-090<br>06/17/98 | MW-094<br>06/26/98 | MW-095<br>06/22/98 | MW-096<br>06/21/98 | MW-097<br>06/21/98 | MW-098<br>06/29/98 | MW-104<br>06/21/98 | MW-106<br>06/18/98 |
|----------------|-------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Radium 226     |                         | 0.48               | 0.30               | 0.88               | 2.34               | 0.69               | 0.86               | 0.13               | 1.96               |
| Radium 228     |                         | 3.12               | 4.52               | 7.85               | 8.61               | 2.52               | 1.57               | 1.46               | 3.67               |
| Radium 226&228 |                         | 3.60               | 4.8                | 8.73               | 10.95              | 3.21               | 2.43               | 0.13               | 5.63               |
| Uranium        |                         | --                 | --                 | --                 | --                 | --                 | --                 | --                 | --                 |

| Parameter      | Well ID<br>Date Sampled | MW-108<br>06/22/98 | MW-110<br>06/30/98 | MW-111<br>06/29/98 | PIPELINE_4<br>08/02/91 | PIPELINE_4<br>08/08/91 | PIPELINE_4<br>08/13/91 | SW-01<br>12/10/97 | SW-01<br>06/30/98 |
|----------------|-------------------------|--------------------|--------------------|--------------------|------------------------|------------------------|------------------------|-------------------|-------------------|
| Radium 226     |                         | 0.21               | 0.76               | 1.22               | NA/R                   | NA/R                   | NA/R                   | NA/R              | 0.17              |
| Radium 228     |                         | 1.44               | -2.68              | 3.23               | NA/R                   | NA/R                   | NA/R                   | NA/R              | -1.28             |
| Radium 226&228 |                         | 0.21               | 0.76               | 4.45               | 4622.2                 | 4115.1                 | 2410                   | 1.15              | 0.17              |
| Uranium        |                         | --                 | --                 | --                 | --                     | --                     | --                     | --                | --                |

| Parameter      | Well ID<br>Date Sampled | SW-02<br>06/24/98 | SW-03<br>06/24/98 | UIHS_ARROYO<br>06/26/98 |
|----------------|-------------------------|-------------------|-------------------|-------------------------|
| Radium 226     |                         | -0.87             | 0.23              | 0.25                    |
| Radium 228     |                         | 0.35              | 2.83              | 2.57                    |
| Radium 226&228 |                         | ND                | 3.06              | 2.82                    |
| Uranium        |                         | --                | --                | --                      |

## Notes:

Concentrations listed in picocuries per liter (pCi/L)

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit

Historical Total Metals Analytical  
Data  
May 1991 - October 1998

## Appendix C

## Historical Total Metals Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID<br>Date Sampled<br>Parameter | BIEBBLE<br>7/1/91 | BIEBBLE<br>7/19/91 | BIEBBLE<br>7/29/91 | LYMAN<br>7/1/91 | LYMAN<br>6/29/98 | MW-010<br>9/1/91 | MW-013<br>9/1/91 | MW-013<br>9/27/91 | MW-013<br>3/21/97 |
|--------------------------------------|-------------------|--------------------|--------------------|-----------------|------------------|------------------|------------------|-------------------|-------------------|
| Aluminum                             | --                | --                 | 0.16               | --              | --               | --               | --               | --                | --                |
| Arsenic                              | --                | --                 | < 0.005            | --              | --               | --               | --               | 0.01              | --                |
| Barium                               | 0.03              | --                 | --                 | 0.02            | --               | 0.97             | 0.74             | 0.65              | 0.37              |
| Boron                                | --                | --                 | < 0.05             | --              | --               | --               | --               | --                | --                |
| Cadmium                              | --                | --                 | < 0.001            | --              | --               | --               | --               | --                | --                |
| Calcium                              | --                | --                 | --                 | --              | --               | --               | --               | --                | --                |
| Chromium                             | --                | --                 | < 0.02             | --              | --               | --               | --               | --                | --                |
| Cobalt                               | --                | --                 | < 0.05             | --              | --               | --               | --               | --                | --                |
| Copper                               | --                | --                 | < 0.02             | --              | --               | --               | --               | --                | --                |
| Iron                                 | < 0.05            | --                 | --                 | < 0.05          | --               | 6.99             | 7.02             | 6.25              | 29                |
| Lead                                 | --                | --                 | 0.003              | --              | --               | --               | --               | --                | --                |
| Magnesium                            | --                | --                 | --                 | --              | --               | --               | --               | --                | --                |
| Manganese                            | --                | --                 | --                 | --              | --               | 0.44             | 0.36             | 0.31              | 0.48              |
| Mercury                              | < 0.01            | --                 | --                 | < 0.01          | --               | --               | --               | < 0.0003          | --                |
| Molybdenum                           | --                | < 0.001            | --                 | --              | --               | --               | --               | --                | --                |
| Nickel                               | --                | --                 | < 0.05             | --              | --               | --               | --               | --                | --                |
| Potassium                            | --                | --                 | < 0.05             | --              | --               | --               | --               | --                | --                |
| Radium 226,228                       | --                | --                 | --                 | --              | --               | --               | --               | --                | --                |
| Selenium                             | --                | --                 | < 0.005            | --              | --               | --               | --               | < 0.01            | --                |
| Silicon                              | --                | --                 | --                 | --              | --               | --               | --               | --                | --                |
| Silver                               | --                | --                 | < 0.02             | --              | --               | --               | --               | --                | --                |
| Sodium                               | --                | --                 | --                 | --              | --               | --               | --               | --                | --                |
| Uranium                              | --                | --                 | --                 | --              | 0.0051           | --               | --               | --                | --                |
| Zinc                                 | --                | --                 | 0.05               | --              | --               | --               | --               | --                | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L).

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit

# Appendix C

## Historical Total Metals Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID<br>Date Sampled<br>Parameter | MW-013<br>6/21/98 | MW-014<br>6/22/98 | MW-019<br>5/1/91 | MW-019<br>9/1/91 | MW-038<br>5/1/91 | MW-041<br>6/1/91 | MW-041<br>3/20/97 | MW-041<br>6/19/98 | MW-043<br>6/1/91 |
|--------------------------------------|-------------------|-------------------|------------------|------------------|------------------|------------------|-------------------|-------------------|------------------|
| Aluminum                             | --                | --                | --               | --               | --               | --               | --                | --                | --               |
| Arsenic                              | --                | --                | --               | --               | --               | --               | --                | --                | --               |
| Barium                               | --                | --                | --               | 1.8              | --               | --               | 0.37              | --                | --               |
| Boron                                | --                | --                | --               | --               | --               | --               | --                | --                | --               |
| Cadmium                              | --                | --                | --               | --               | --               | --               | --                | --                | --               |
| Calcium                              | --                | --                | --               | --               | --               | --               | --                | --                | --               |
| Chromium                             | --                | --                | --               | --               | --               | --               | --                | --                | --               |
| Cobalt                               | --                | --                | --               | --               | --               | --               | --                | --                | --               |
| Copper                               | --                | --                | --               | --               | --               | --               | --                | --                | --               |
| Iron                                 | --                | --                | 45.4             | 1.39             | 0.08             | 4                | 0.69              | --                | 9.65             |
| Lead                                 | --                | --                | --               | --               | --               | --               | --                | --                | --               |
| Magnesium                            | --                | --                | --               | --               | --               | --               | --                | --                | --               |
| Manganese                            | --                | --                | 2.24             | 0.2              | 0.15             | 0.53             | 0.11              | --                | 2.7              |
| Mercury                              | --                | --                | --               | --               | --               | --               | --                | --                | --               |
| Molybdenum                           | --                | --                | --               | --               | --               | --               | --                | --                | --               |
| Nickel                               | --                | --                | --               | --               | --               | --               | --                | --                | --               |
| Potassium                            | --                | --                | --               | --               | --               | --               | --                | --                | --               |
| Radium 226,228                       | --                | --                | --               | --               | --               | --               | --                | --                | --               |
| Selenium                             | --                | --                | --               | --               | --               | --               | --                | --                | --               |
| Silicon                              | --                | --                | --               | --               | --               | --               | --                | --                | --               |
| Silver                               | --                | --                | --               | --               | --               | --               | --                | --                | --               |
| Sodium                               | --                | --                | --               | --               | --               | --               | --                | --                | --               |
| Uranium                              | 0.0018            | < 0.001           | --               | --               | --               | --               | --                | 0.0043            | --               |
| Zinc                                 | --                | --                | --               | --               | --               | --               | --                | --                | --               |

### Notes:

Concentrations listed in milligrams per liter (mg/L).

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit

## Appendix C

## Historical Total Metals Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID<br>Date Sampled<br>Parameter | MW-043<br>9/1/91 | MW-043<br>9/19/91 | MW-043<br>6/22/98 | MW-044<br>6/1/91 | MW-044<br>6/22/98 | MW-045<br>6/1/91 | MW-045<br>9/24/91 | MW-046<br>6/1/91 | MW-046<br>5/29/97 |
|--------------------------------------|------------------|-------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|
| Aluminum                             | --               | --                | --                | --               | --                | --               | --                | --               | 2.6               |
| Arsenic                              | --               | --                | --                | --               | --                | --               | --                | --               | 0.006             |
| Barium                               | 0.15             | 0.16              | --                | --               | --                | --               | 0.07              | --               | 0.33              |
| Boron                                | --               | --                | --                | --               | --                | --               | --                | --               | 0.22              |
| Cadmium                              | --               | --                | --                | --               | --                | --               | --                | --               | < 0.001           |
| Calcium                              | --               | --                | --                | --               | --                | --               | --                | --               | 140               |
| Chromium                             | --               | --                | --                | --               | --                | --               | --                | --               | 0.007             |
| Cobalt                               | --               | --                | --                | --               | --                | --               | --                | --               | < 0.005           |
| Copper                               | --               | --                | --                | --               | --                | --               | --                | --               | 0.013             |
| Iron                                 | 4.04             | 3.29              | --                | 9.28             | --                | 40.1             | 54                | 1.14             | 3.9               |
| Lead                                 | --               | --                | --                | --               | --                | --               | --                | --               | < 0.003           |
| Magnesium                            | --               | --                | --                | --               | --                | --               | --                | --               | 140               |
| Manganese                            | 0.43             | 0.32              | --                | 1.14             | --                | 1.4              | 2.03              | 0.71             | 0.16              |
| Mercury                              | --               | --                | --                | --               | --                | --               | --                | --               | < 0.0002          |
| Molybdenum                           | --               | --                | --                | --               | --                | --               | --                | --               | < 0.005           |
| Nickel                               | --               | --                | --                | --               | --                | --               | --                | --               | 0.009             |
| Potassium                            | --               | --                | --                | --               | --                | --               | --                | --               | 3.6               |
| Radium 226,228                       | --               | --                | --                | --               | --                | --               | --                | --               | --                |
| Selenium                             | --               | --                | --                | --               | --                | --               | --                | --               | < 0.005           |
| Silicon                              | --               | --                | --                | --               | --                | --               | --                | --               | 20                |
| Silver                               | --               | --                | --                | --               | --                | --               | --                | --               | < 0.005           |
| Sodium                               | --               | --                | --                | --               | --                | --               | --                | --               | 120               |
| Uranium                              | --               | --                | 0.0108            | --               | < 0.001           | --               | --                | --               | --                |
| Zinc                                 | --               | --                | --                | --               | --                | --               | --                | --               | 0.03              |

## Notes:

Concentrations listed in milligrams per liter (mg/L).

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit

## Appendix C

## Historical Total Metals Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID<br>Date Sampled<br>Parameter | MW-046<br>6/21/98 | MW-047<br>6/1/91 | MW-049<br>6/1/91 | MW-049<br>3/20/97 | MW-049<br>6/21/98 | MW-050<br>6/1/91 | MW-050<br>9/27/91 | MW-050<br>3/20/97 | MW-050<br>6/19/98 |
|--------------------------------------|-------------------|------------------|------------------|-------------------|-------------------|------------------|-------------------|-------------------|-------------------|
| Aluminum                             | --                | --               | --               | --                | --                | --               | --                | --                | --                |
| Arsenic                              | --                | --               | --               | --                | --                | --               | < 0.05            | --                | --                |
| Barium                               | --                | --               | --               | 0.07              | --                | --               | 0.02              | 0.03              | --                |
| Boron                                | --                | --               | --               | --                | --                | --               | --                | --                | --                |
| Cadmium                              | --                | --               | --               | --                | --                | --               | --                | --                | --                |
| Calcium                              | --                | --               | --               | --                | --                | --               | --                | --                | --                |
| Chromium                             | --                | --               | --               | --                | --                | --               | --                | --                | --                |
| Cobalt                               | --                | --               | --               | --                | --                | --               | --                | --                | --                |
| Copper                               | --                | --               | --               | --                | --                | --               | --                | --                | --                |
| Iron                                 | --                | 0.16             | 2.5              | 6.8               | --                | 41.5             | 0.9               | 6.5               | --                |
| Lead                                 | --                | --               | --               | --                | --                | --               | --                | --                | --                |
| Magnesium                            | --                | --               | --               | --                | --                | --               | --                | --                | --                |
| Manganese                            | --                | 0.64             | 7.78             | 0.33              | --                | 2.14             | 0.45              | 0.64              | --                |
| Mercury                              | --                | --               | --               | --                | --                | --               | < 0.0003          | --                | --                |
| Molybdenum                           | --                | --               | --               | --                | --                | --               | --                | --                | --                |
| Nickel                               | --                | --               | --               | --                | --                | --               | --                | --                | --                |
| Potassium                            | --                | --               | --               | --                | --                | --               | --                | --                | --                |
| Radium 226,228                       | --                | --               | --               | --                | --                | --               | --                | --                | --                |
| Selenium                             | --                | --               | --               | --                | --                | --               | < 0.05            | --                | --                |
| Silicon                              | --                | --               | --               | --                | --                | --               | --                | --                | --                |
| Silver                               | --                | --               | --               | --                | --                | --               | --                | --                | --                |
| Sodium                               | --                | --               | --               | --                | --                | --               | --                | --                | --                |
| Uranium                              | 0.0013            | --               | --               | --                | 0.0336            | --               | --                | --                | 0.0962            |
| Zinc                                 | --                | --               | --               | --                | --                | --               | --                | --                | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L).

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit

## Appendix C

## Historical Total Metals Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID<br>Date Sampled<br>Parameter | MW-054<br>6/25/98 | MW-055<br>6/25/98 | MW-056<br>9/25/91 | MW-056<br>3/20/97 | MW-057<br>7/1/91 | MW-057<br>7/19/91 | MW-057<br>6/25/98 | MW-058<br>6/22/98 | MW-059<br>6/24/98 |
|--------------------------------------|-------------------|-------------------|-------------------|-------------------|------------------|-------------------|-------------------|-------------------|-------------------|
| Aluminum                             | --                | --                | --                | --                | --               | 1.4               | --                | --                | --                |
| Arsenic                              | --                | --                | --                | --                | --               | < 0.005           | --                | --                | --                |
| Barium                               | --                | --                | 0.68              | 0.66              | 0.15             | --                | --                | --                | --                |
| Boron                                | --                | --                | --                | --                | --               | < 0.5             | --                | --                | --                |
| Cadmium                              | --                | --                | --                | --                | --               | < 0.001           | --                | --                | --                |
| Calcium                              | --                | --                | --                | --                | --               | --                | --                | --                | --                |
| Chromium                             | --                | --                | --                | --                | --               | < 0.02            | --                | --                | --                |
| Cobalt                               | --                | --                | --                | --                | --               | < 0.05            | --                | --                | --                |
| Copper                               | --                | --                | --                | --                | --               | < 0.02            | --                | --                | --                |
| Iron                                 | --                | --                | 11.7              | 28                | < 0.05           | --                | --                | --                | --                |
| Lead                                 | --                | --                | --                | --                | --               | 0.003             | --                | --                | --                |
| Magnesium                            | --                | --                | --                | --                | --               | --                | --                | --                | --                |
| Manganese                            | --                | --                | 0.17              | 0.24              | < 0.01           | --                | --                | --                | --                |
| Mercury                              | --                | --                | --                | --                | --               | < 0.001           | --                | --                | --                |
| Molybdenum                           | --                | --                | --                | --                | --               | < 0.05            | --                | --                | --                |
| Nickel                               | --                | --                | --                | --                | --               | < 0.05            | --                | --                | --                |
| Potassium                            | --                | --                | --                | --                | --               | --                | --                | --                | --                |
| Radium 226,228                       | --                | --                | --                | --                | --               | --                | --                | --                | --                |
| Selenium                             | --                | --                | --                | --                | --               | < 0.005           | --                | --                | --                |
| Silicon                              | --                | --                | --                | --                | --               | --                | --                | --                | --                |
| Silver                               | --                | --                | --                | --                | --               | < 0.02            | --                | --                | --                |
| Sodium                               | --                | --                | --                | --                | --               | --                | --                | --                | --                |
| Uranium                              | 0.0452            | 0.0026            | --                | --                | --               | --                | < 0.001           | < 0.001           | 0.0011            |
| Zinc                                 | --                | --                | --                | --                | --               | 0.04              | --                | --                | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L).

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit

## Appendix C

## Historical Total Metals Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID<br>Date Sampled<br>Parameter | MW-060<br>7/1/91 | MW-060<br>7/19/91 | MW-060<br>3/19/97 | MW-060<br>6/21/98 | MW-061<br>6/18/98 | MW-061A<br>7/1/91 | MW-061A<br>7/19/91 | MW-061A<br>9/27/91 | MW-061A<br>6/18/98 |
|--------------------------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|--------------------|--------------------|
| Aluminum                             | --               | 0.51              | --                | --                | --                | --                | 1.8                | --                 | --                 |
| Arsenic                              | --               | < 0.005           | --                | --                | --                | --                | < 0.005            | --                 | --                 |
| Barium                               | 0.04             | --                | 0.03              | --                | --                | 0.13              | --                 | 0.02               | --                 |
| Boron                                | --               | < 0.5             | --                | --                | --                | --                | < 0.5              | --                 | --                 |
| Cadmium                              | --               | < 0.001           | --                | --                | --                | --                | < 0.001            | --                 | --                 |
| Calcium                              | --               | --                | --                | --                | --                | --                | --                 | --                 | --                 |
| Chromium                             | --               | < 0.02            | --                | --                | --                | --                | < 0.02             | --                 | --                 |
| Cobalt                               | --               | < 0.05            | --                | --                | --                | --                | < 0.05             | --                 | --                 |
| Copper                               | --               | < 0.02            | --                | --                | --                | --                | < 0.02             | --                 | --                 |
| Iron                                 | < 0.05           | --                | 0.67              | --                | --                | < 0.05            | --                 | 0.22               | --                 |
| Lead                                 | --               | 0.004             | --                | --                | --                | --                | 0.005              | --                 | --                 |
| Magnesium                            | --               | --                | --                | --                | --                | --                | --                 | --                 | --                 |
| Manganese                            | 0.05             | --                | 0.03              | --                | --                | 0.13              | --                 | 0.15               | --                 |
| Mercury                              | --               | < 0.001           | --                | --                | --                | --                | < 0.001            | --                 | --                 |
| Molybdenum                           | --               | < 0.05            | --                | --                | --                | --                | < 0.05             | --                 | --                 |
| Nickel                               | --               | < 0.05            | --                | --                | --                | --                | < 0.05             | --                 | --                 |
| Potassium                            | --               | --                | --                | --                | --                | --                | --                 | --                 | --                 |
| Radium 226,228                       | --               | --                | --                | --                | --                | --                | --                 | --                 | --                 |
| Selenium                             | --               | < 0.005           | --                | --                | --                | --                | < 0.005            | --                 | --                 |
| Silicon                              | --               | --                | --                | --                | --                | --                | --                 | --                 | --                 |
| Silver                               | --               | < 0.02            | --                | --                | --                | --                | < 0.02             | --                 | --                 |
| Sodium                               | --               | --                | --                | --                | --                | --                | --                 | --                 | --                 |
| Uranium                              | --               | --                | --                | 0.0039            | < 0.001           | --                | --                 | --                 | < 0.001            |
| Zinc                                 | --               | 0.04              | --                | --                | --                | --                | 0.03               | --                 | --                 |

## Notes:

Concentrations listed in milligrams per liter (mg/L).

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit

## Appendix C

## Historical Total Metals Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID<br>Date Sampled<br>Parameter | MW-062<br>9/26/91 | MW-062<br>6/26/98 | MW-063<br>6/25/98 | MW-064<br>6/23/98 | MW-065A<br>6/25/98 | MW-066<br>6/17/98 | MW-067<br>6/24/98 | MW-068<br>6/26/98 | MW-069<br>6/29/98 |
|--------------------------------------|-------------------|-------------------|-------------------|-------------------|--------------------|-------------------|-------------------|-------------------|-------------------|
| Aluminum                             | --                | --                | --                | --                | --                 | --                | --                | --                | --                |
| Arsenic                              | --                | --                | --                | --                | --                 | --                | --                | --                | --                |
| Barium                               | 2.85              | --                | --                | --                | --                 | --                | --                | --                | --                |
| Boron                                | --                | --                | --                | --                | --                 | --                | --                | --                | --                |
| Cadmium                              | --                | --                | --                | --                | --                 | --                | --                | --                | --                |
| Calcium                              | --                | --                | --                | --                | --                 | --                | --                | --                | --                |
| Chromium                             | --                | --                | --                | --                | --                 | --                | --                | --                | --                |
| Cobalt                               | --                | --                | --                | --                | --                 | --                | --                | --                | --                |
| Copper                               | --                | --                | --                | --                | --                 | --                | --                | --                | --                |
| Iron                                 | 4.81              | --                | --                | --                | --                 | --                | --                | --                | --                |
| Lead                                 | --                | --                | --                | --                | --                 | --                | --                | --                | --                |
| Magnesium                            | --                | --                | --                | --                | --                 | --                | --                | --                | --                |
| Manganese                            | 0.81              | --                | --                | --                | --                 | --                | --                | --                | --                |
| Mercury                              | --                | --                | --                | --                | --                 | --                | --                | --                | --                |
| Molybdenum                           | --                | --                | --                | --                | --                 | --                | --                | --                | --                |
| Nickel                               | --                | --                | --                | --                | --                 | --                | --                | --                | --                |
| Potassium                            | --                | --                | --                | --                | --                 | --                | --                | --                | --                |
| Radium 226,228                       | --                | --                | --                | --                | --                 | --                | --                | --                | --                |
| Selenium                             | --                | --                | --                | --                | --                 | --                | --                | --                | --                |
| Silicon                              | --                | --                | --                | --                | --                 | --                | --                | --                | --                |
| Silver                               | --                | --                | --                | --                | --                 | --                | --                | --                | --                |
| Sodium                               | --                | --                | --                | --                | --                 | --                | --                | --                | --                |
| Uranium                              | --                | < 0.001           | 0.0011            | 0.001             | < 0.001            | 0.0018            | < 0.001           | < 0.001           | < 0.001           |
| Zinc                                 | --                | --                | --                | --                | --                 | --                | --                | --                | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L).

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit

# Appendix C

## Historical Total Metals Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID<br>Date Sampled<br>Parameter | MW-070<br>6/16/98 | MW-071<br>6/19/98 | MW-072<br>6/30/98 | MW-073<br>6/30/98 | MW-074<br>6/24/98 | MW-075<br>6/30/98 | MW-076<br>6/29/98 | MW-078<br>6/19/98 | MW-081<br>6/29/98 |
|--------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Aluminum                             | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Arsenic                              | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Barium                               | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Boron                                | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Cadmium                              | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Calcium                              | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Chromium                             | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Cobalt                               | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Copper                               | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Iron                                 | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Lead                                 | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Magnesium                            | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Manganese                            | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Mercury                              | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Molybdenum                           | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Nickel                               | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Potassium                            | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Radium 226,228                       | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Selenium                             | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Silicon                              | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Silver                               | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Sodium                               | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Uranium                              | 0.0016            | 0.0018            | 0.0028            | 0.0201            | < 0.001           | 0.0016            | 0.0013            | 0.0017            | < 0.001           |
| Zinc                                 | --                | --                | --                | --                | --                | --                | --                | --                | --                |

### Notes:

Concentrations listed in milligrams per liter (mg/L).

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit

## Appendix C

## Historical Total Metals Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID<br>Date Sampled<br>Parameter | MW-082<br>6/25/98 | MW-083<br>6/25/98 | MW-084<br>6/23/98 | MW-085<br>6/23/98 | MW-086<br>6/26/98 | MW-087<br>6/19/98 | MW-087A<br>6/19/98 | MW-088<br>6/18/98 |
|--------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|-------------------|
| Aluminum                             | --                | --                | --                | --                | --                | --                | --                 | --                |
| Arsenic                              | --                | --                | --                | --                | --                | --                | --                 | --                |
| Barium                               | --                | --                | --                | --                | --                | --                | --                 | --                |
| Boron                                | --                | --                | --                | --                | --                | --                | --                 | --                |
| Cadmium                              | --                | --                | --                | --                | --                | --                | --                 | --                |
| Calcium                              | --                | --                | --                | --                | --                | --                | --                 | --                |
| Chromium                             | --                | --                | --                | --                | --                | --                | --                 | --                |
| Cobalt                               | --                | --                | --                | --                | --                | --                | --                 | --                |
| Copper                               | --                | --                | --                | --                | --                | --                | --                 | --                |
| Iron                                 | --                | --                | --                | --                | --                | --                | --                 | --                |
| Lead                                 | --                | --                | --                | --                | --                | --                | --                 | --                |
| Magnesium                            | --                | --                | --                | --                | --                | --                | --                 | --                |
| Manganese                            | --                | --                | --                | --                | --                | --                | --                 | --                |
| Mercury                              | --                | --                | --                | --                | --                | --                | --                 | --                |
| Molybdenum                           | --                | --                | --                | --                | --                | --                | --                 | --                |
| Nickel                               | --                | --                | --                | --                | --                | --                | --                 | --                |
| Potassium                            | --                | --                | --                | --                | --                | --                | --                 | --                |
| Radium 226,228                       | --                | --                | --                | --                | --                | --                | --                 | --                |
| Selenium                             | --                | --                | --                | 20.5              | --                | --                | 23                 | --                |
| Silicon                              | --                | --                | --                | --                | --                | --                | --                 | --                |
| Silver                               | --                | --                | --                | --                | --                | --                | --                 | --                |
| Sodium                               | --                | --                | --                | --                | --                | --                | --                 | --                |
| Uranium                              | 0.0014            | 0.0016            | 0.0018            | < 0.001           | 0.0027            | 0.0015            | 0.0064             | < 0.001           |
| Zinc                                 | --                | --                | --                | --                | --                | --                | --                 | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L).

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit

## Appendix C

## Historical Total Metals Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID<br>Date Sampled<br>Parameter | MW-089<br>6/17/98 | MW-090<br>6/17/98 | MW-094<br>6/26/98 | MW-095<br>6/22/98 | MW-096<br>6/21/98 | MW-097<br>6/21/98 | MW-098<br>6/29/98 | MW-104<br>7/17/97 | MW-104<br>6/21/98 |
|--------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Aluminum                             | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Arsenic                              | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Barium                               | --                | --                | 0.05              | --                | --                | --                | --                | --                | 0.08              |
| Boron                                | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Cadmium                              | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Calcium                              | --                | --                | --                | --                | --                | --                | --                | 126               | --                |
| Chromium                             | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Cobalt                               | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Copper                               | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Iron                                 | --                | --                | 0.09              | --                | --                | --                | --                | --                | 0.73              |
| Lead                                 | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Magnesium                            | --                | --                | --                | --                | --                | --                | --                | 47.6              | --                |
| Manganese                            | --                | --                | 0.04              | --                | --                | --                | --                | --                | 0.18              |
| Mercury                              | --                | --                | --                | --                | --                | --                | --                | < 0.0003          | --                |
| Molybdenum                           | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Nickel                               | --                | --                | --                | --                | --                | --                | --                | < 1               | --                |
| Potassium                            | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Radium 226,228                       | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Selenium                             | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Silicon                              | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Silver                               | --                | --                | --                | --                | --                | --                | --                | --                | --                |
| Sodium                               | --                | --                | --                | --                | --                | --                | --                | 11.1              | --                |
| Uranium                              | 0.0015            | 0.0031            | 0.0019            | 0.0017            | 0.0028            | 0.0021            | 0.0012            | --                | 0.002             |
| Zinc                                 | --                | --                | --                | --                | --                | --                | --                | --                | --                |

## Notes:

Concentrations listed in milligrams per liter (mg/L).

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit

## Appendix C

## Historical Total Metals Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID<br>Date Sampled<br>Parameter | MW-106<br>6/18/98 | MW-108<br>7/17/97 | MW-108<br>6/22/98 | MW-110<br>6/30/98 | MW-111<br>6/29/98 | PIPELINE_4<br>5/28/91 | PIPELINE_4<br>8/2/91 | SW-01<br>7/19/91 | SW-01<br>12/10/97 |
|--------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|----------------------|------------------|-------------------|
| Aluminum                             | --                | --                | --                | --                | --                | 0.05                  | --                   | 0.14             | < 0.05            |
| Arsenic                              | --                | --                | --                | --                | --                | < 0.1                 | --                   | < 0.005          | < 0.005           |
| Barium                               | 0.03              | --                | 0.029             | --                | --                | --                    | 0.18                 | --               | --                |
| Boron                                | --                | --                | --                | --                | --                | 2.13                  | --                   | < 0.5            | 0.044             |
| Cadmium                              | --                | --                | --                | --                | --                | < 0.005               | --                   | 0.004            | < 0.002           |
| Calcium                              | --                | 88.7              | --                | --                | --                | --                    | --                   | --               | --                |
| Chromium                             | --                | --                | --                | --                | --                | < 0.01                | --                   | < 0.02           | < 0.005           |
| Cobalt                               | --                | --                | --                | --                | --                | < 0.03                | --                   | < 0.05           | < 0.005           |
| Copper                               | --                | --                | --                | --                | --                | 0.01                  | --                   | < 0.02           | 0.38              |
| Iron                                 | < 0.05            | --                | 0.062             | --                | --                | 0.75                  | 0.5                  | --               | --                |
| Lead                                 | --                | --                | --                | --                | --                | < 0.05                | --                   | < 0.001          | < 0.005           |
| Magnesium                            | --                | 34.6              | --                | --                | --                | --                    | --                   | --               | --                |
| Manganese                            | 0.02              | --                | 0.005             | --                | --                | 0.4                   | 0.34                 | --               | --                |
| Mercury                              | --                | < 0.001           | < 0.0002          | --                | --                | --                    | --                   | --               | --                |
| Molybdenum                           | --                | --                | --                | --                | --                | < 0.05                | --                   | < 0.05           | < 0.005           |
| Nickel                               | --                | --                | --                | --                | --                | < 0.04                | --                   | < 0.05           | < 0.005           |
| Potassium                            | --                | 1.5               | --                | --                | --                | --                    | --                   | --               | --                |
| Radium 226,228                       | --                | --                | --                | --                | --                | --                    | --                   | --               | --                |
| Selenium                             | --                | --                | --                | --                | --                | < 0.1                 | --                   | < 0.005          | < 0.005           |
| Silicon                              | --                | --                | --                | --                | --                | --                    | --                   | --               | --                |
| Silver                               | --                | --                | --                | --                | --                | < 0.01                | --                   | < 0.02           | < 0.005           |
| Sodium                               | --                | 4.9               | --                | --                | --                | --                    | --                   | --               | --                |
| Uranium                              | 0.0035            | --                | < 0.001           | 0.002             | 0.003             | --                    | --                   | --               | --                |
| Zinc                                 | --                | --                | --                | --                | --                | < 0.01                | --                   | < 0.02           | < 0.005           |

## Notes:

Concentrations listed in milligrams per liter (mg/L).

-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit

# Appendix C

## Historical Total Metals Analytical Data

May 1991 - October 1998

Marathon Oil Company, Indian Basin Remediation Project, Eddy County, New Mexico

| Well ID<br>Date Sampled<br>Parameter | SW-01<br>6/30/98 | SW-02<br>6/24/98 | SW-03<br>6/24/98 | UIHS_ARROYO<br>6/26/98 |
|--------------------------------------|------------------|------------------|------------------|------------------------|
| Aluminum                             | --               | --               | --               | --                     |
| Arsenic                              | --               | --               | --               | --                     |
| Barium                               | --               | --               | --               | --                     |
| Boron                                | --               | --               | --               | --                     |
| Cadmium                              | --               | --               | --               | --                     |
| Calcium                              | --               | --               | --               | --                     |
| Chromium                             | --               | --               | --               | --                     |
| Cobalt                               | --               | --               | --               | --                     |
| Copper                               | --               | --               | --               | --                     |
| Iron                                 | --               | --               | --               | --                     |
| Lead                                 | --               | --               | --               | --                     |
| Magnesium                            | --               | --               | --               | --                     |
| Manganese                            | --               | --               | --               | --                     |
| Mercury                              | --               | --               | --               | --                     |
| Molybdenum                           | --               | --               | --               | --                     |
| Nickel                               | --               | --               | --               | --                     |
| Potassium                            | --               | --               | --               | --                     |
| Radium 226,228                       | --               | --               | --               | --                     |
| Selenium                             | --               | --               | --               | --                     |
| Silicon                              | --               | --               | --               | --                     |
| Silver                               | --               | --               | --               | --                     |
| Sodium                               | --               | --               | --               | --                     |
| Uranium                              | 0.0015           | < 0.001          | 0.0016           | < 0.001                |
| Zinc                                 | --               | --               | --               | --                     |

### Notes:

Concentrations listed in milligrams per liter (mg/L).

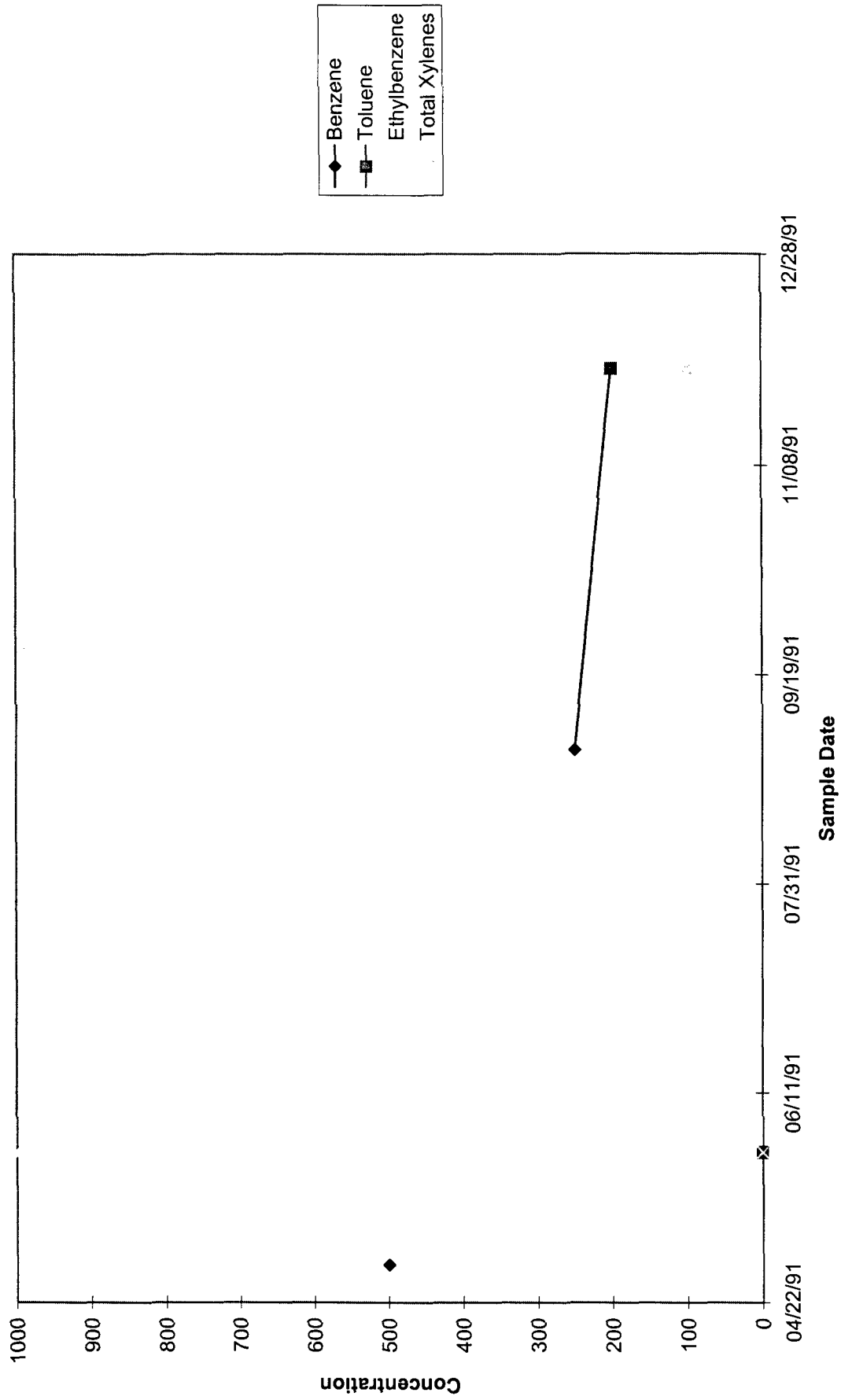
-- Not analyzed or not reported.

&lt; Constituent not detected above noted laboratory detection limit

## **Appendix D**

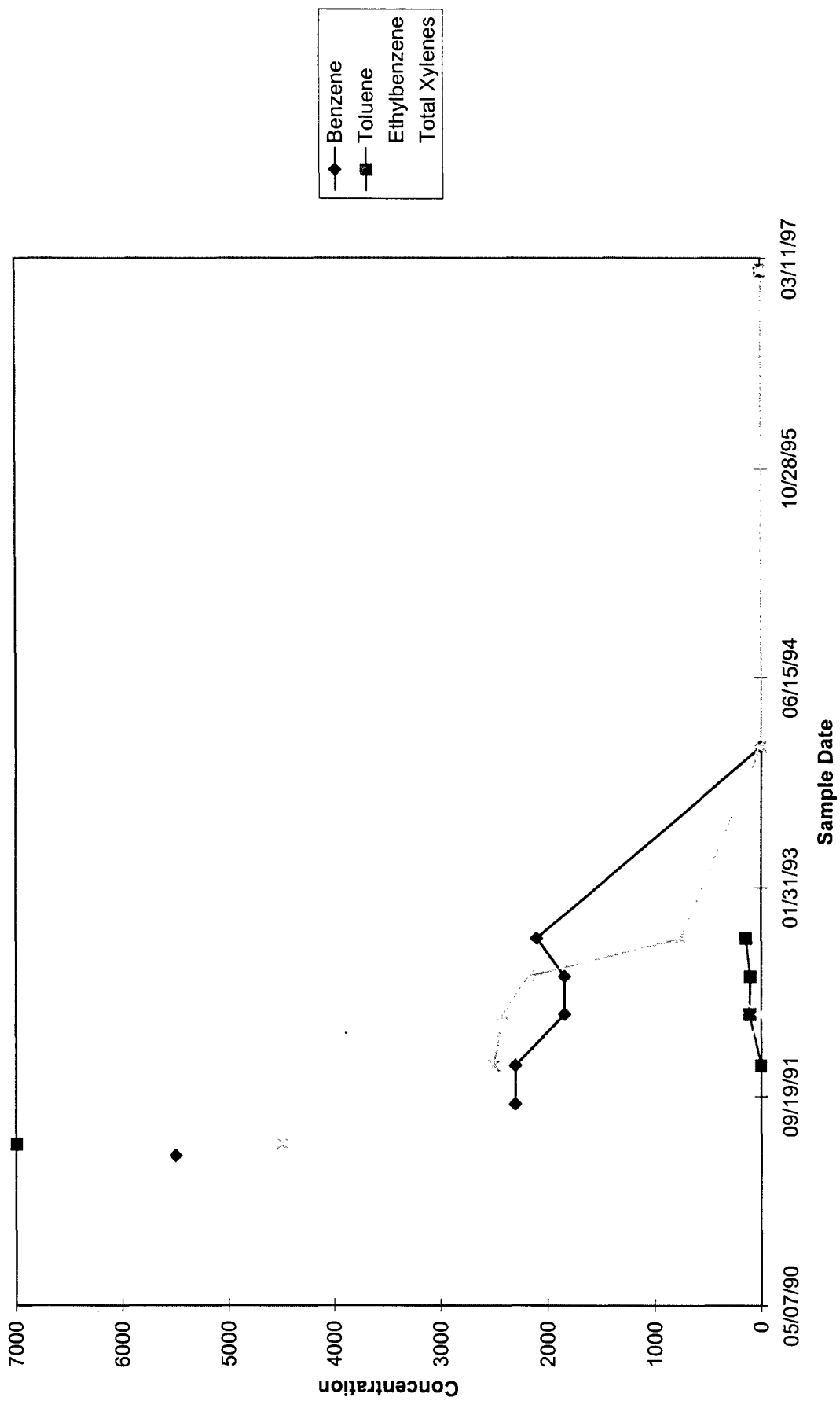
BTEX Concentration Trend Plots

MW-1



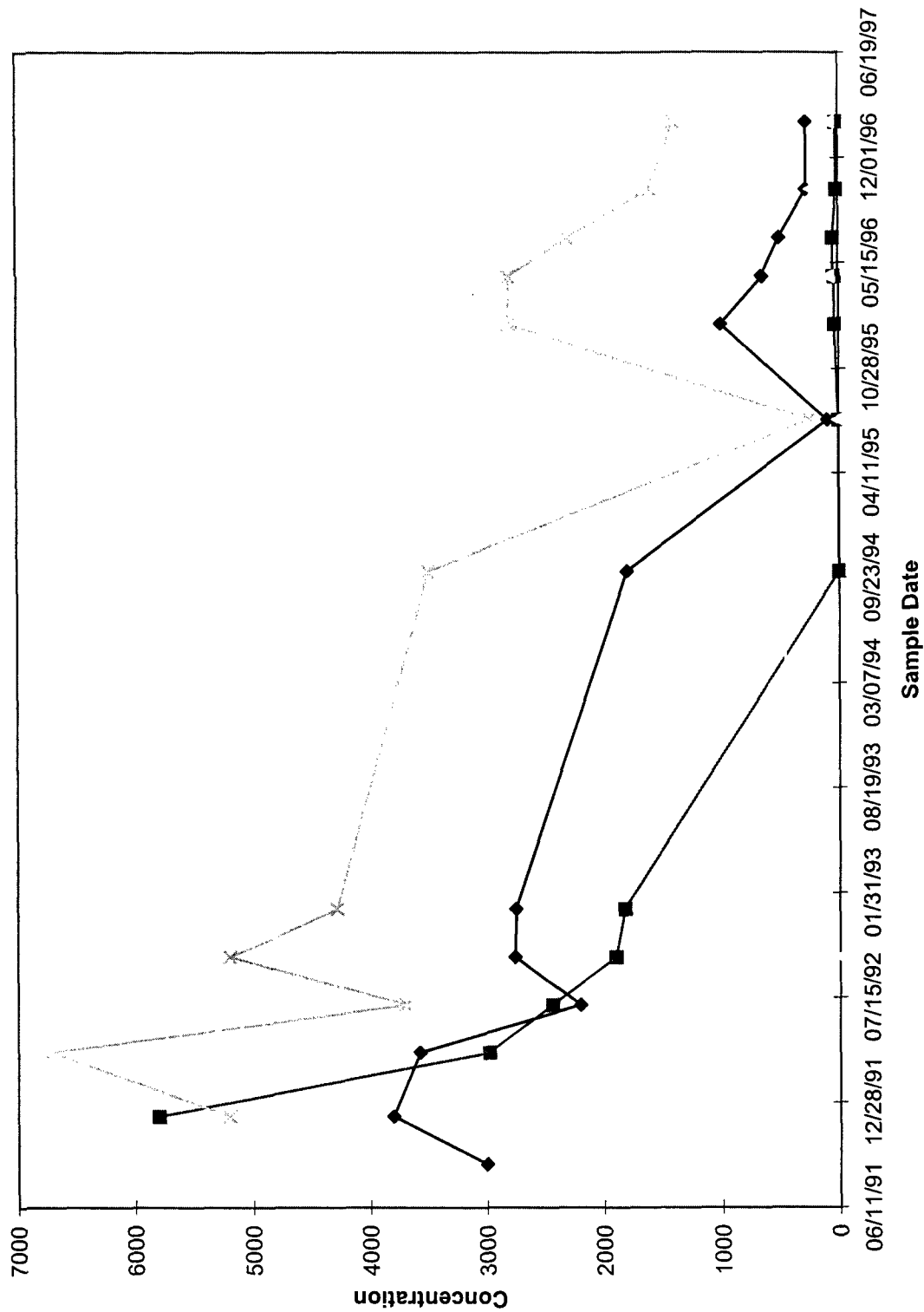
\*Concentrations in micrograms per liter (ug/L)

# MW-10



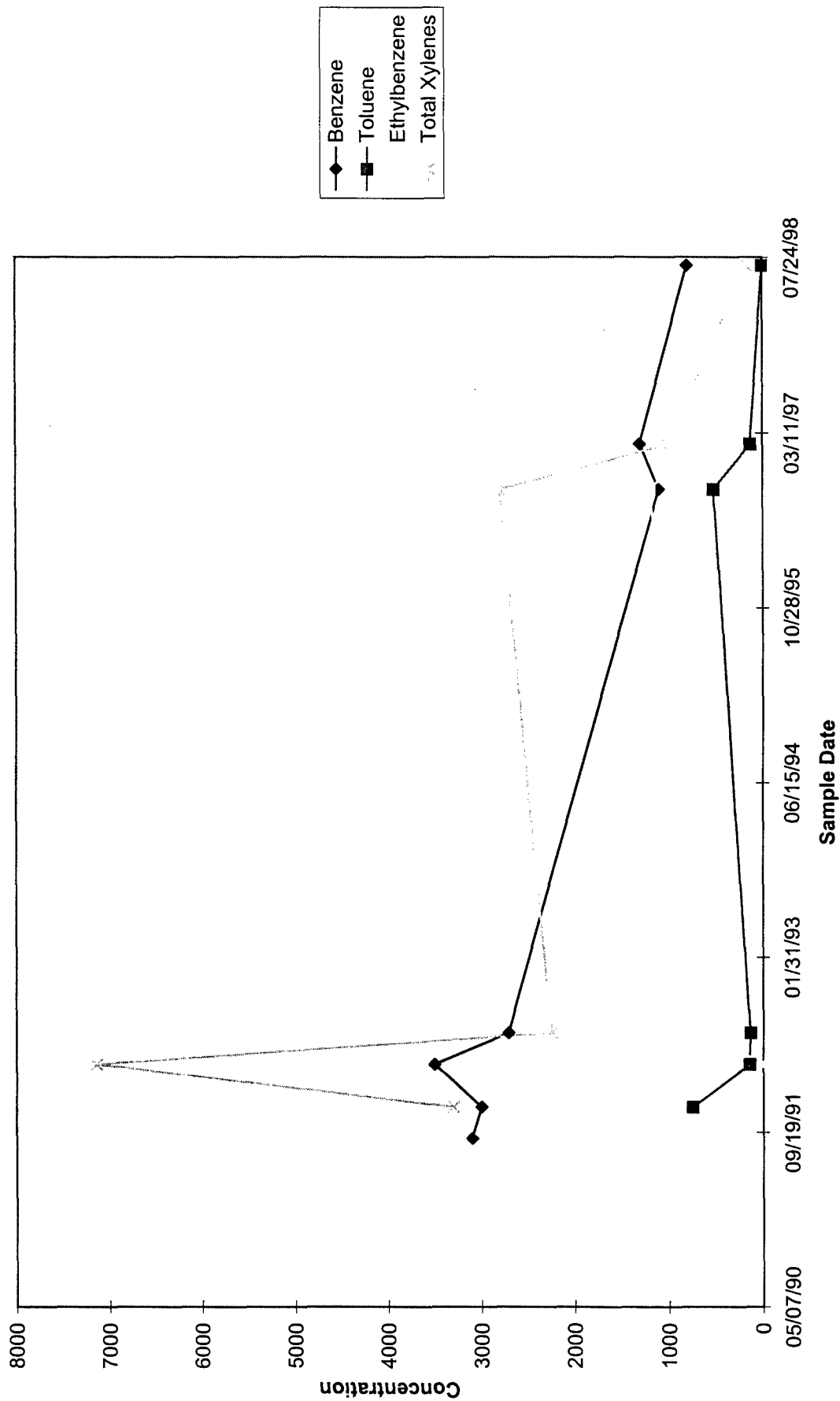
\*Concentrations in micrograms per liter (ug/L)

# MW-11



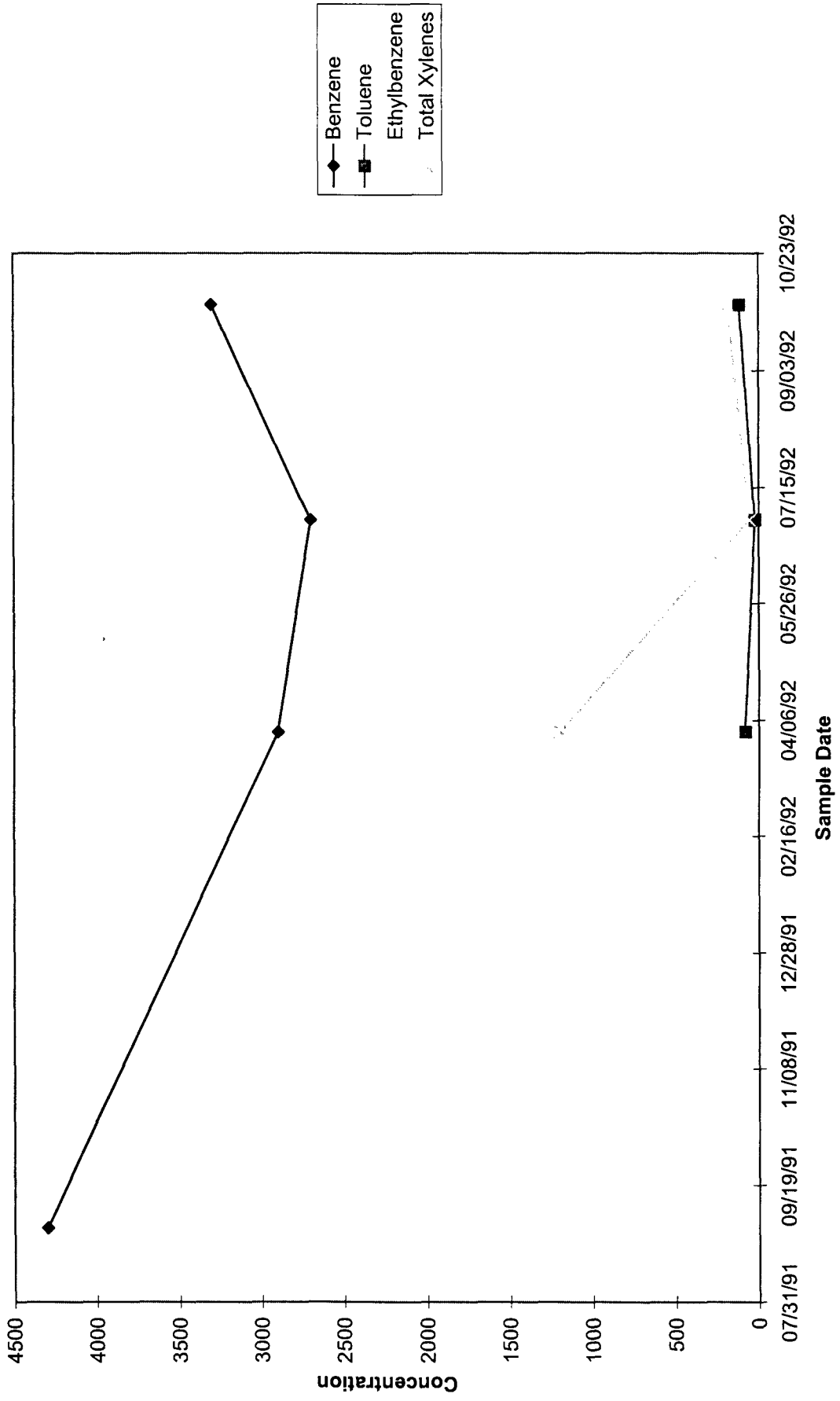
\*Concentrations in micrograms per liter (ug/L)

# MW-13



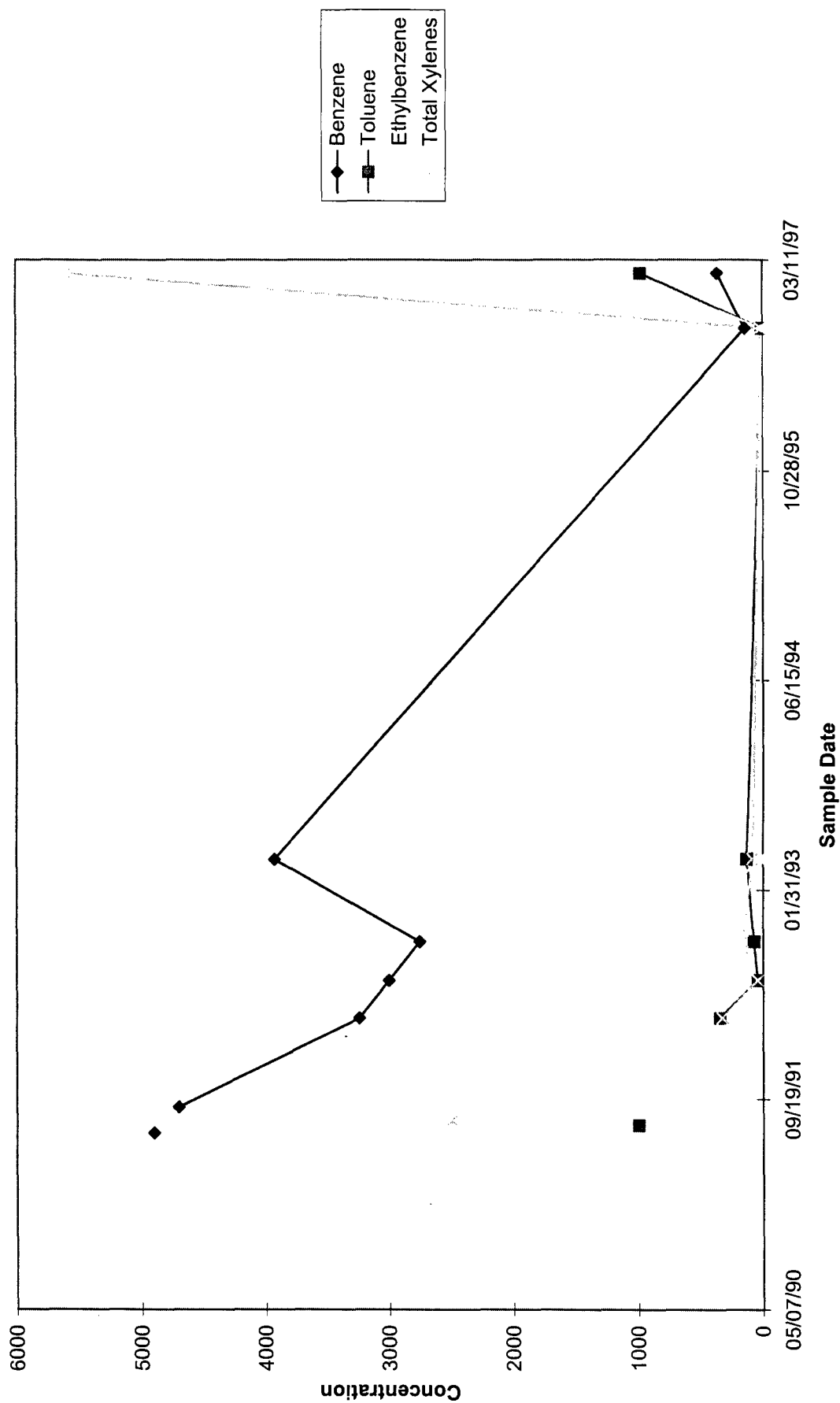
\*Concentrations in micrograms per liter (ug/L)

# MW-18



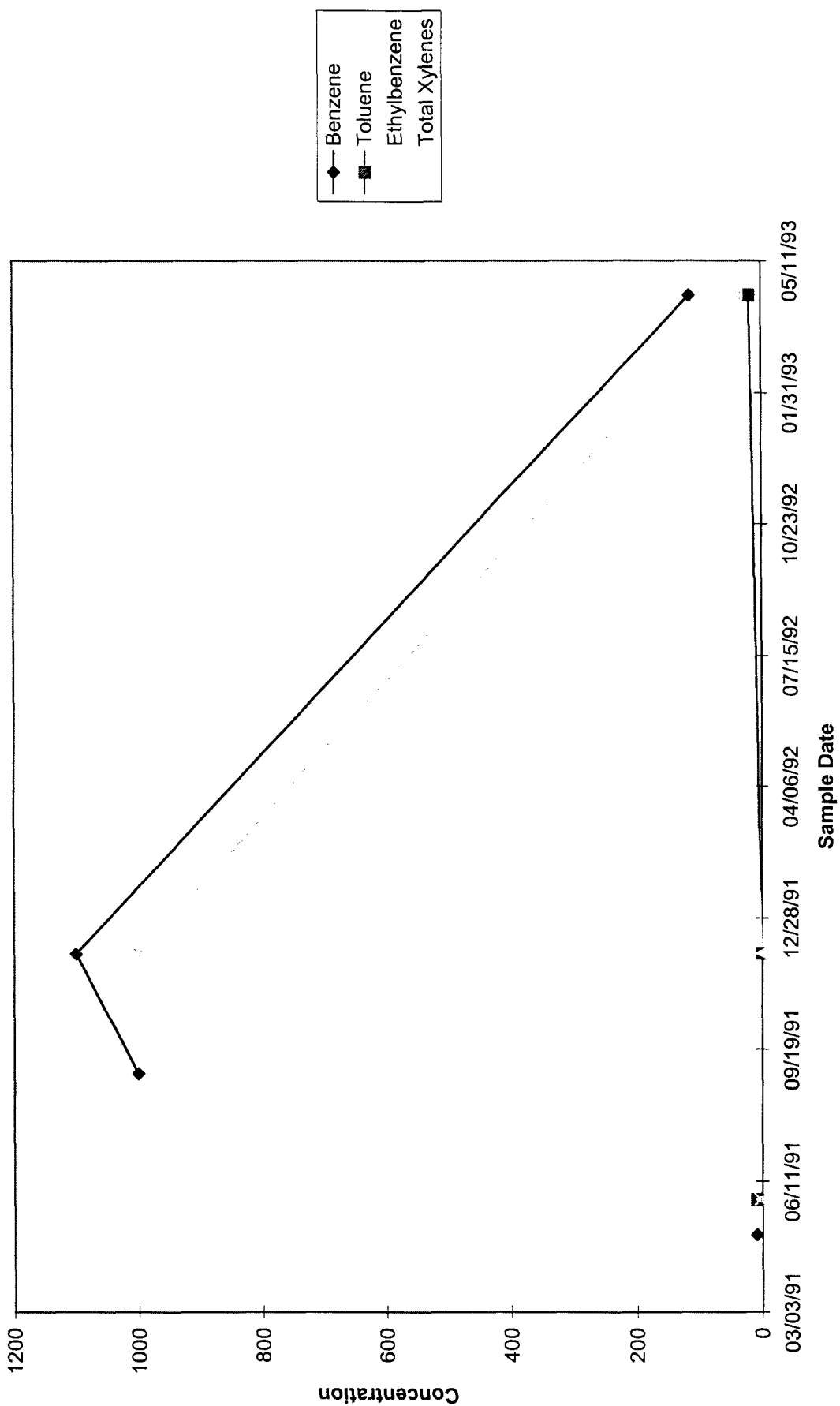
\*Concentrations in micrograms per liter (ug/L)

# MW-19



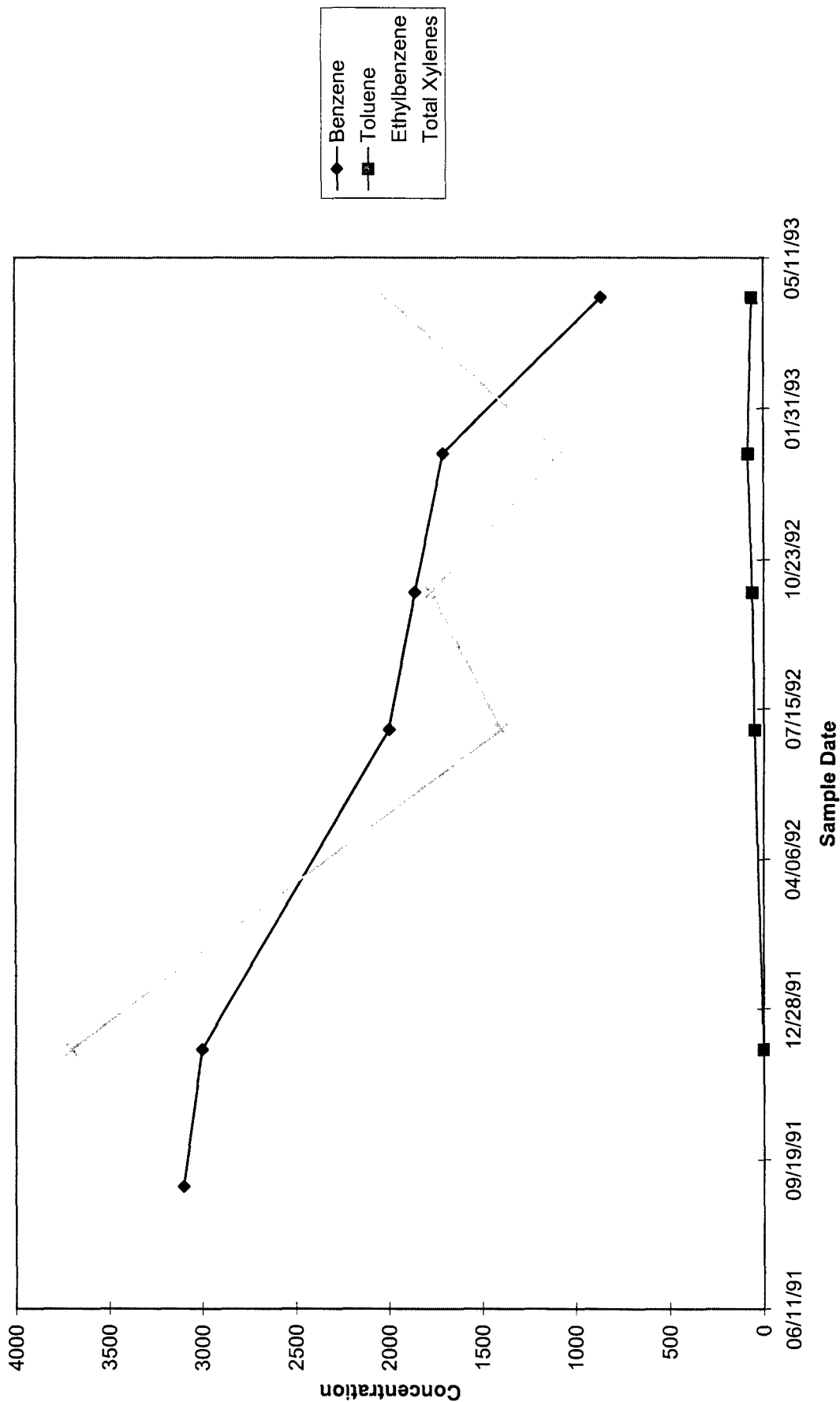
\*Concentrations in micrograms per liter (ug/L)

# MW-21



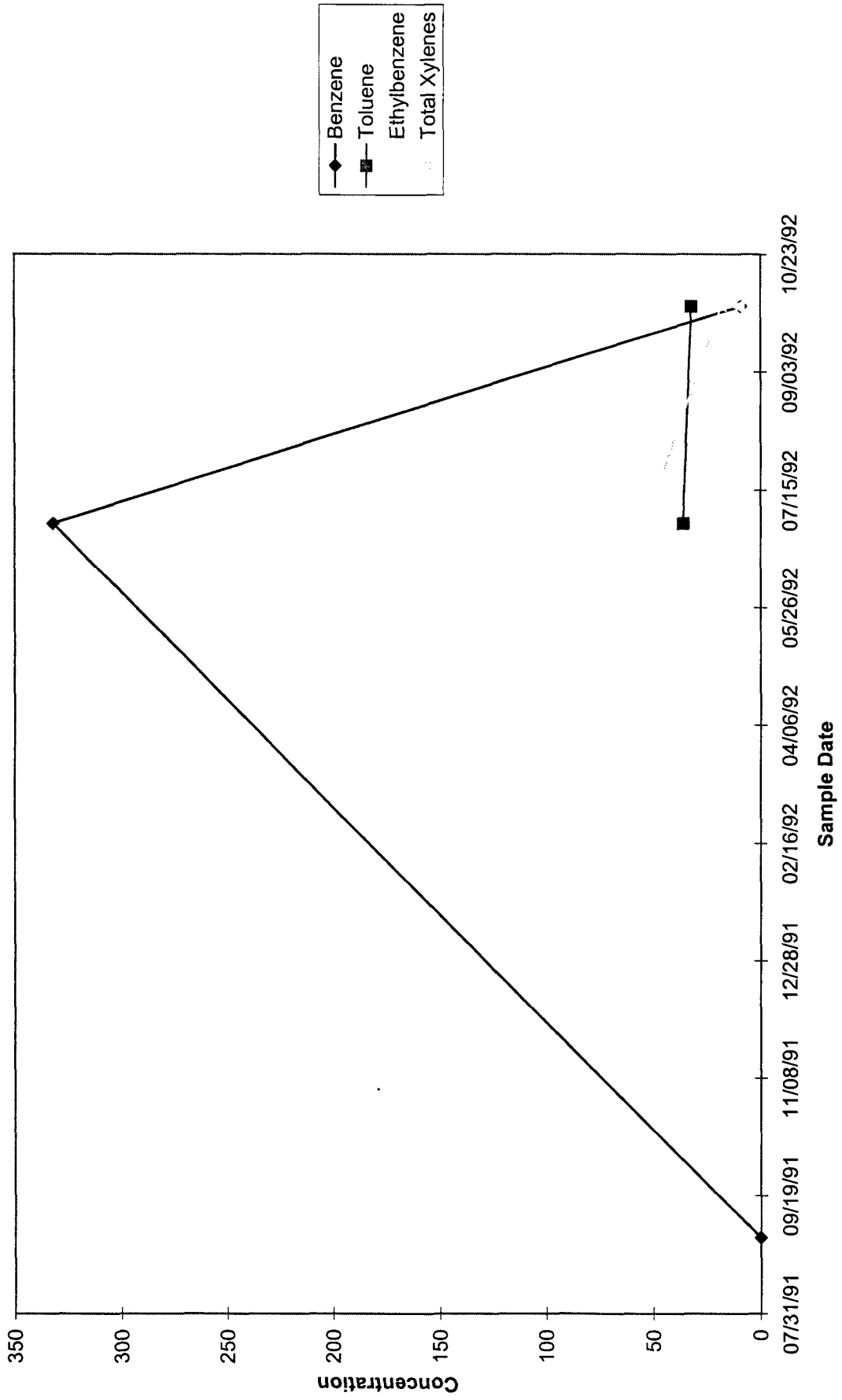
\*Concentrations in micrograms per liter (ug/L)

# MW-26



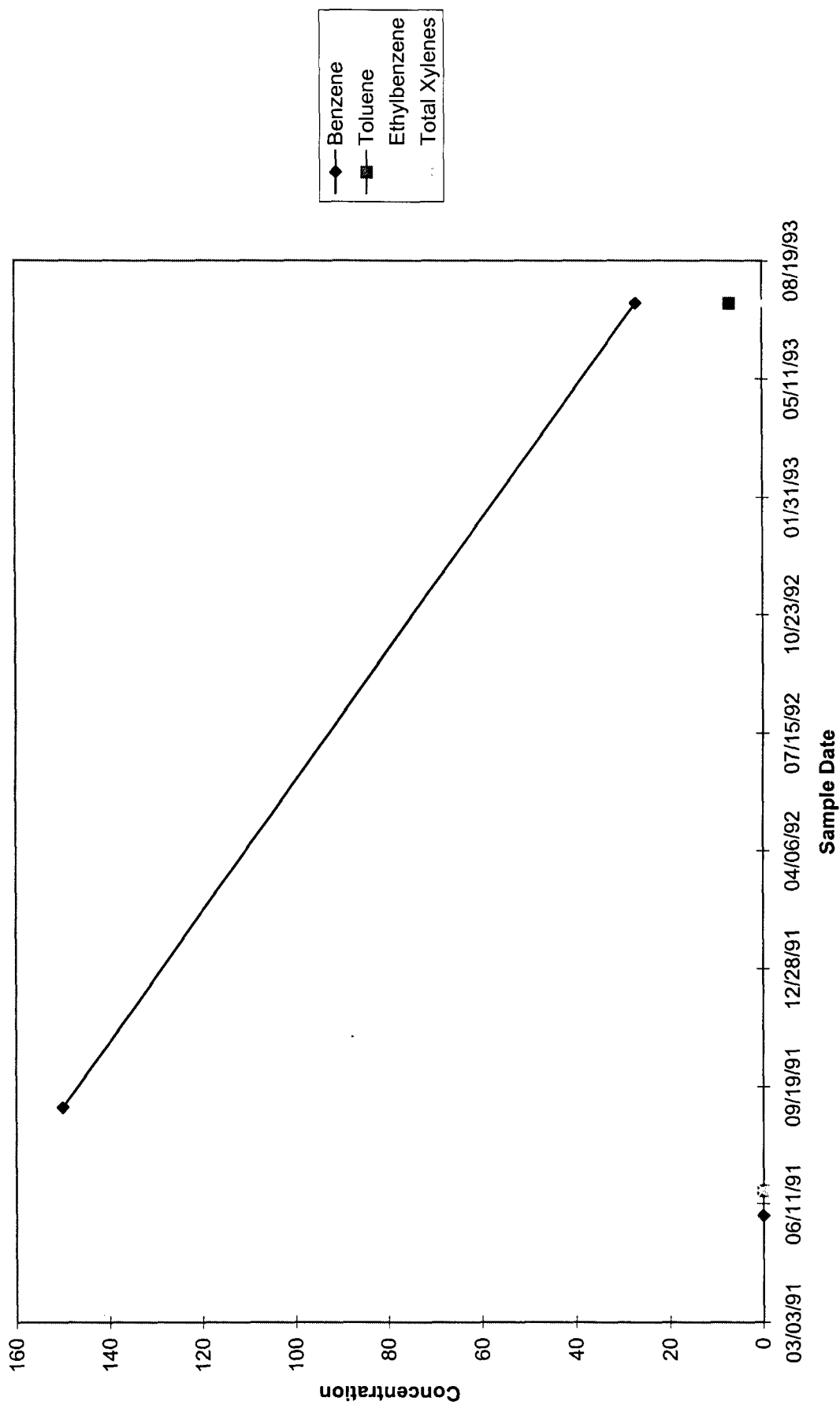
\*Concentrations in micrograms per liter (ug/L)

# MW-31



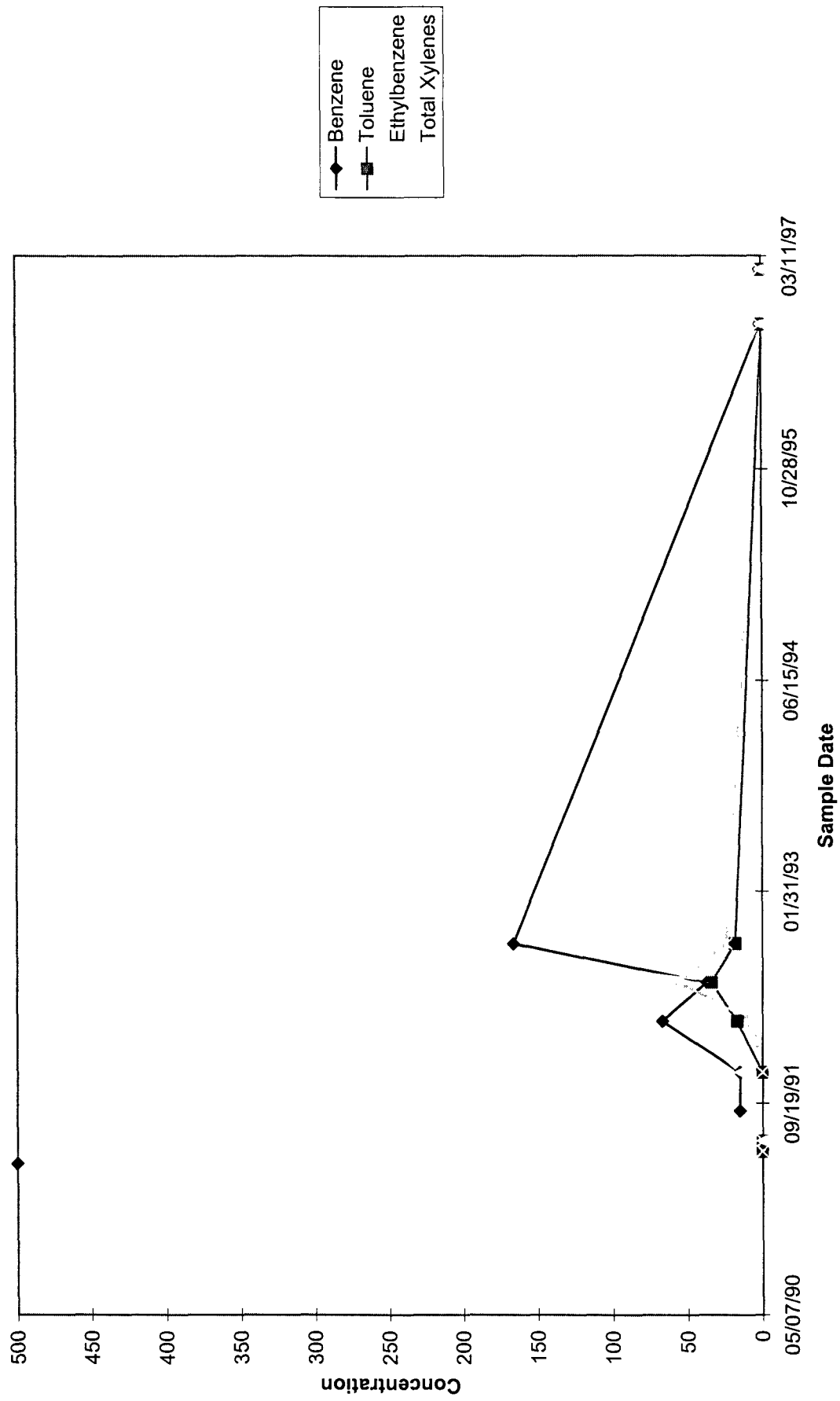
\*Concentrations in micrograms per liter (ug/L)

# MW-37



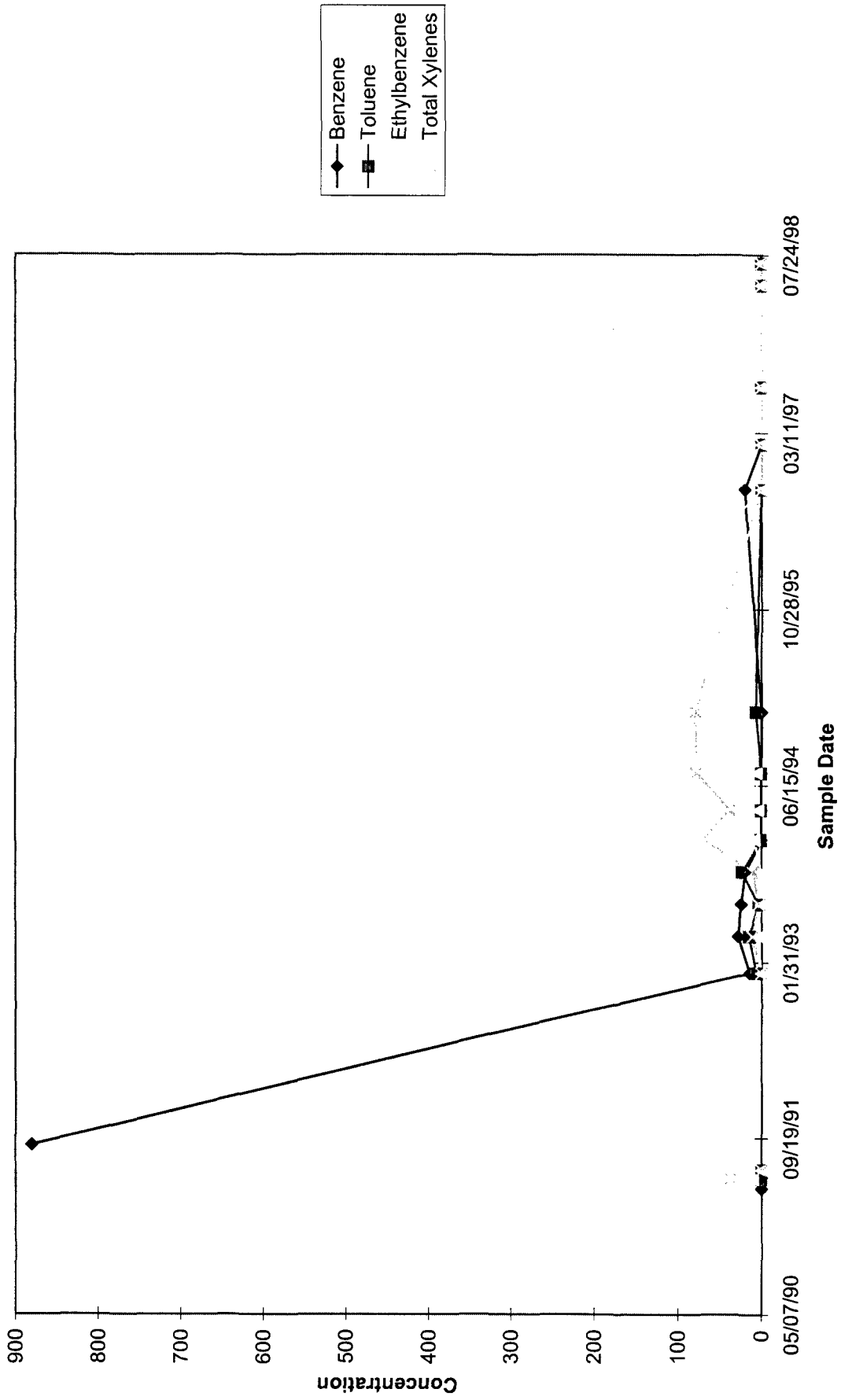
\*Concentrations in micrograms per liter (ug/L)

# MW-38



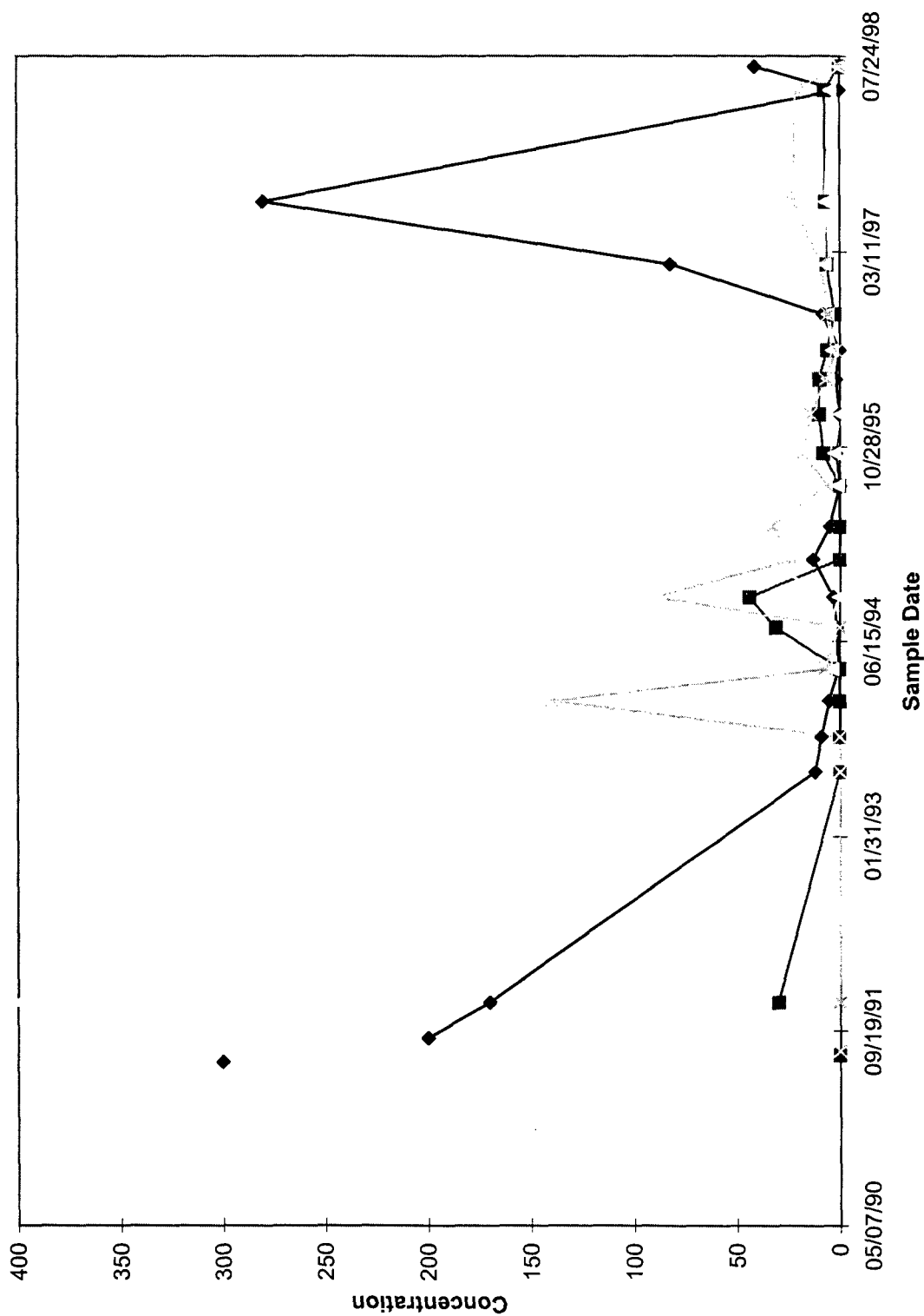
\*Concentrations in micrograms per liter (ug/L)

# MW-39



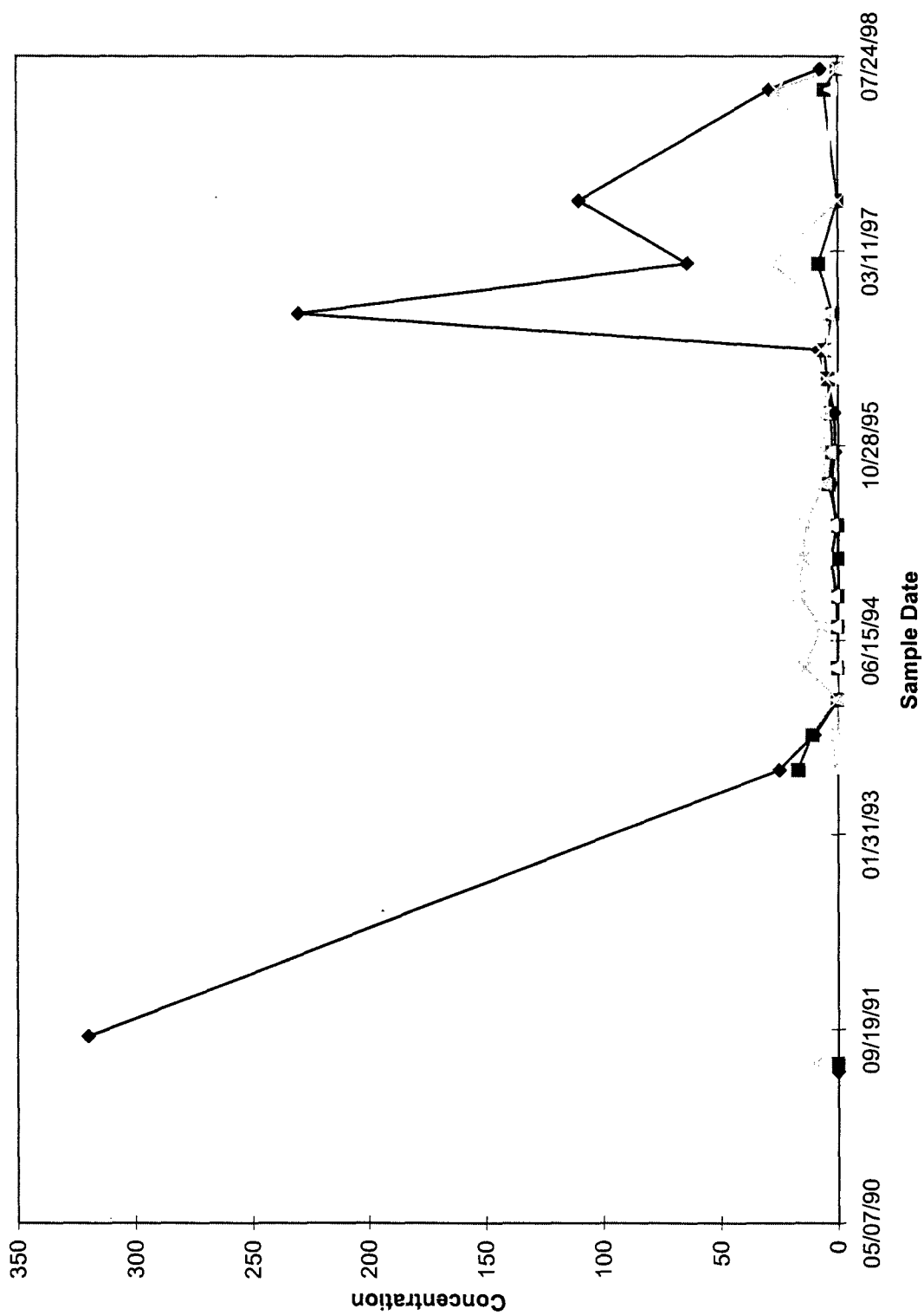
\*Concentrations in micrograms per liter (ug/L)

# MW-41



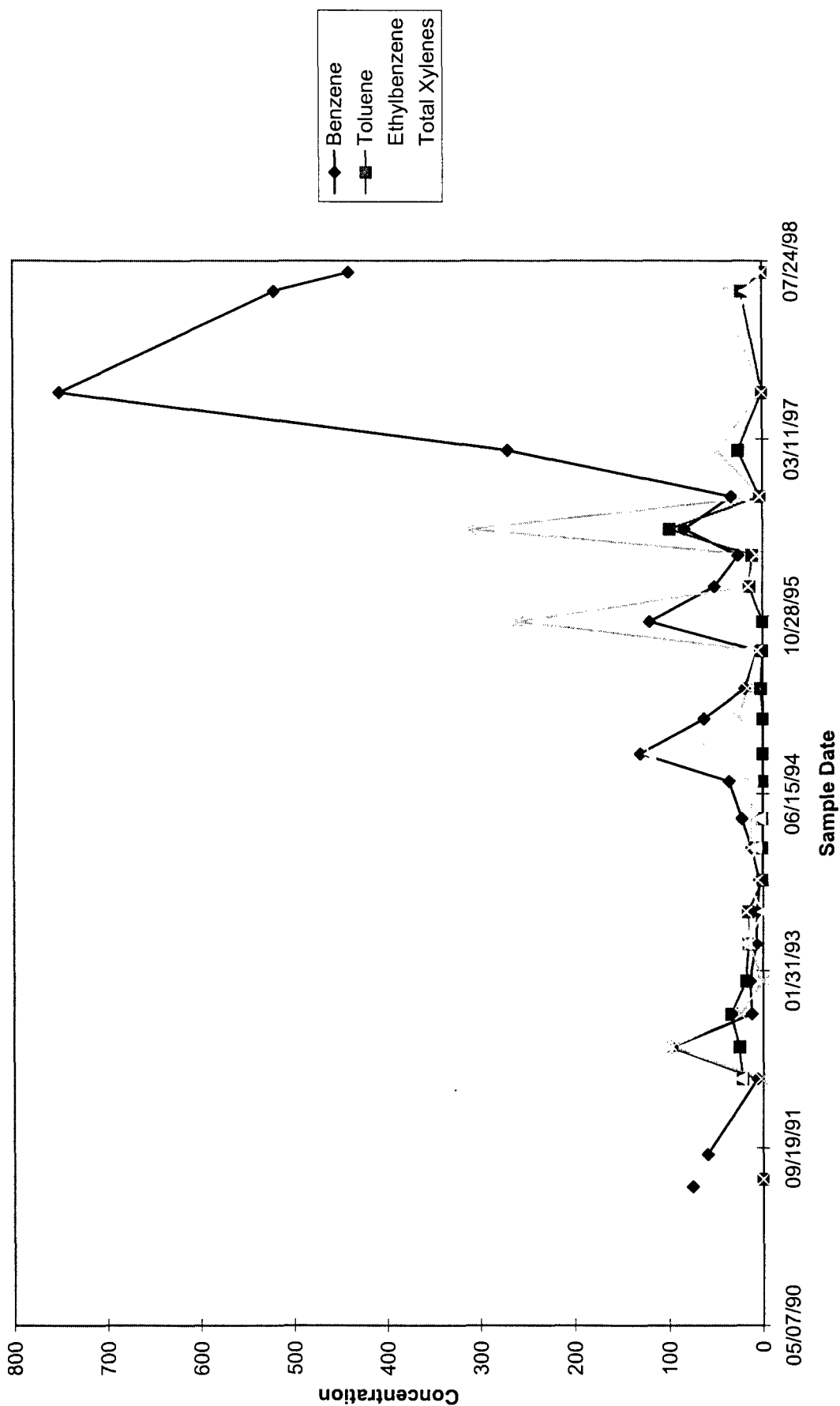
\*Concentrations in micrograms per liter (ug/L)

MW-43



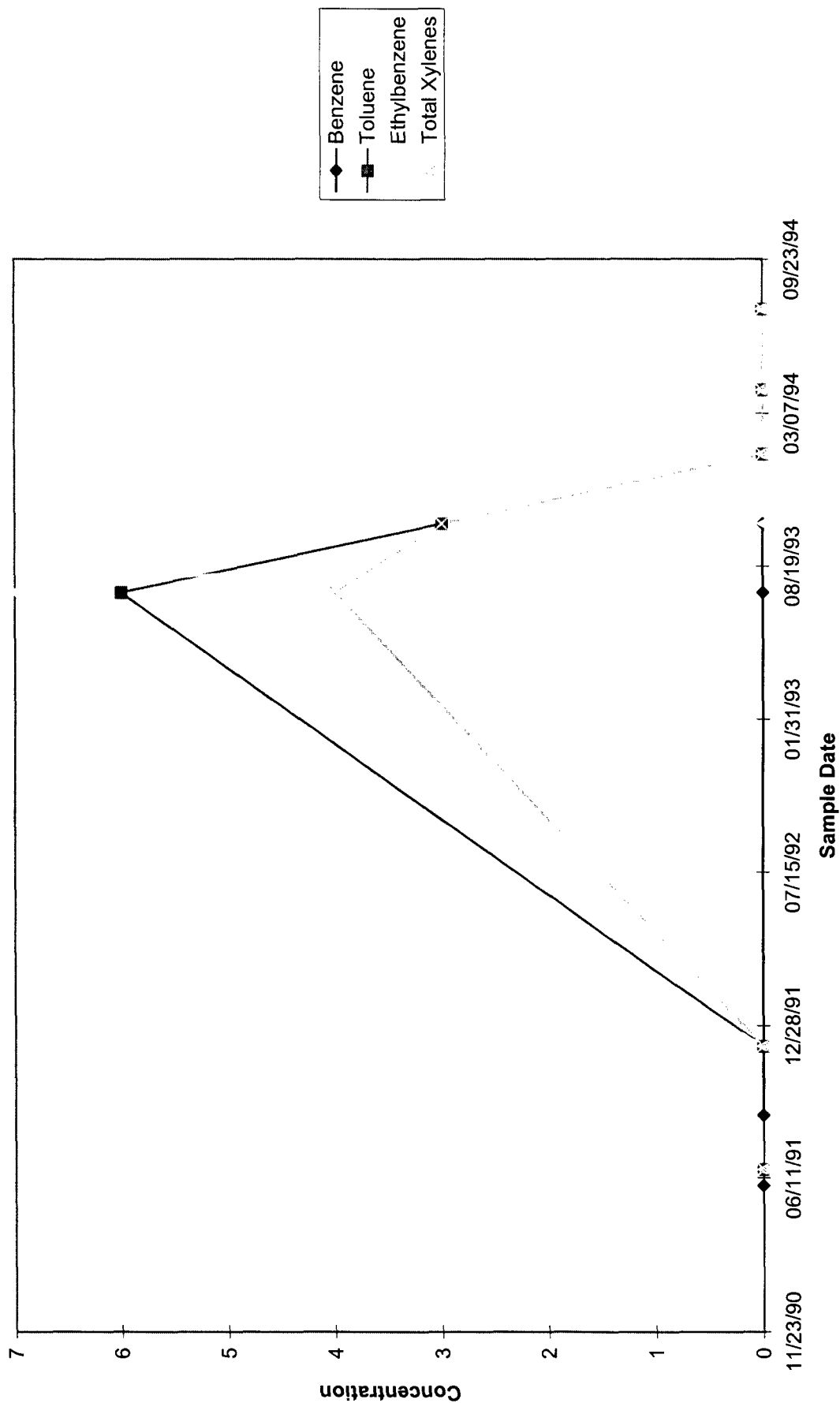
\*Concentrations in micrograms per liter (ug/L)

# MW-44



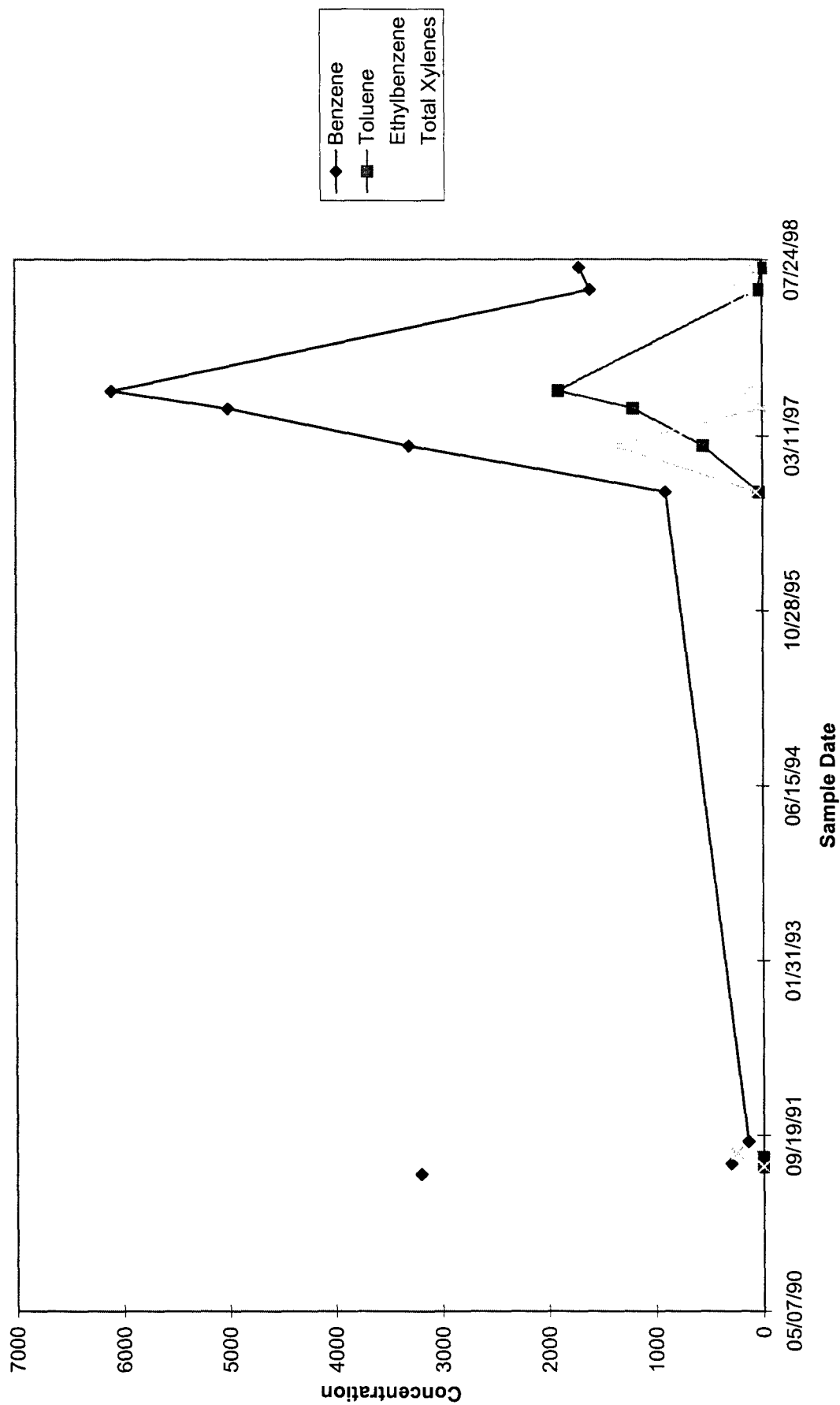
\*Concentrations in micrograms per liter (ug/L)

# MW-45



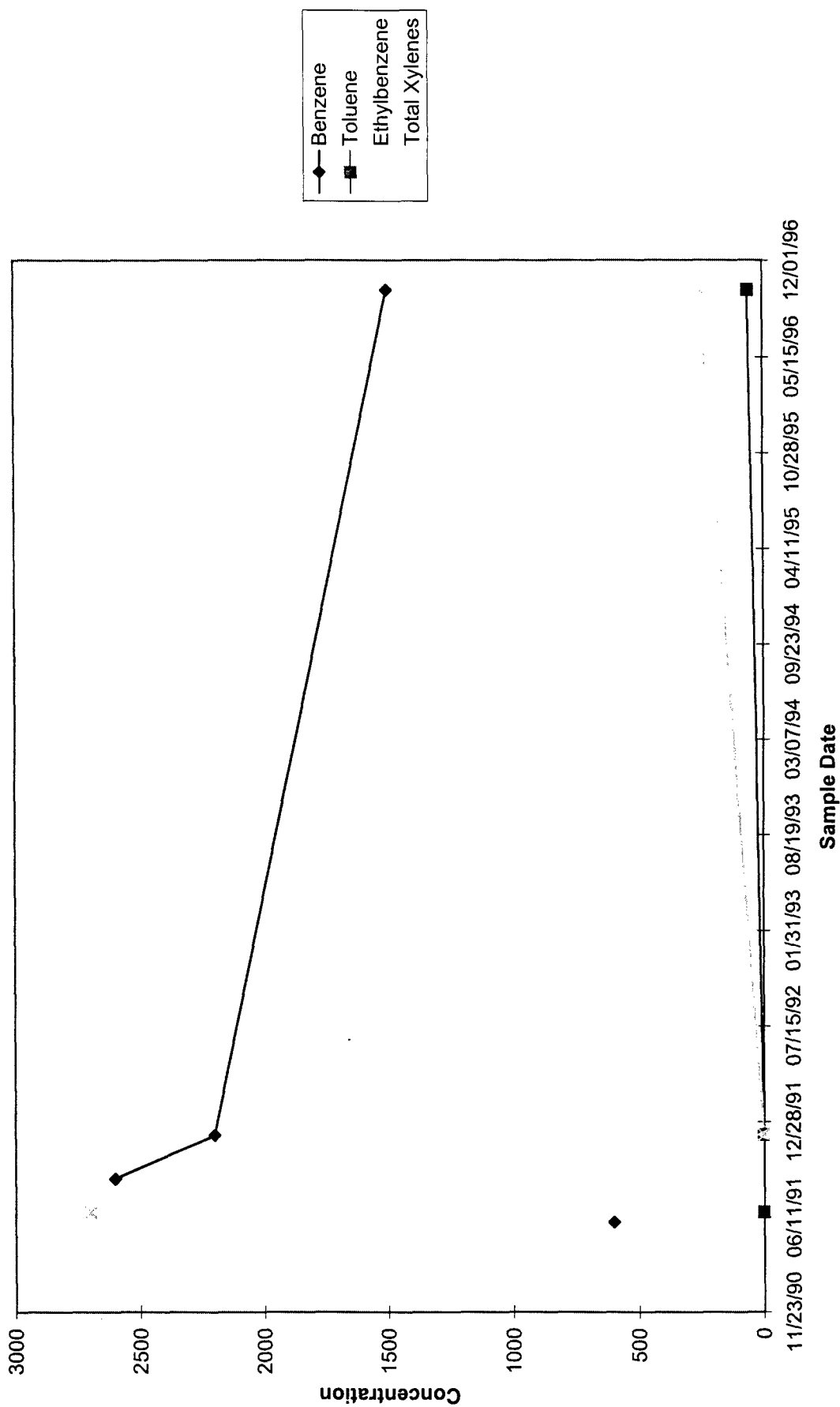
\*Concentrations in micrograms per liter (ug/L)

# MW-46



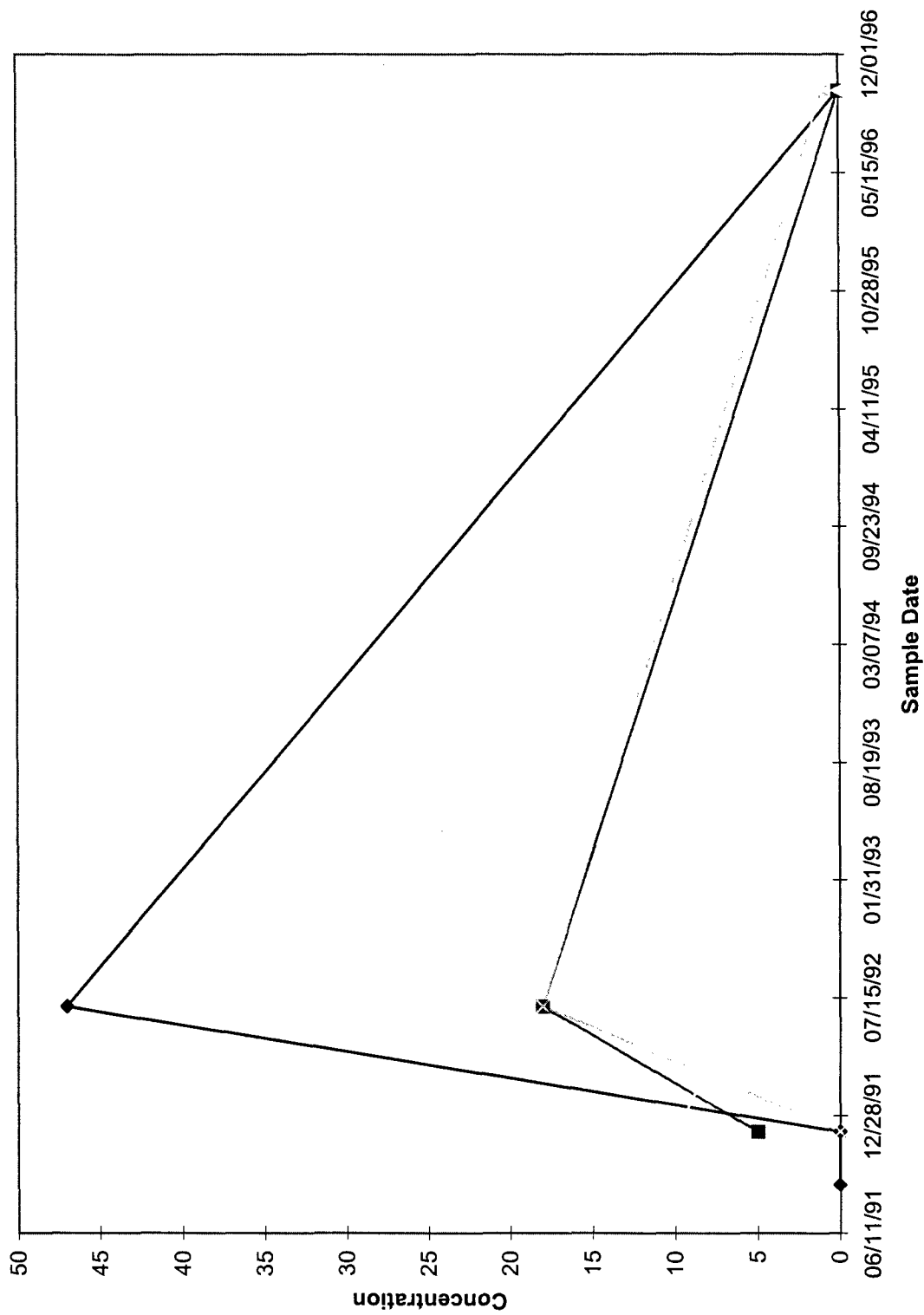
\*Concentrations in micrograms per liter (ug/L)

MW-47



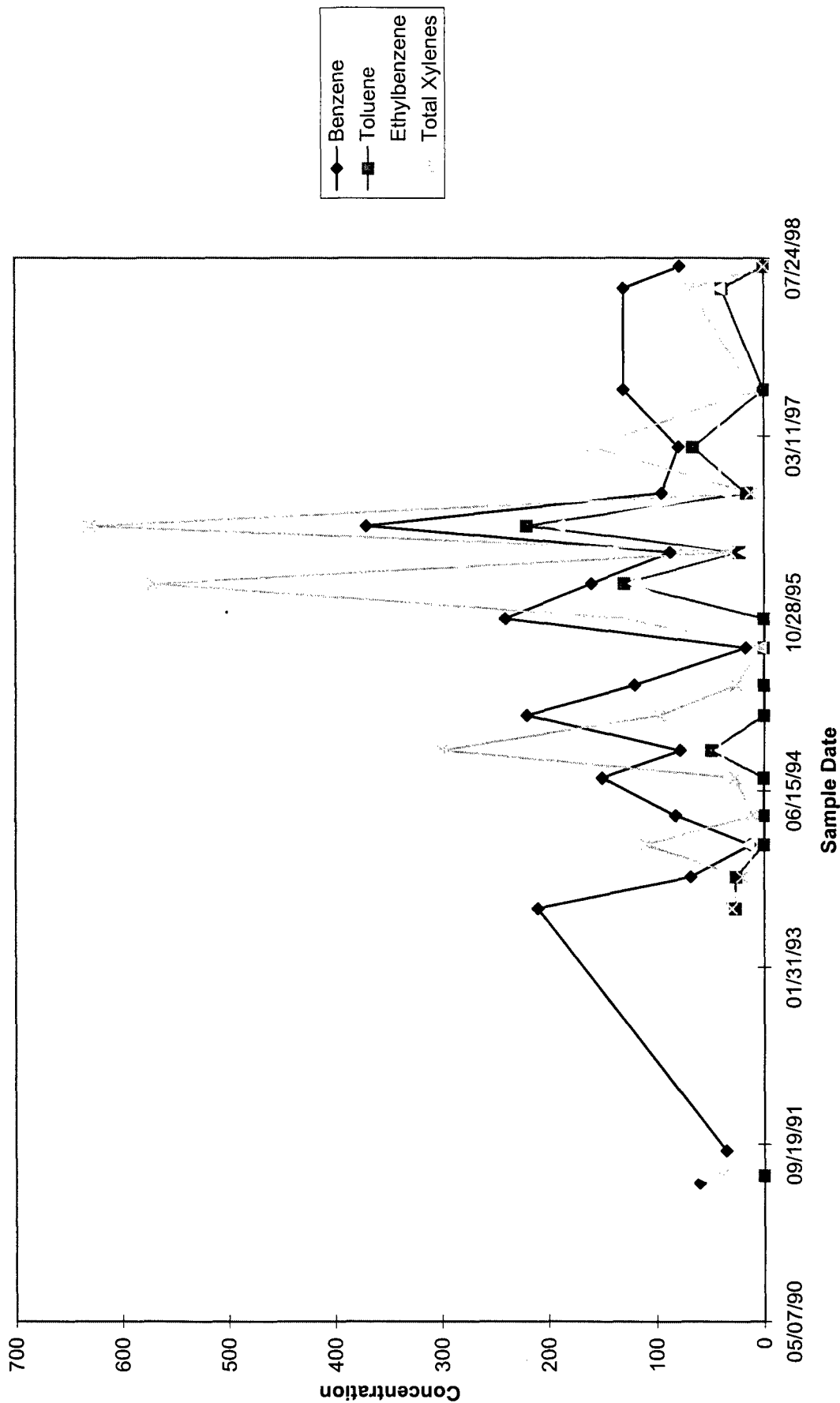
\*Concentrations in micrograms per liter (ug/L)

MW-48



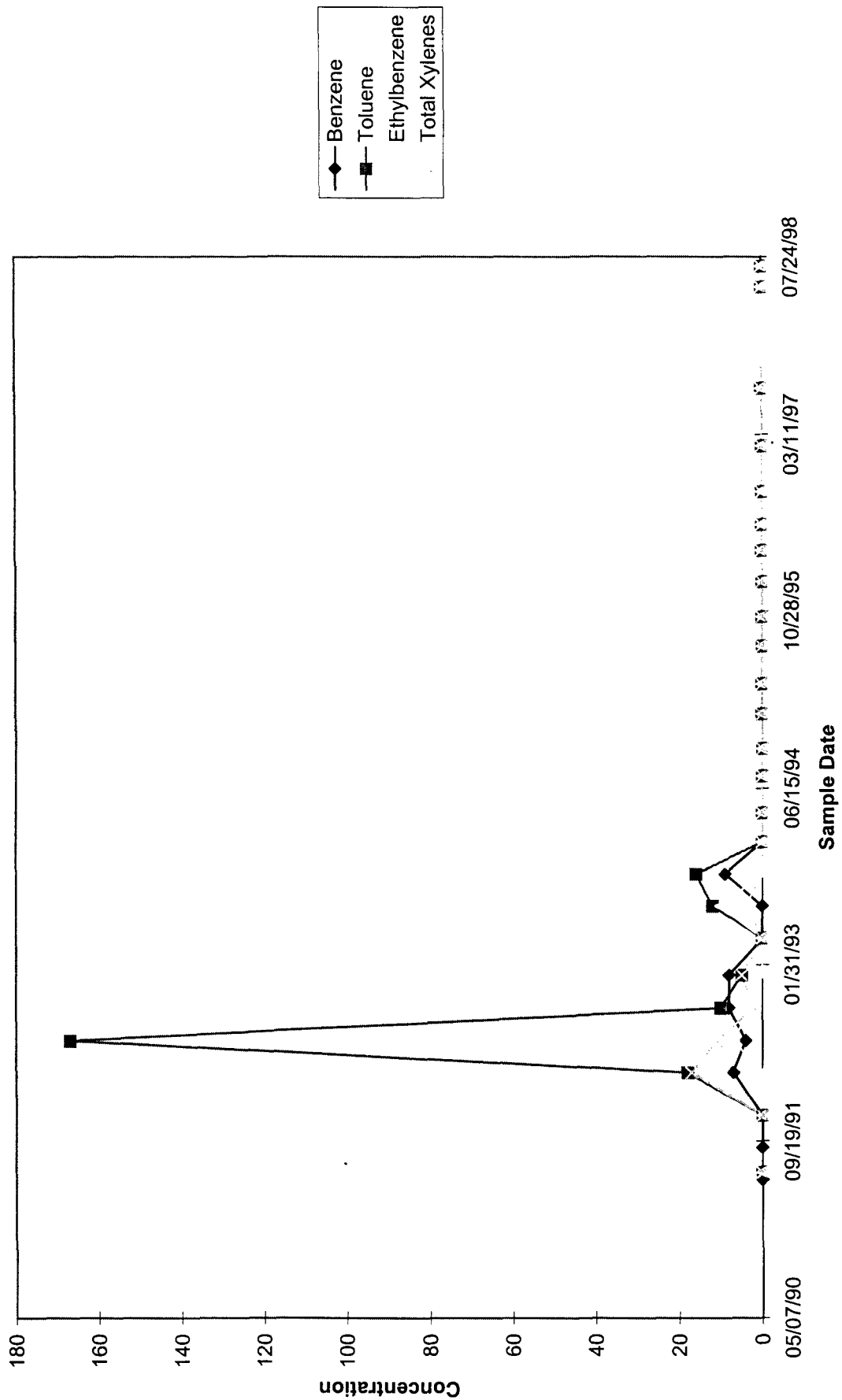
\*Concentrations in micrograms per liter (ug/L)

# MW-49



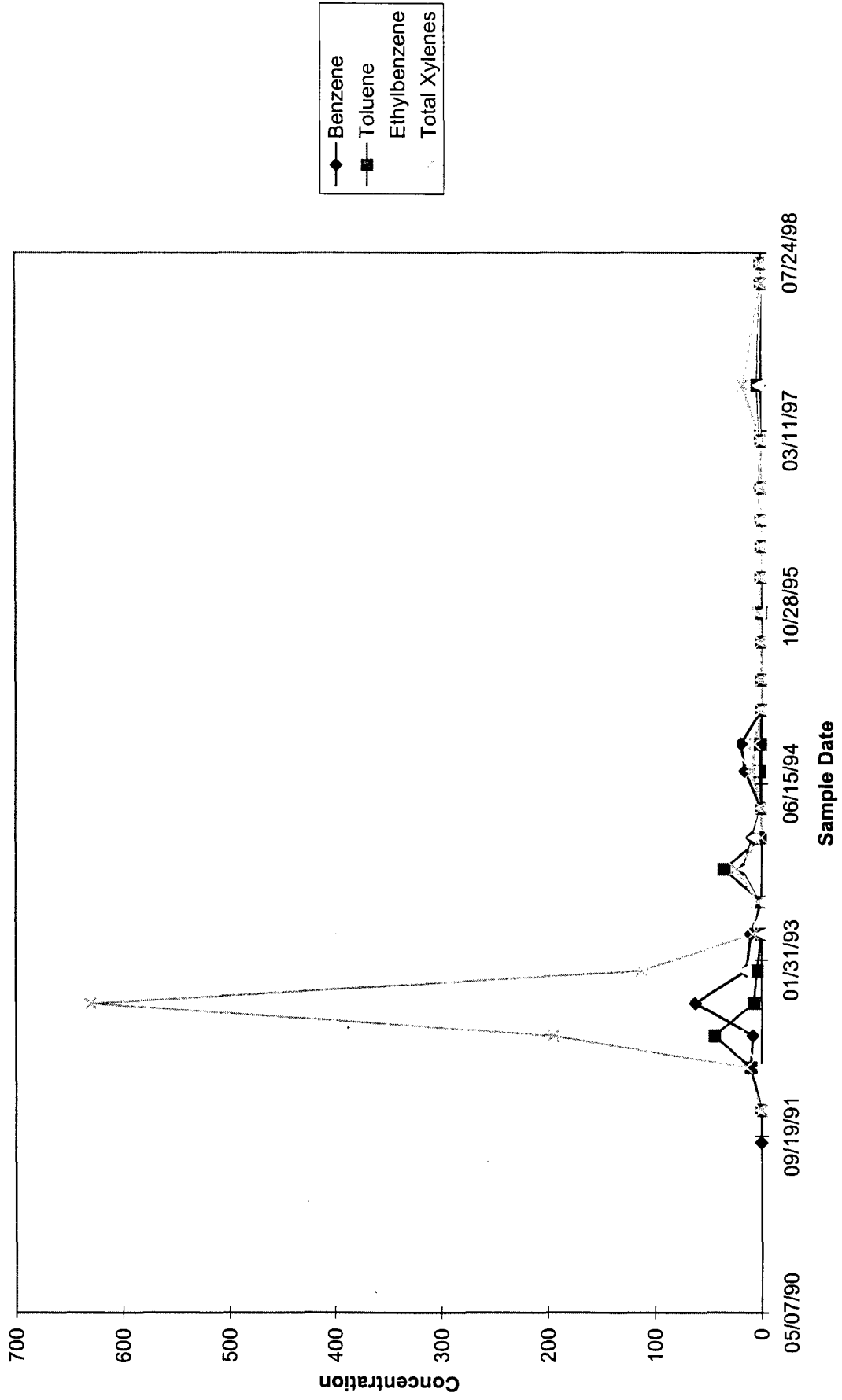
\*Concentrations in micrograms per liter (ug/L)

# MW-50



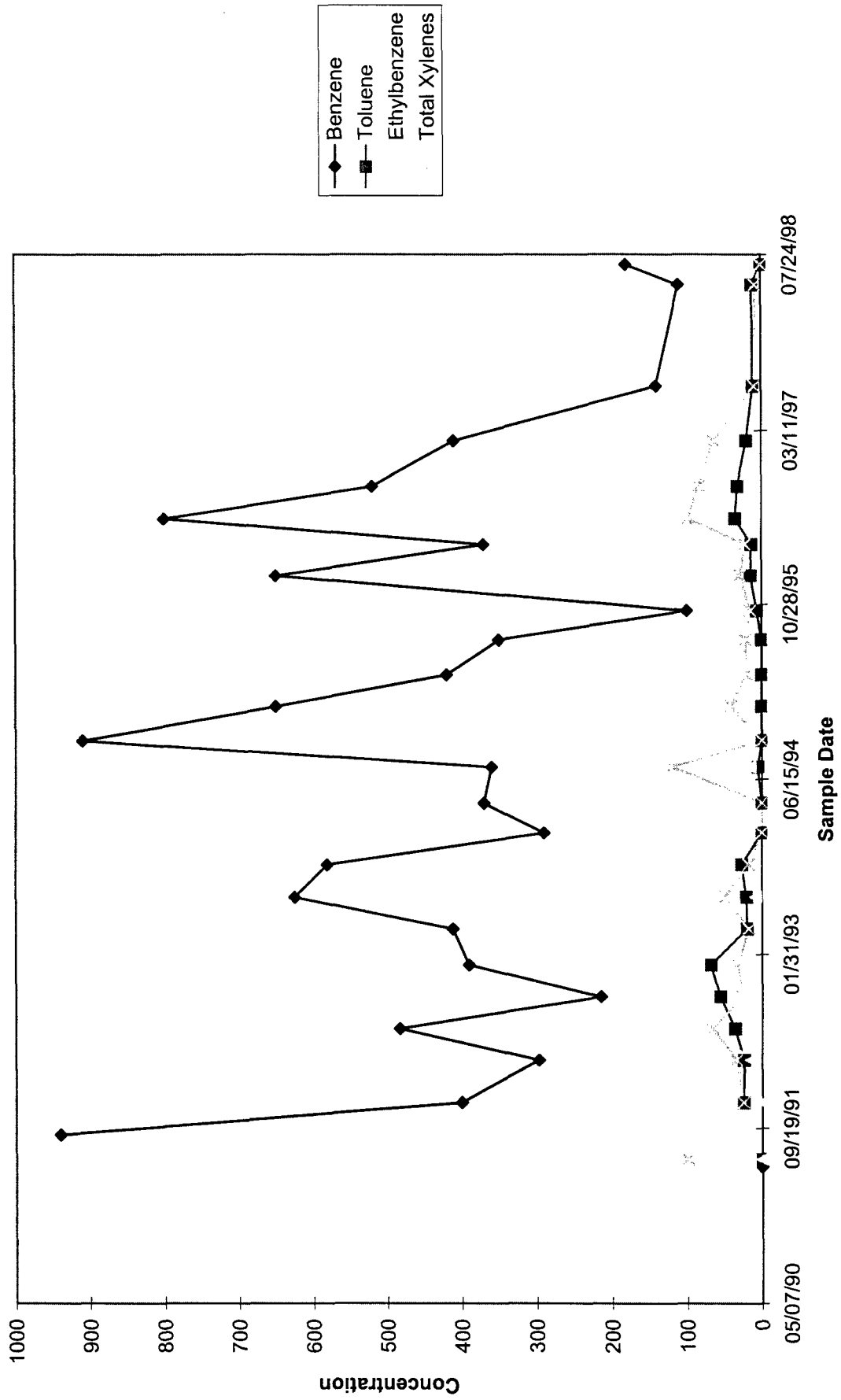
\*Concentrations in micrograms per liter (ug/L)

# MW-54



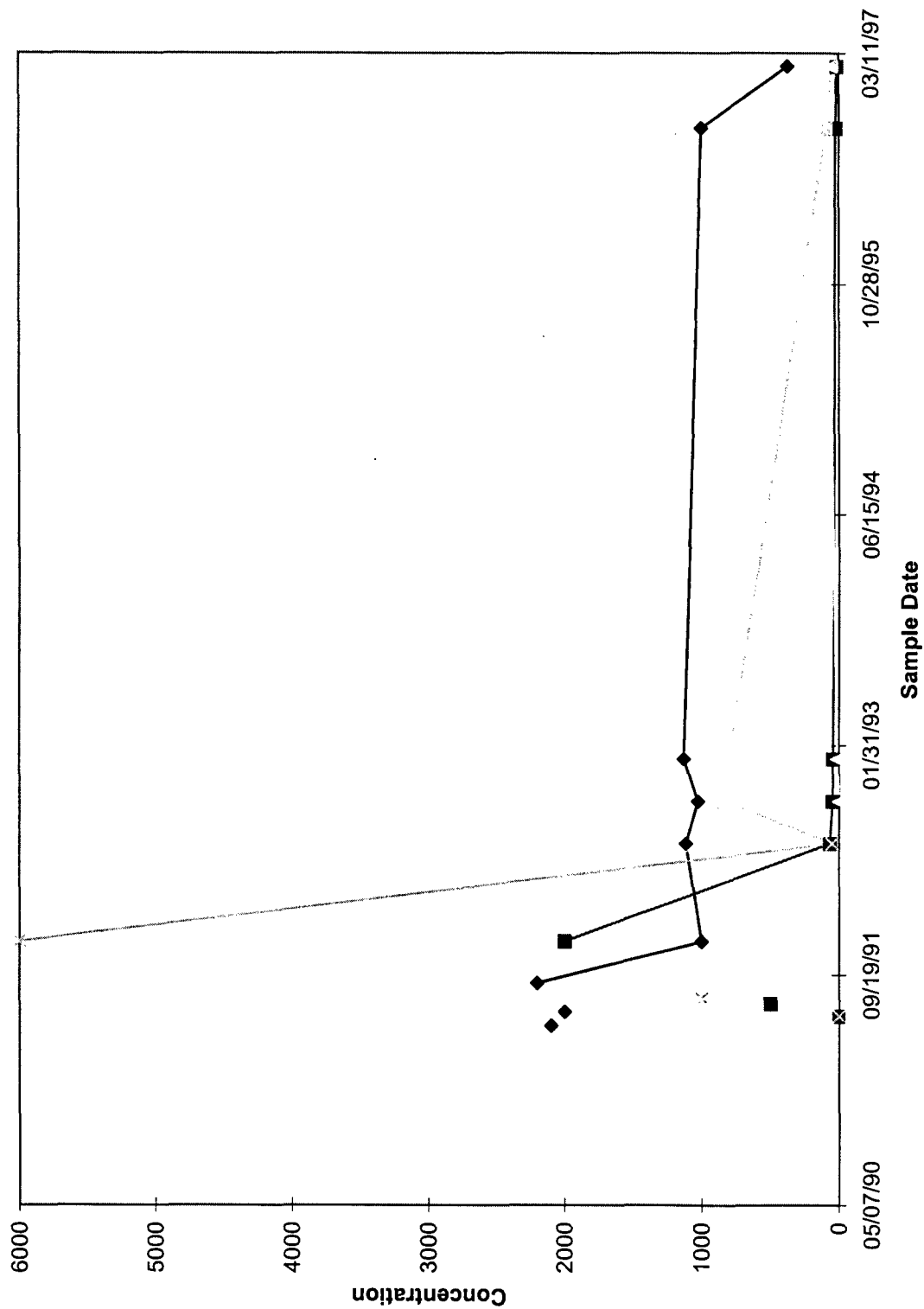
\*Concentrations in micrograms per liter (ug/L)

# MW-55



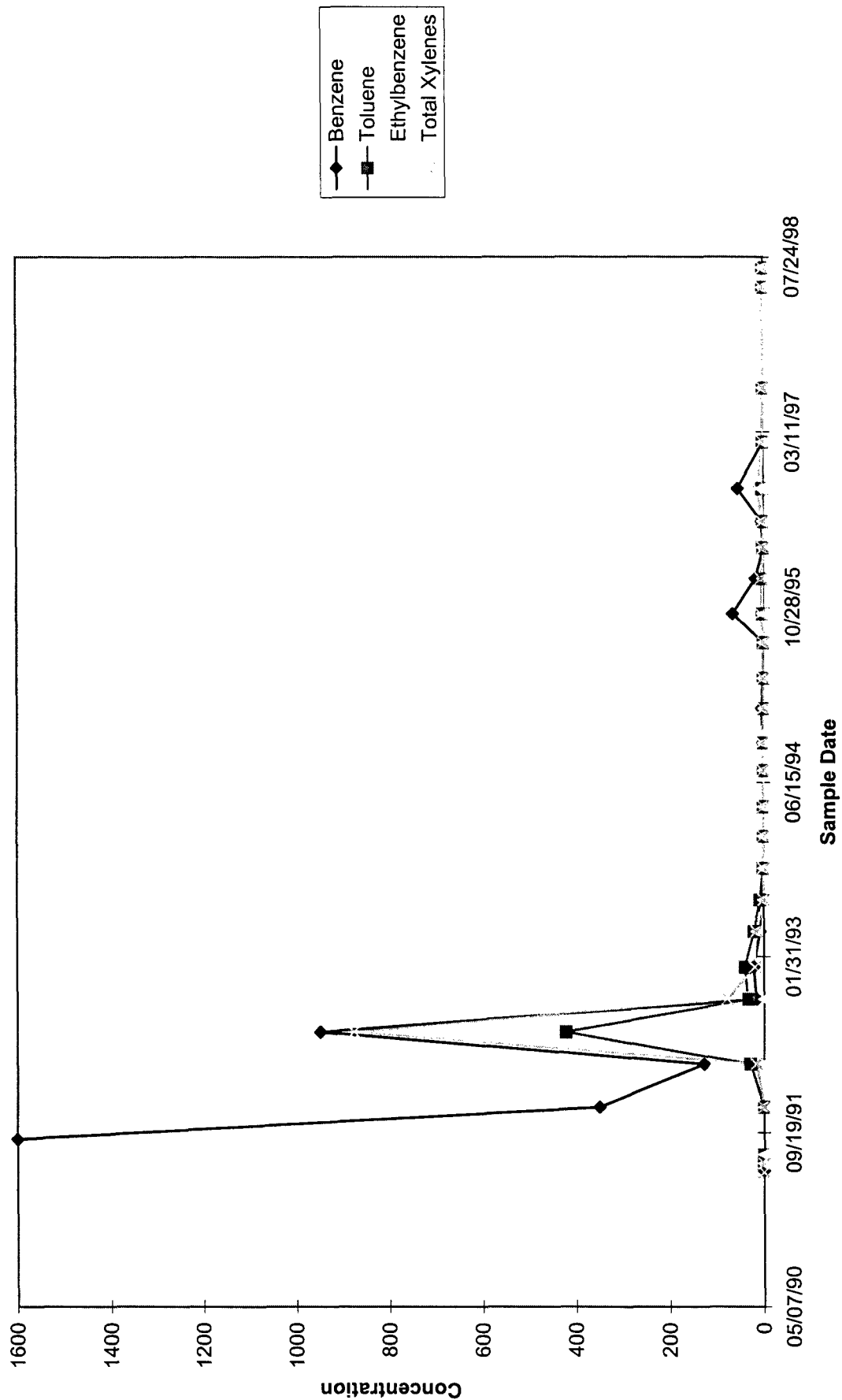
\*Concentrations in micrograms per liter (ug/L)

# MW-56



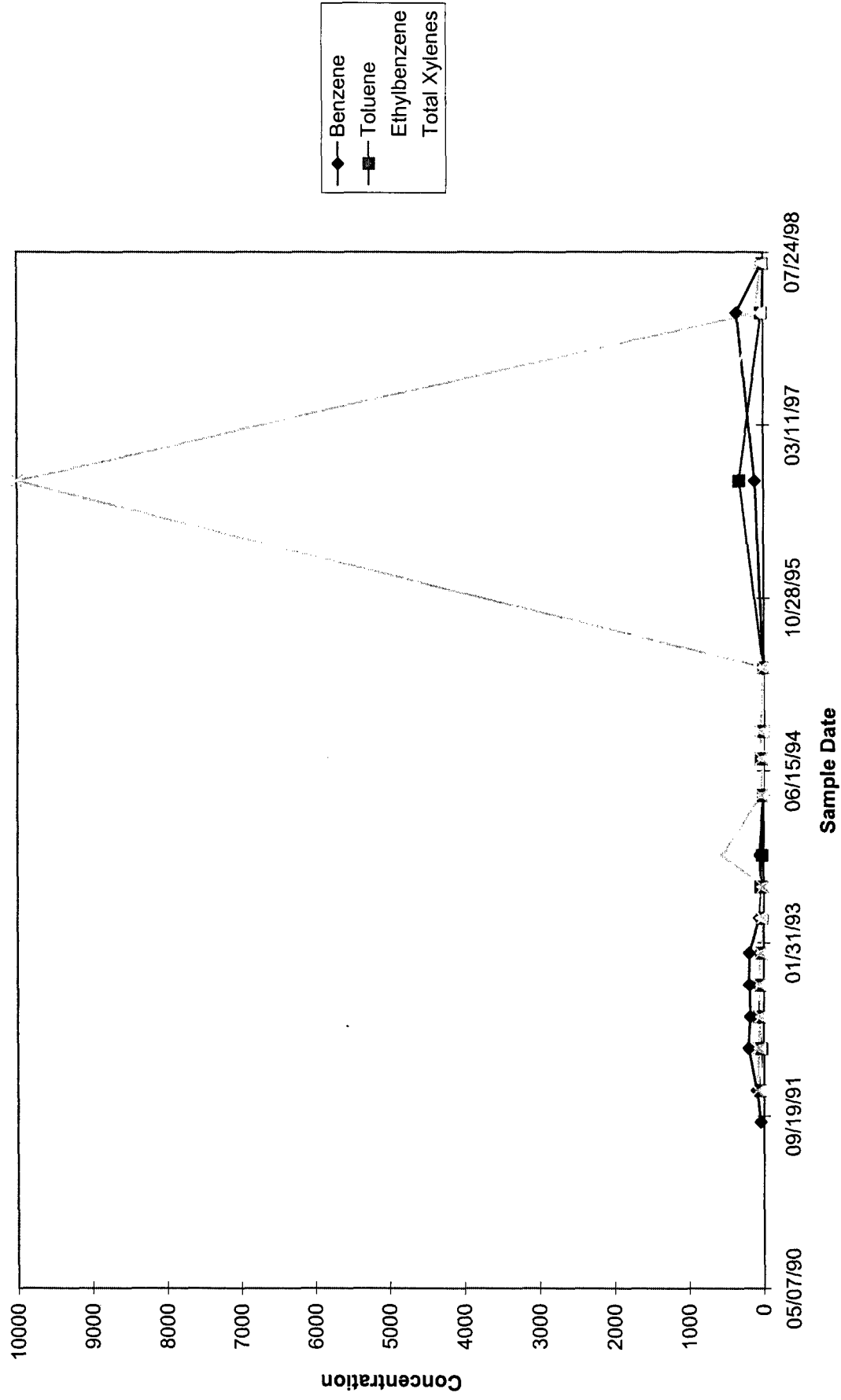
\*Concentrations in micrograms per liter (ug/L)

# MW-57



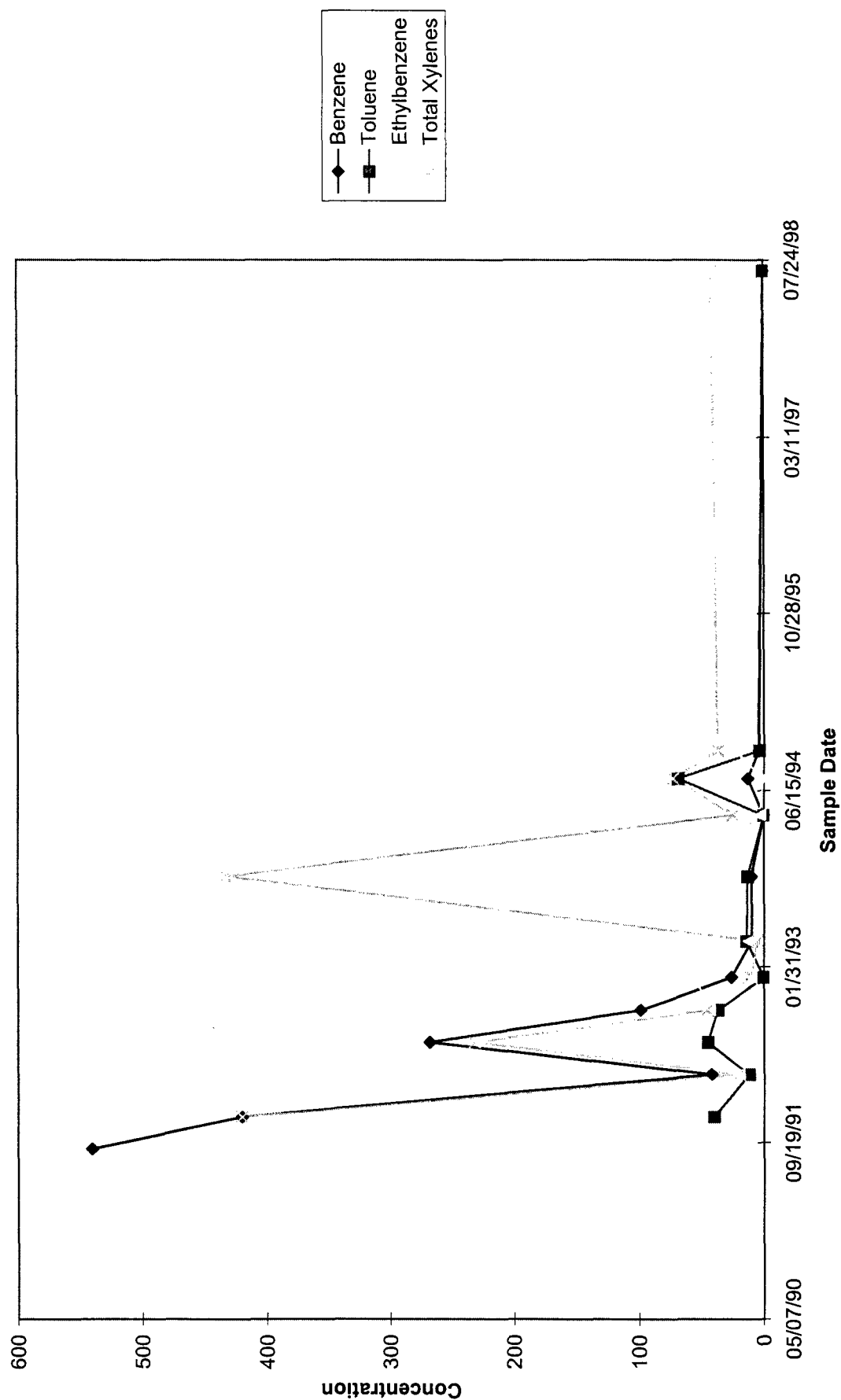
\*Concentrations in micrograms per liter (ug/L)

# MW-58



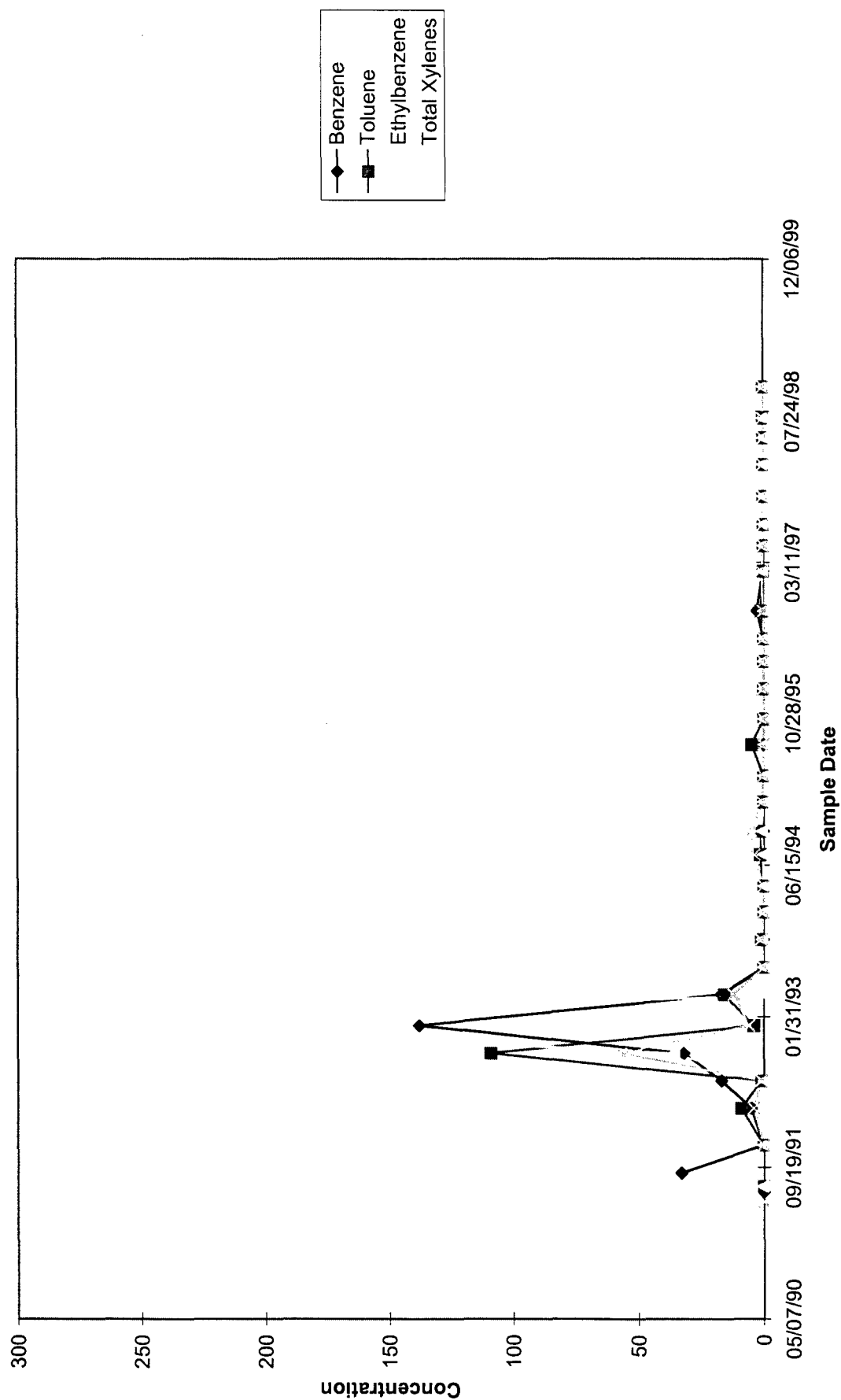
\*Concentrations in micrograms per liter (ug/L)

# MW-59



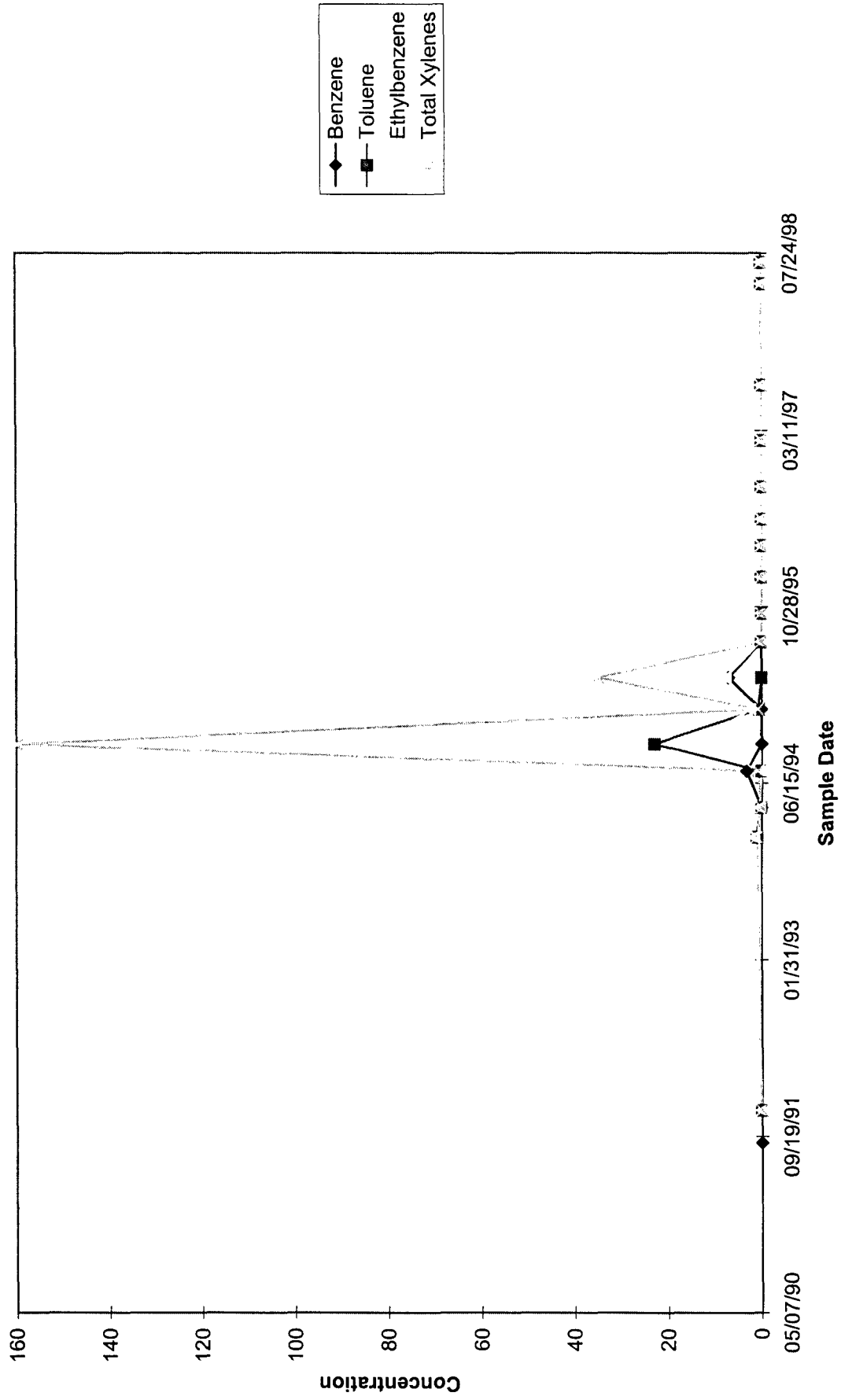
\*Concentrations in micrograms per liter (ug/L)

# MW-60



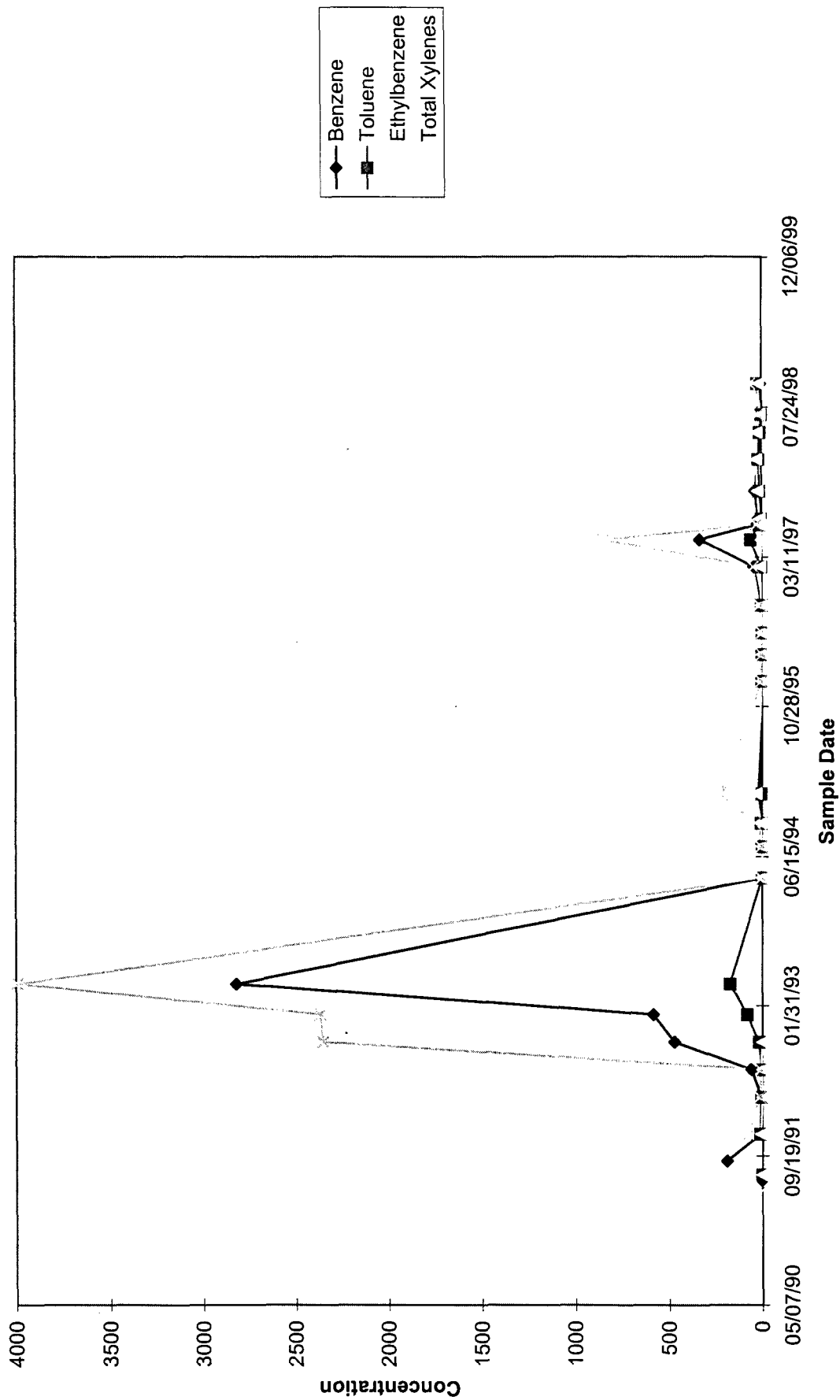
\*Concentrations in micrograms per liter (ug/L)

# MW-61



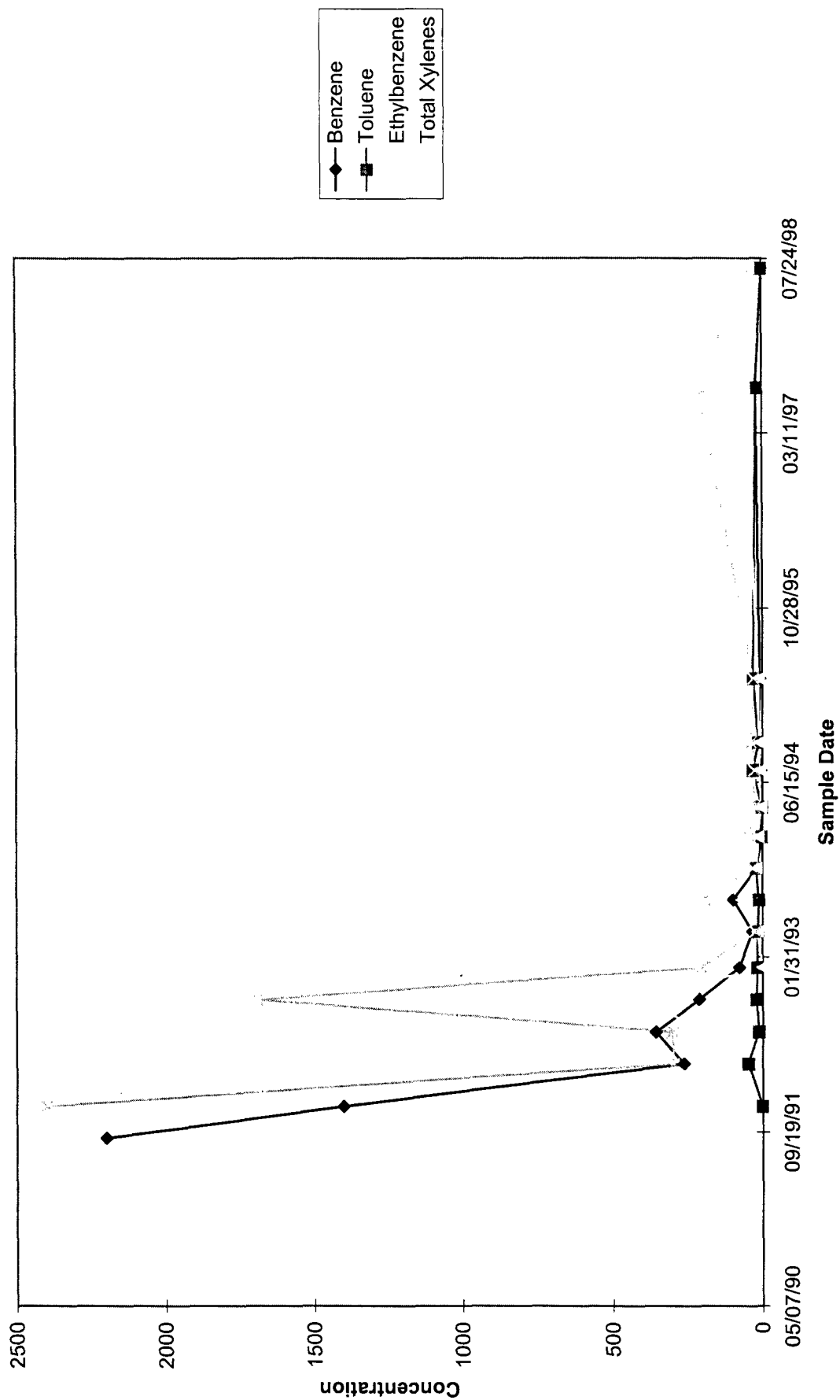
\*Concentrations in micrograms per liter (ug/L)

# MW-61A



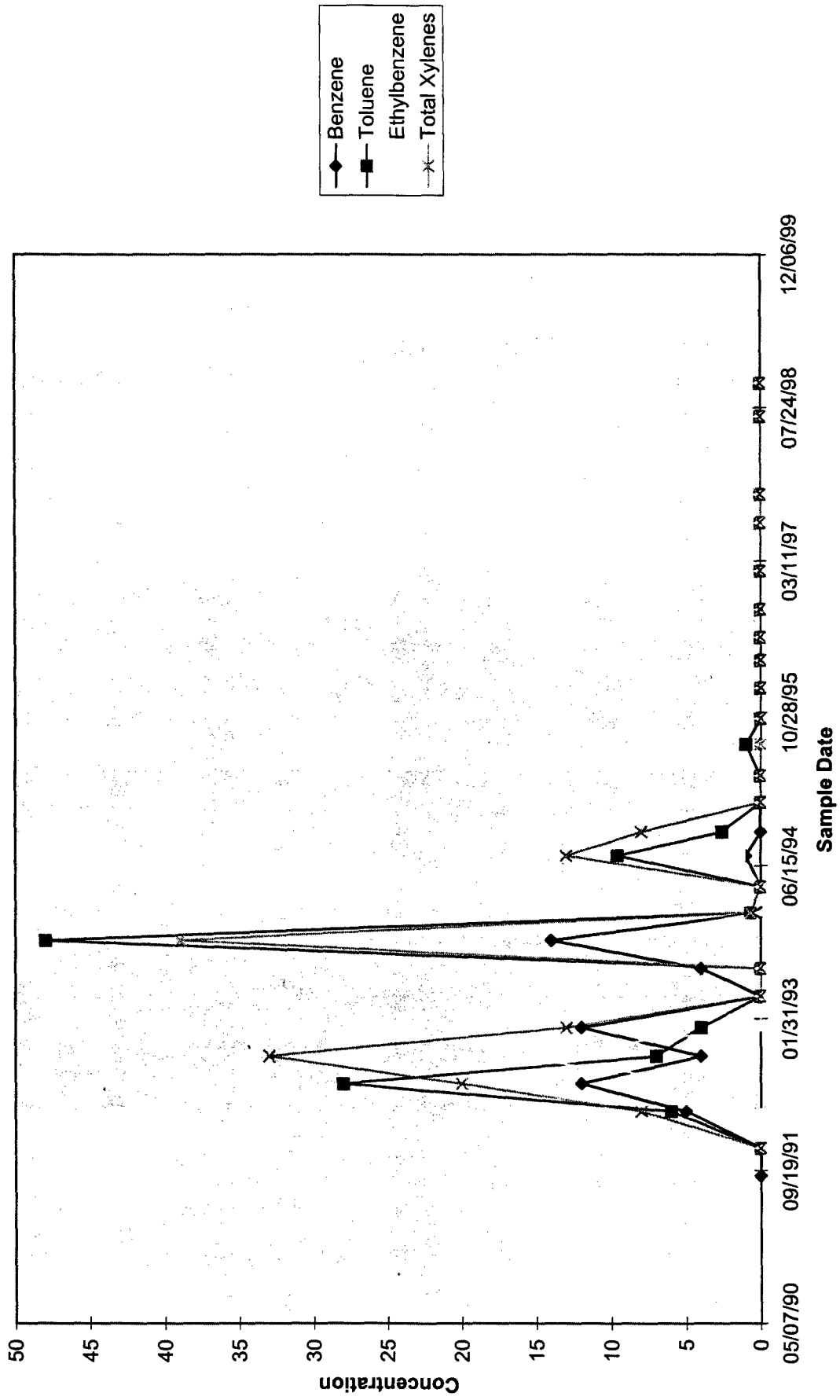
\*Concentrations in micrograms per liter (ug/L)

# MW-62



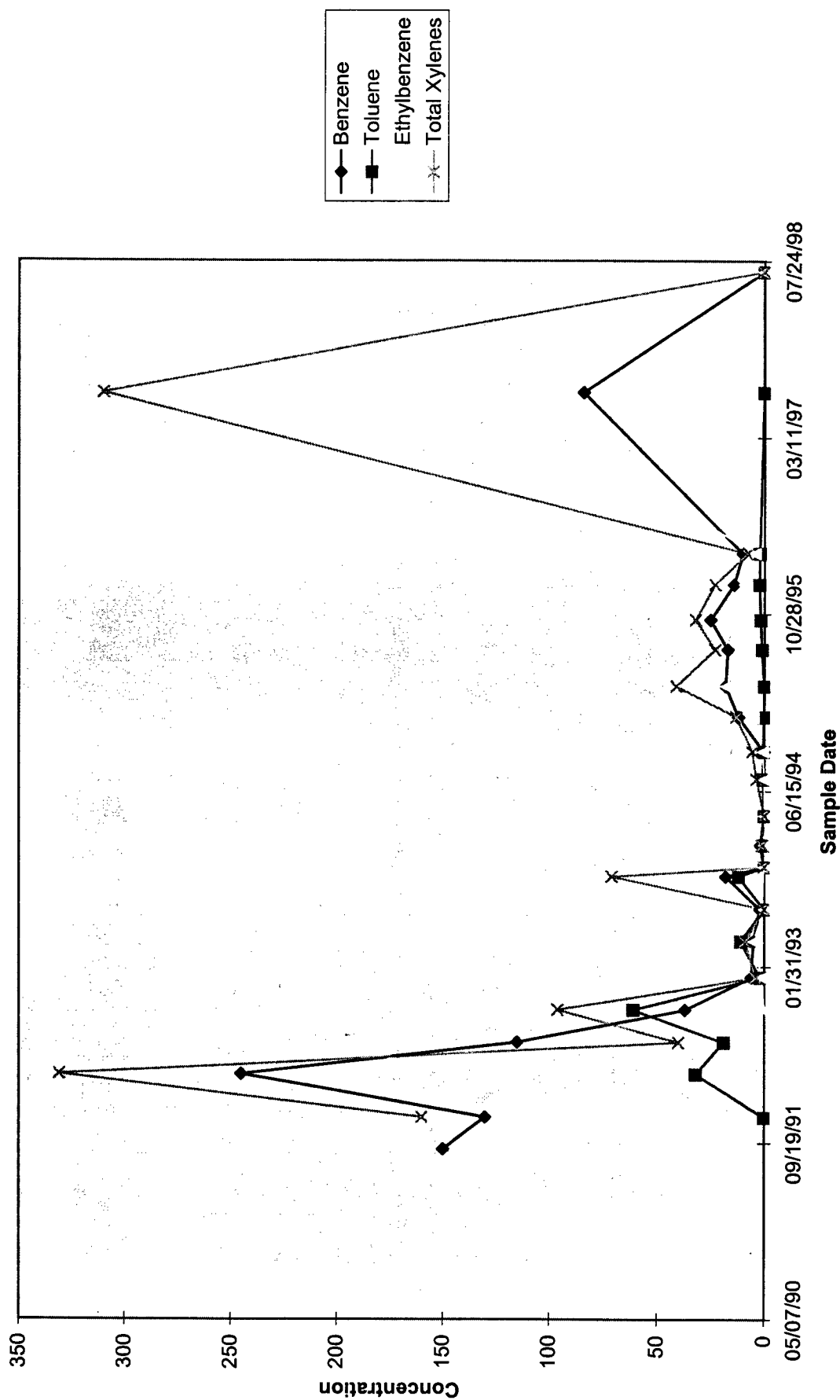
\*Concentrations in micrograms per liter (ug/L)

# MW-63



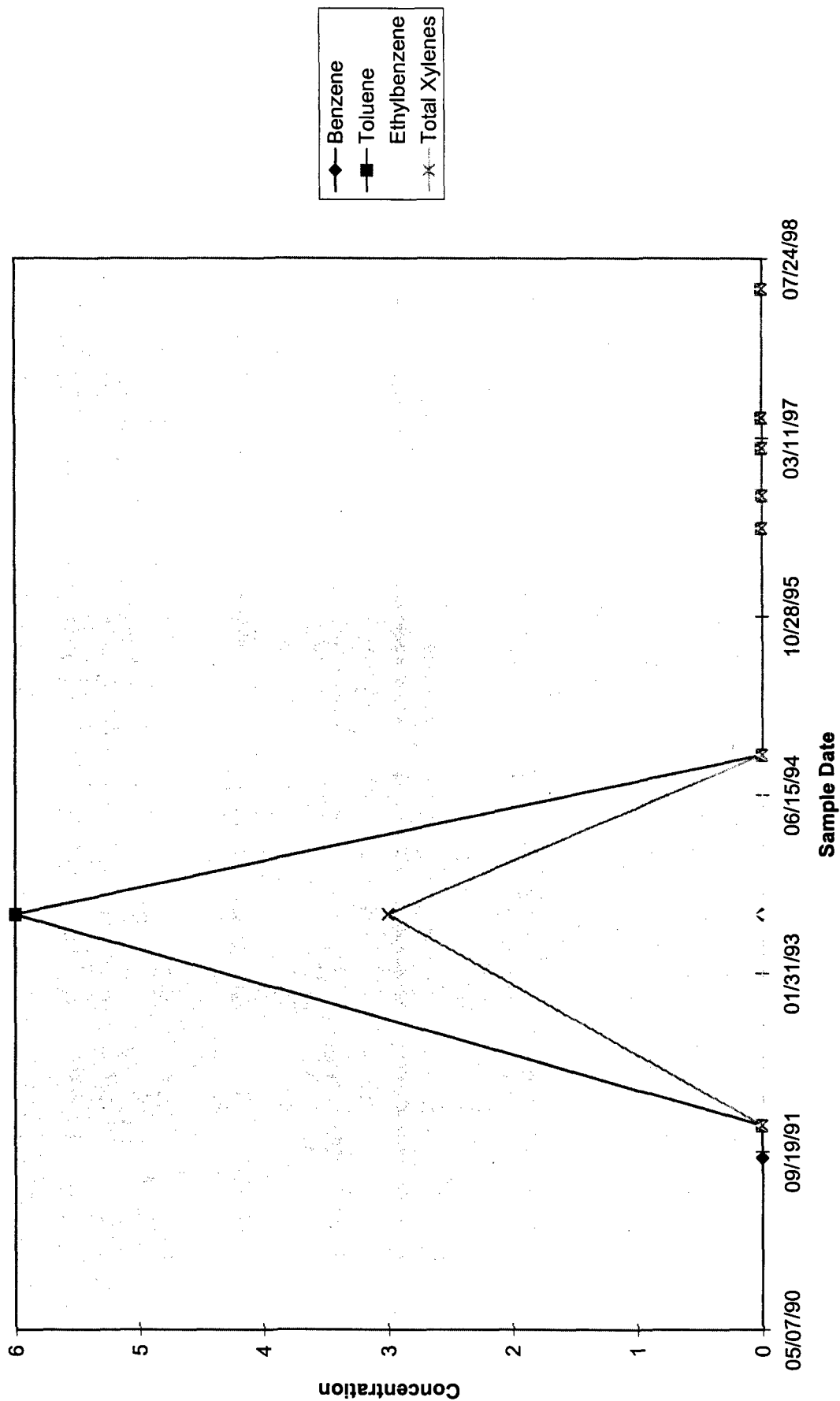
\*Concentrations in micrograms per liter (ug/L)

# MW-64



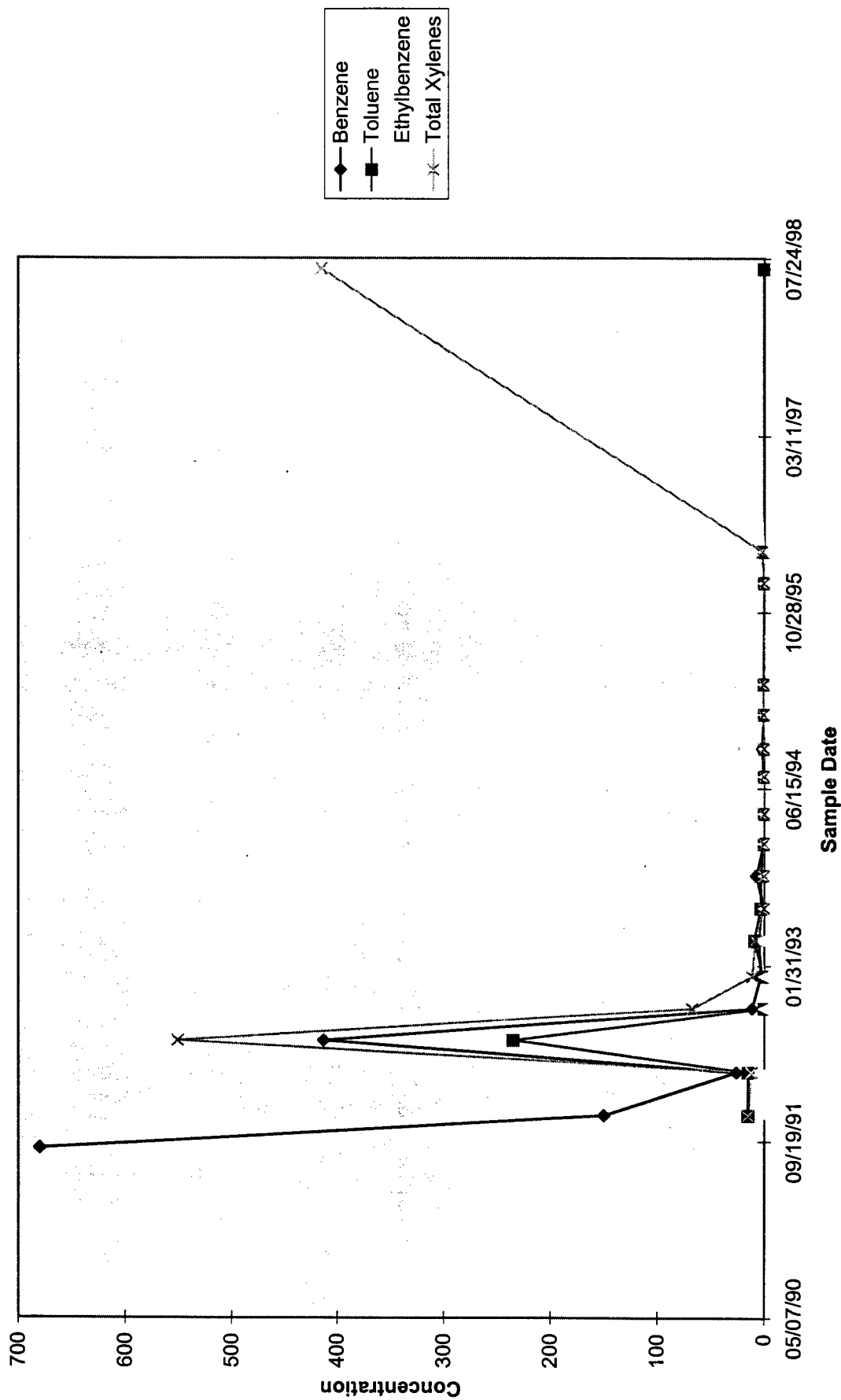
\*Concentrations in micrograms per liter (ug/L)

# MW-65



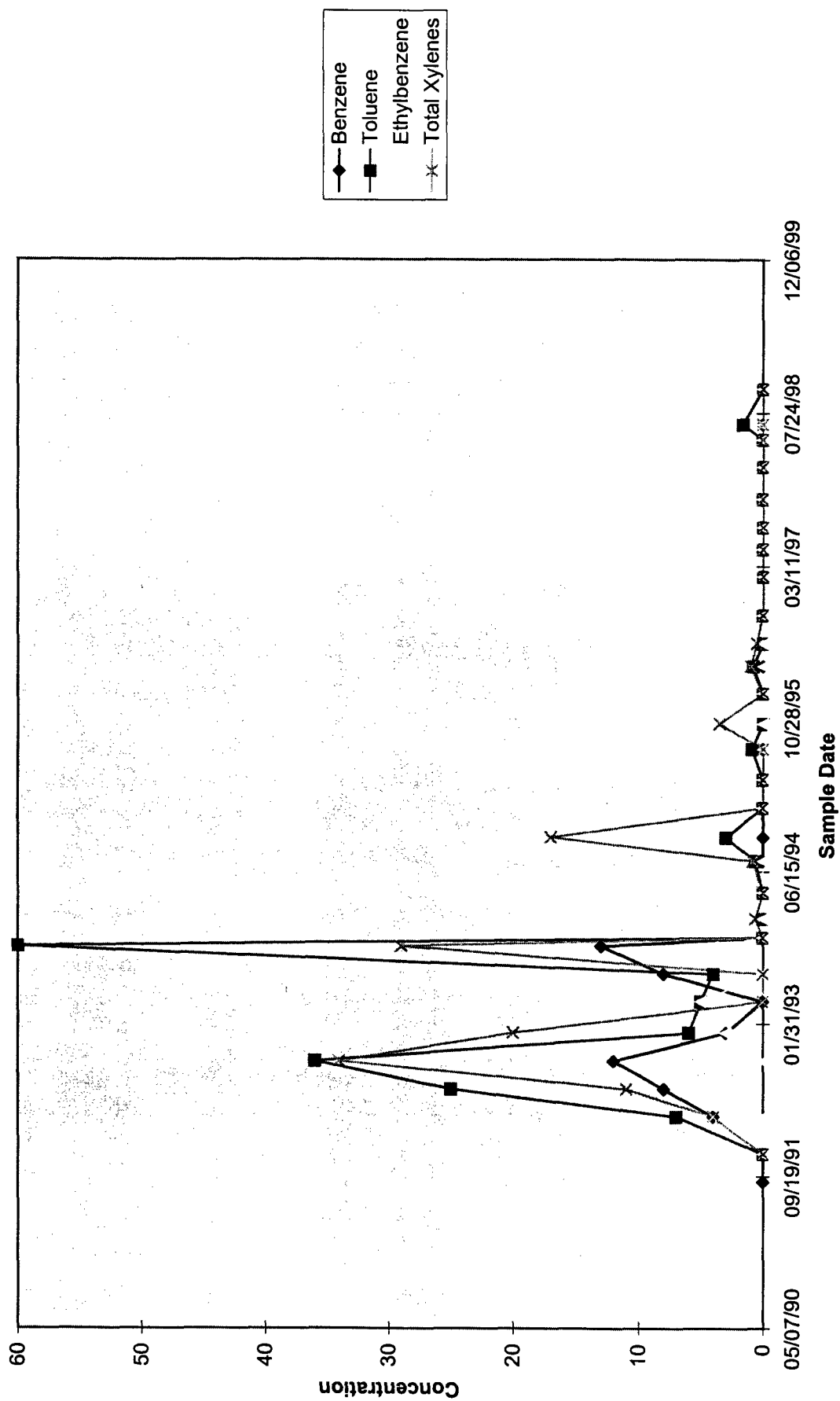
\*Concentrations in micrograms per liter (ug/L)

# MW-65A



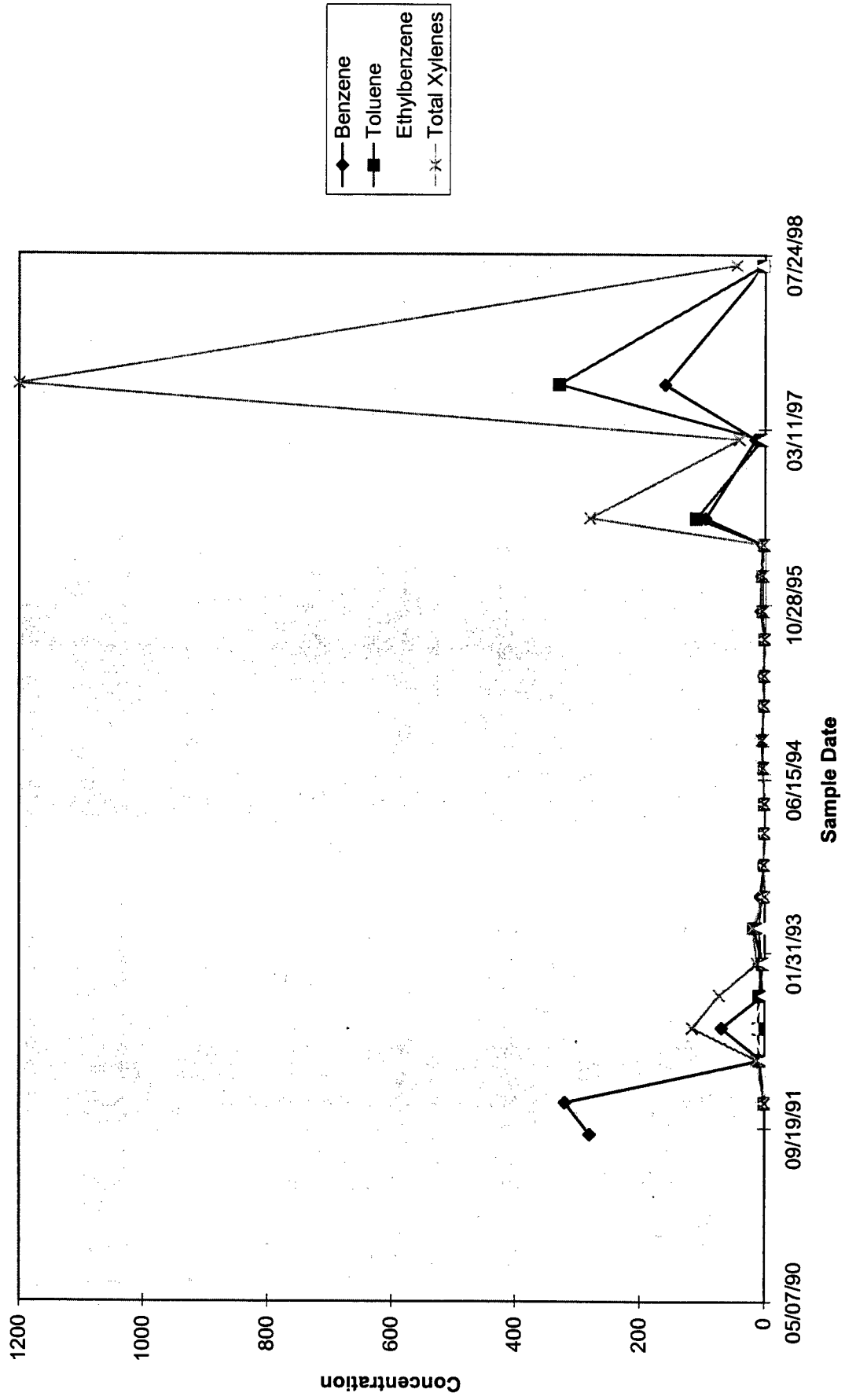
\*Concentrations in micrograms per liter (ug/L)

# MW-66



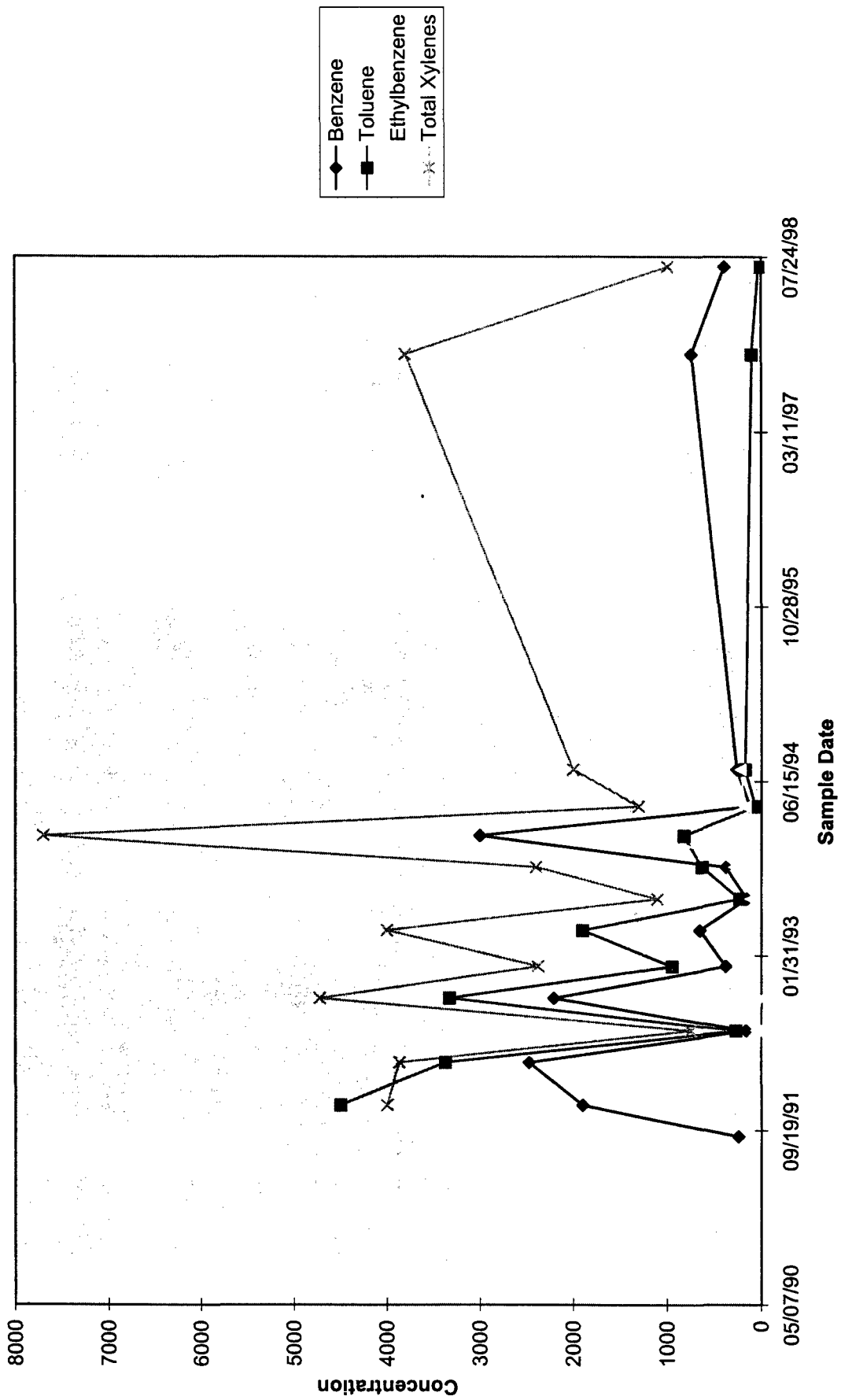
\*Concentrations in micrograms per liter (ug/L)

# MW-67



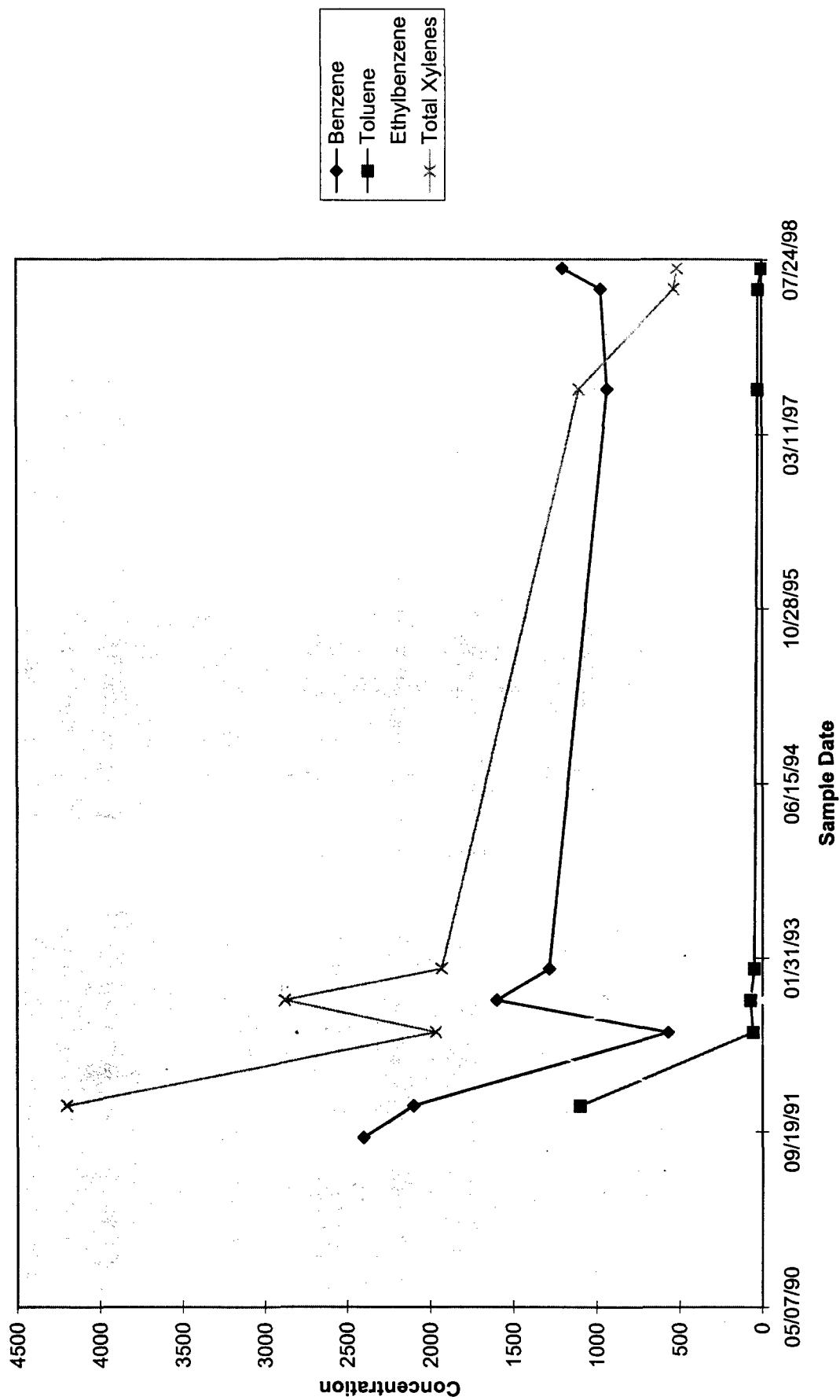
\*Concentrations in micrograms per liter (ug/L)

# MW-68



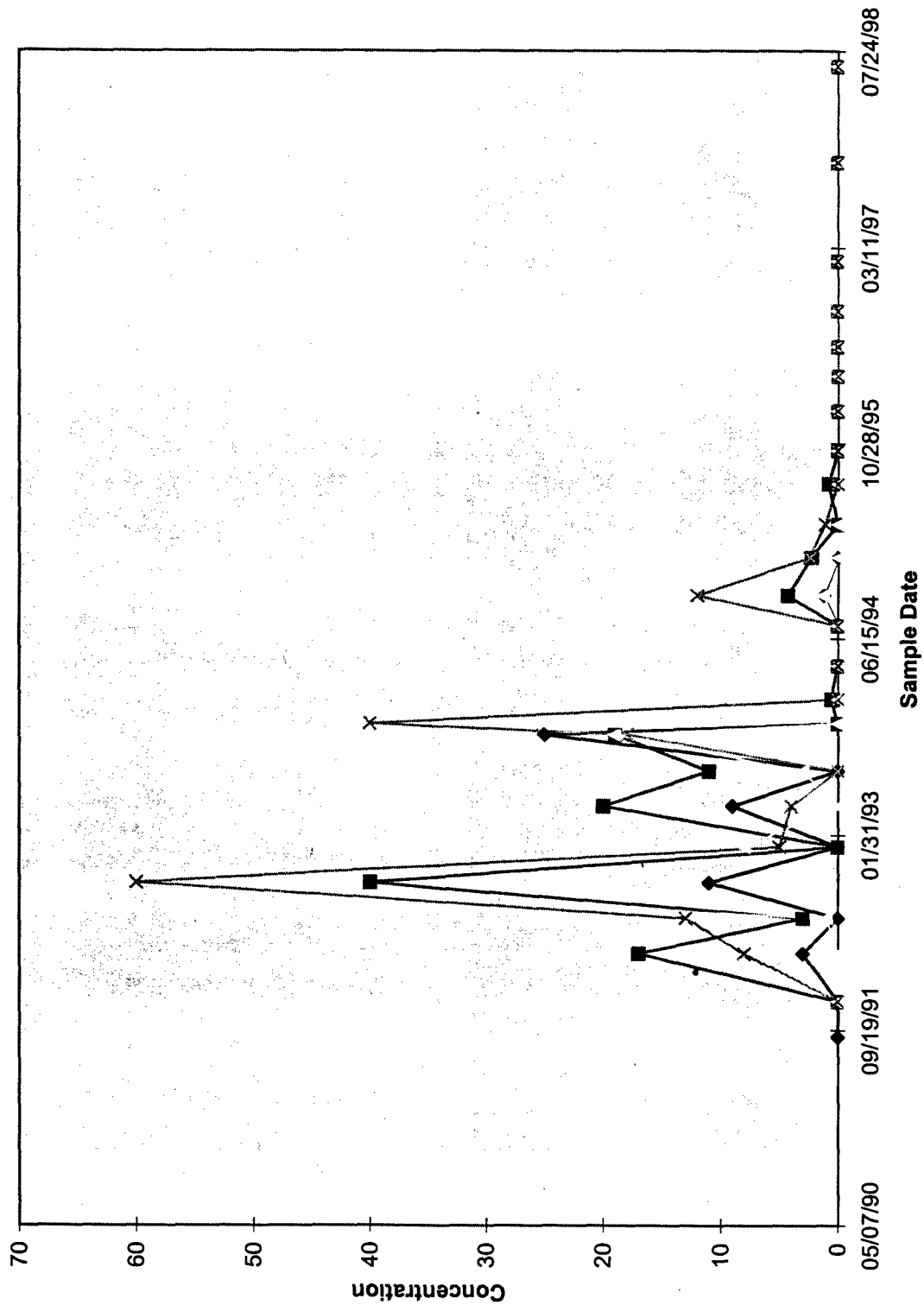
\*Concentrations in micrograms per liter (ug/L)

# MW-69



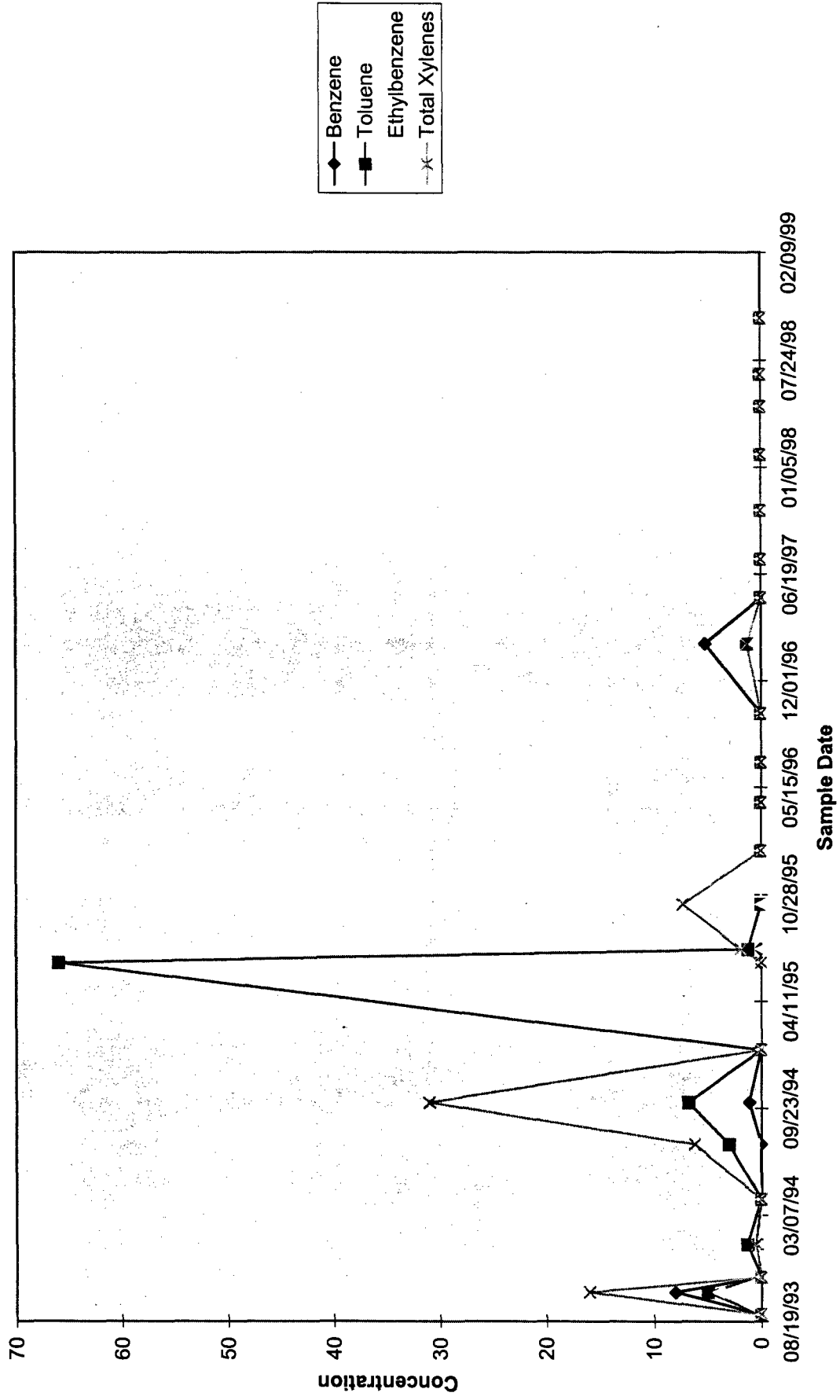
\*Concentrations in micrograms per liter (ug/L)

# MW-70



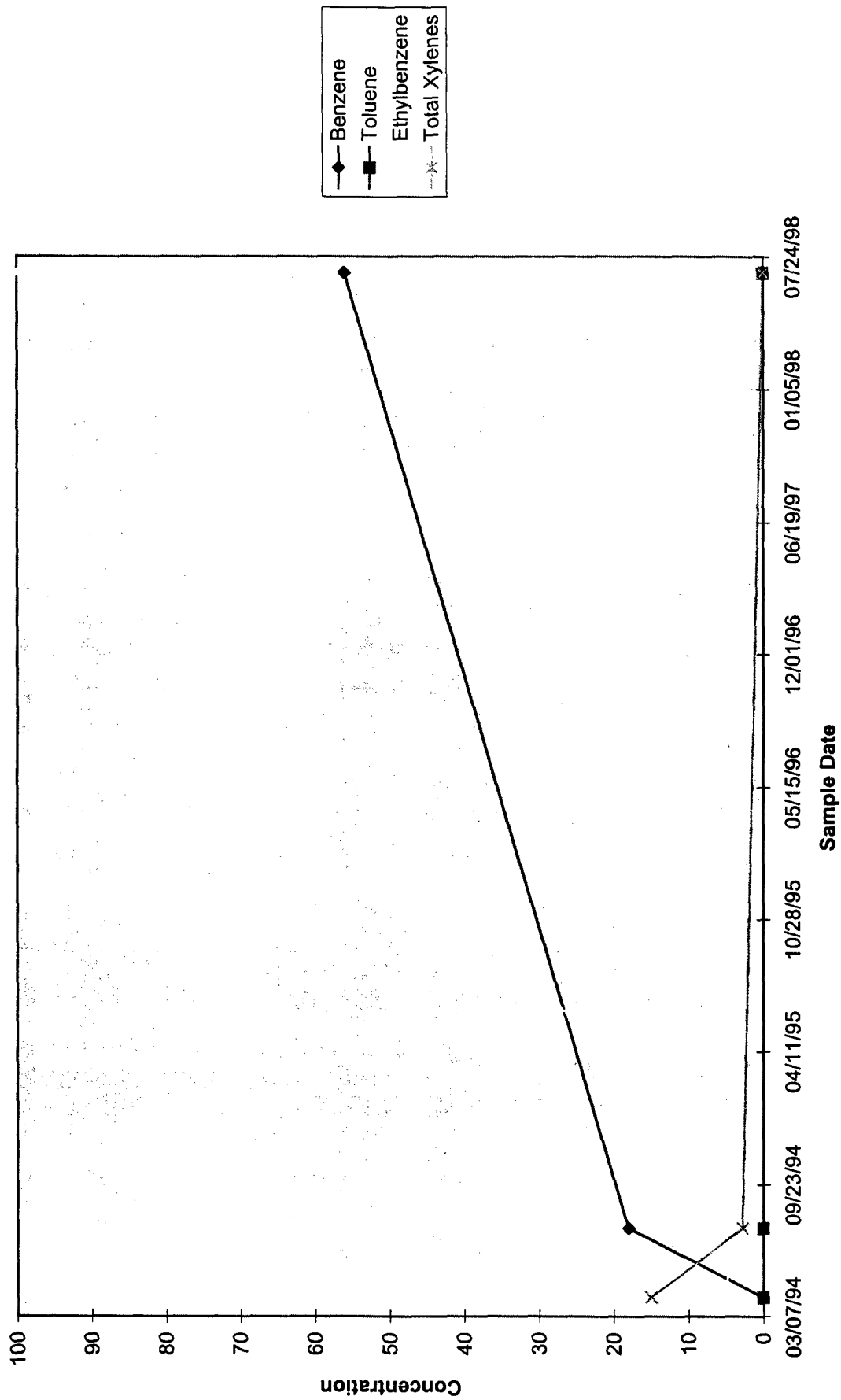
\*Concentrations in micrograms per liter (ug/L)

# MW-71



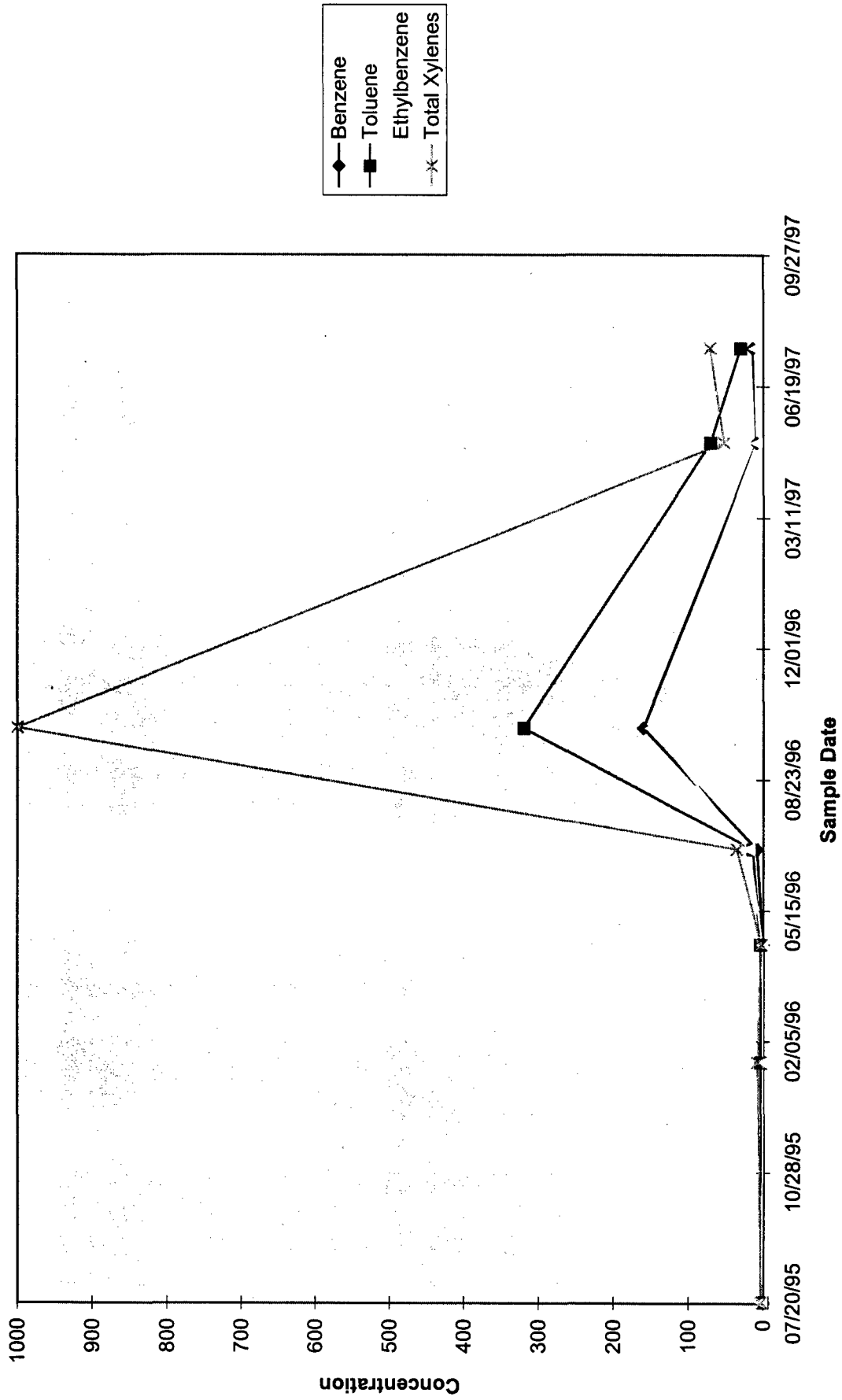
\*Concentrations in micrograms per liter (ug/L)

# MW-72



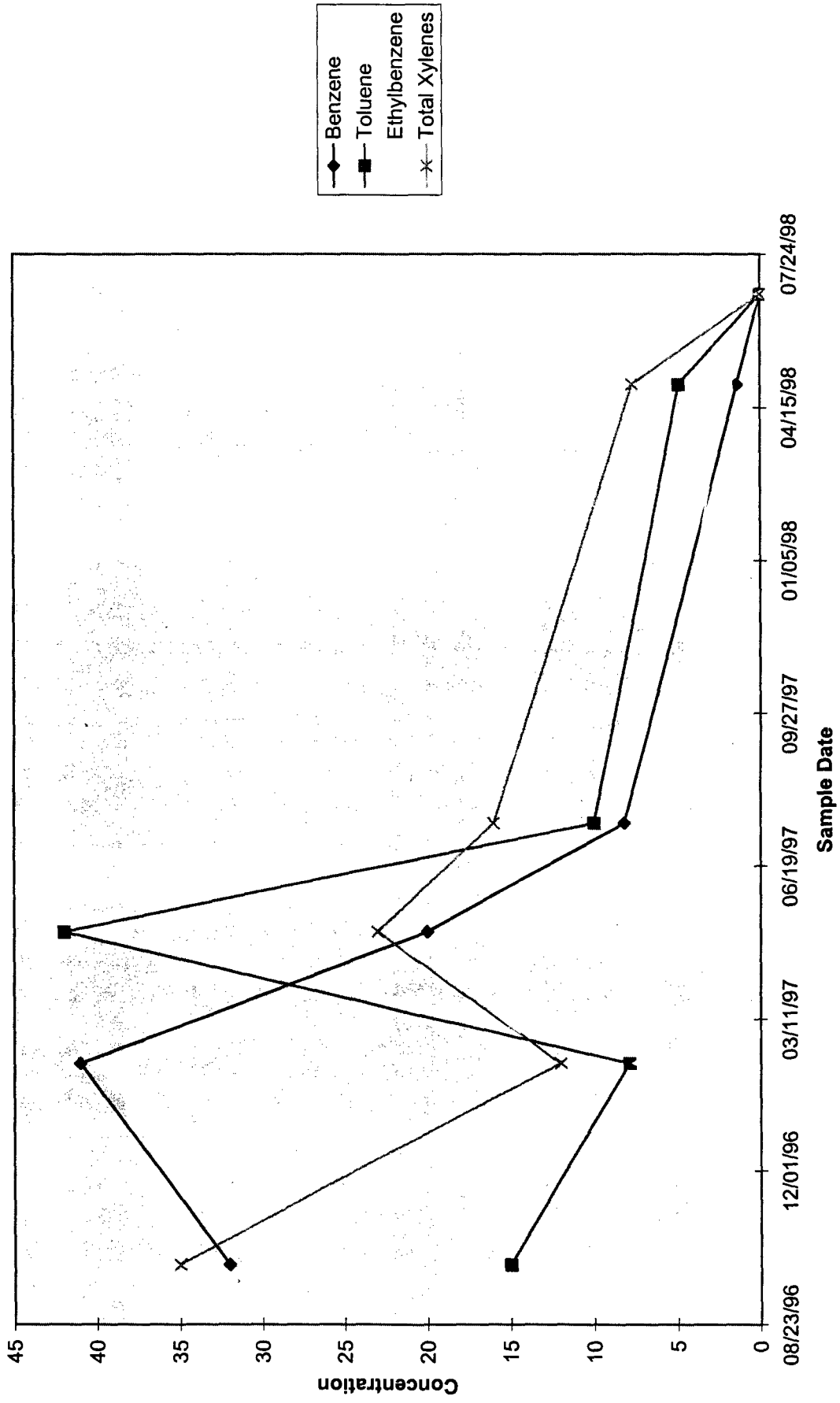
\*Concentrations in micrograms per liter (ug/L)

MW-77



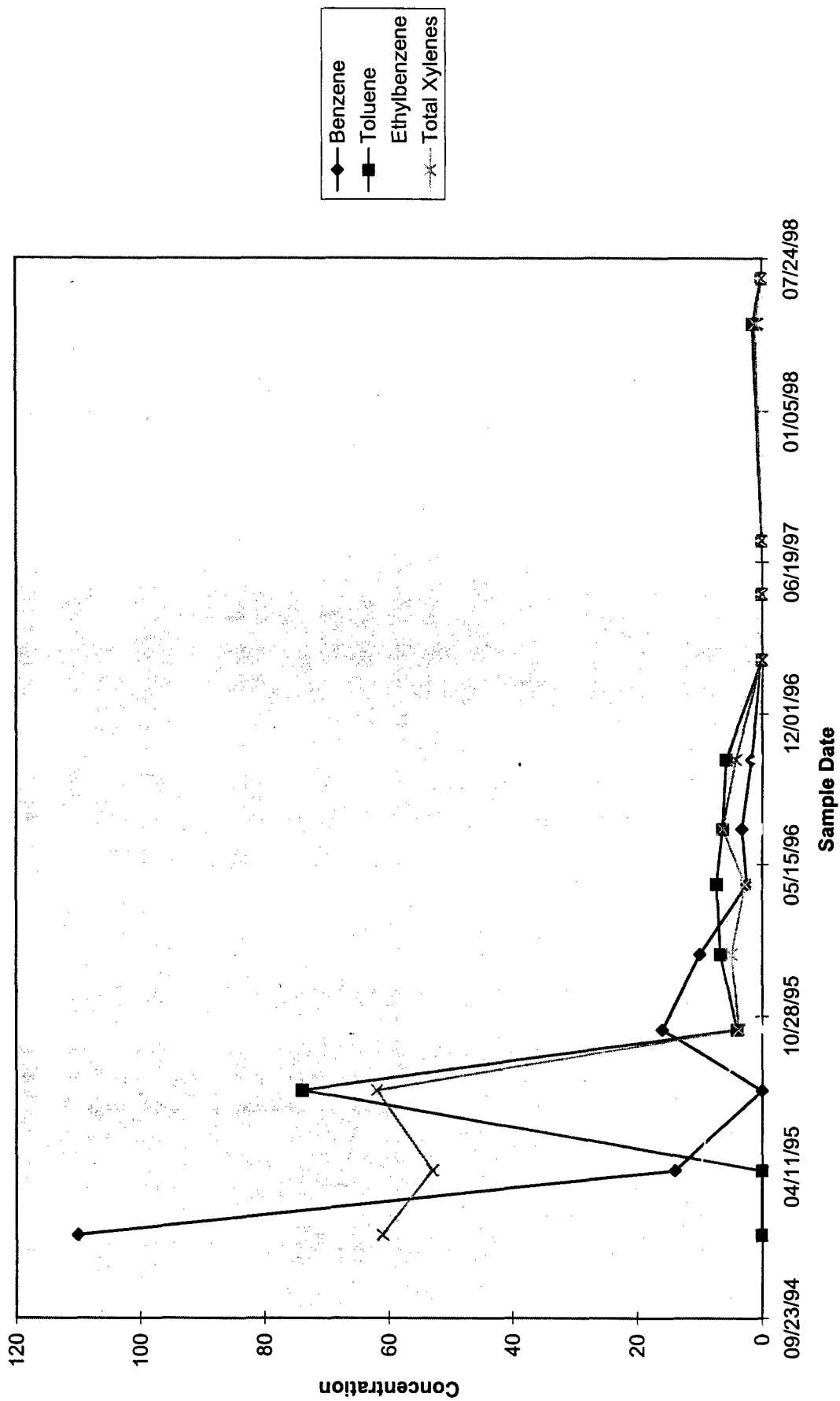
\*Concentrations in micrograms per liter (ug/L)

# MW-78



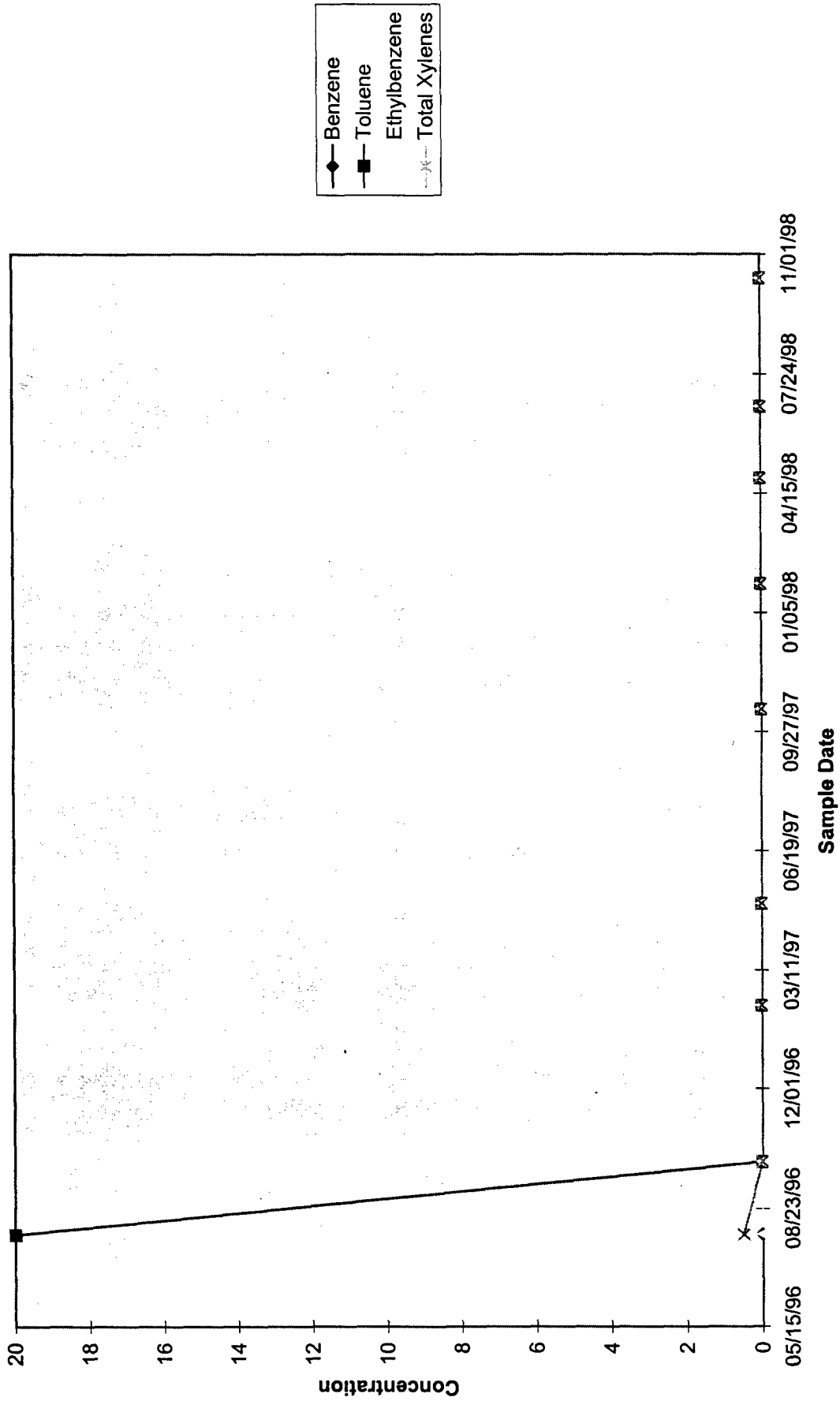
\*Concentrations in micrograms per liter (ug/L)

# MW-79



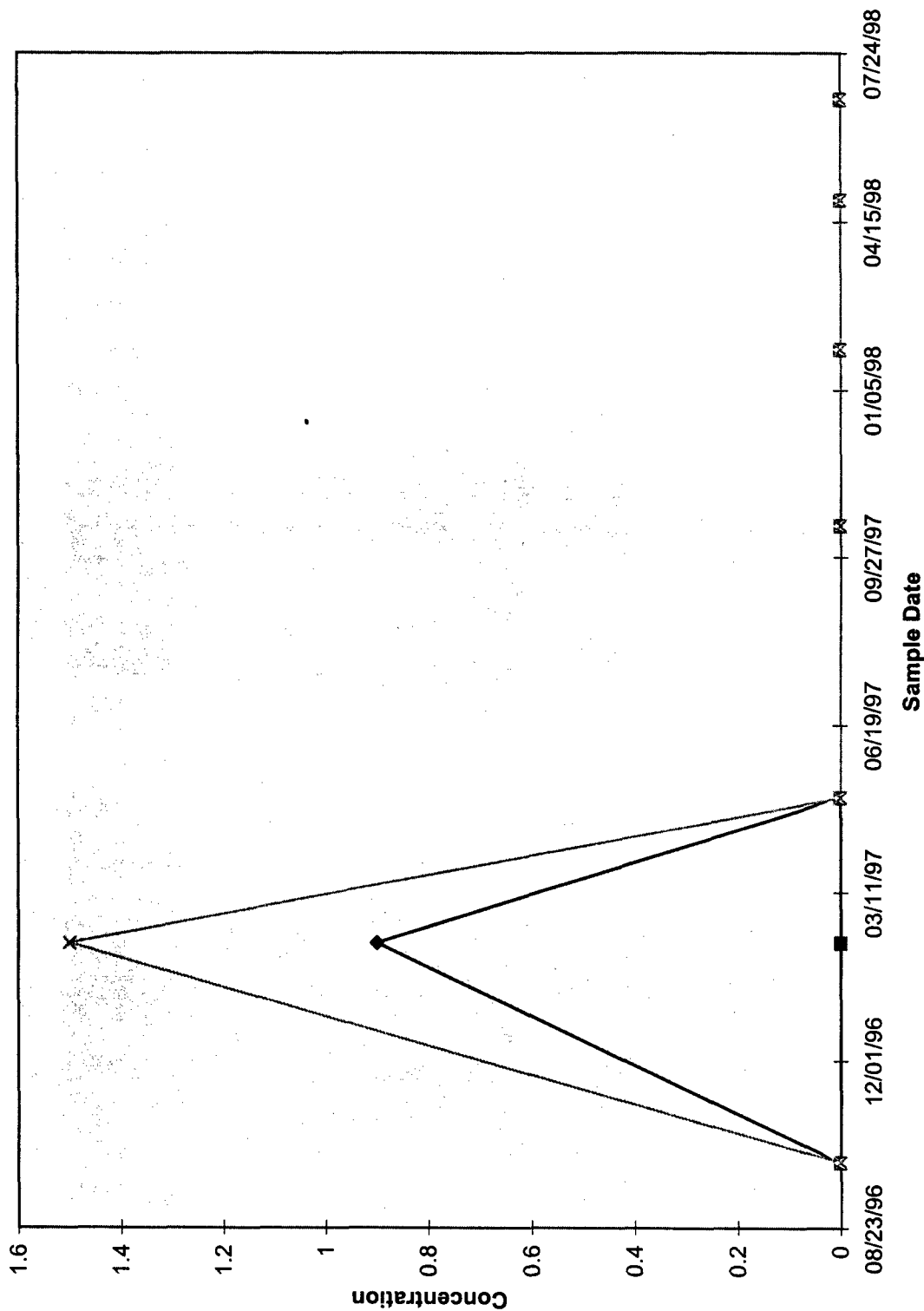
\*Concentrations in micrograms per liter (ug/L)

# MW-87



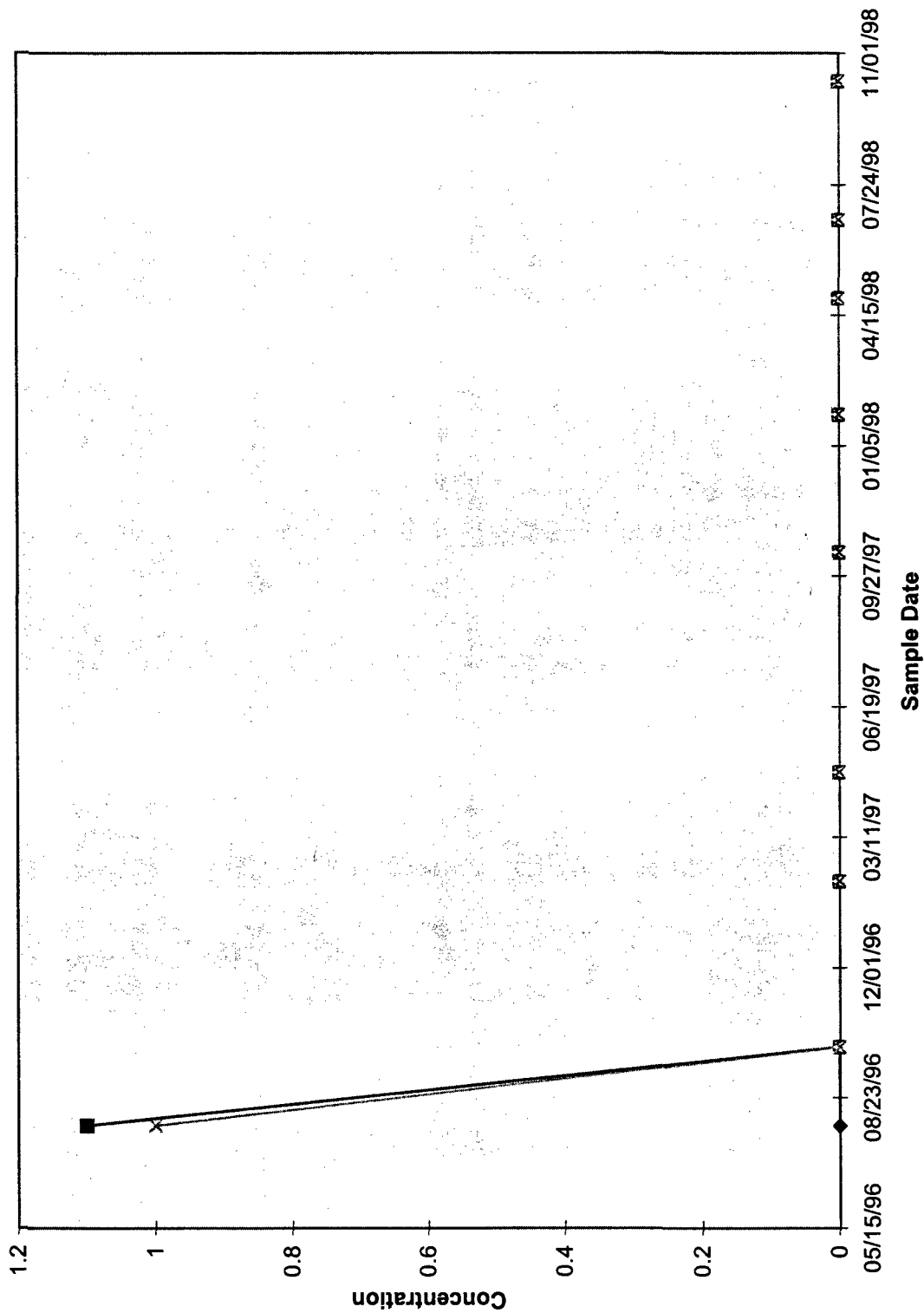
\*Concentrations in micrograms per liter (ug/L)

# MW-87A



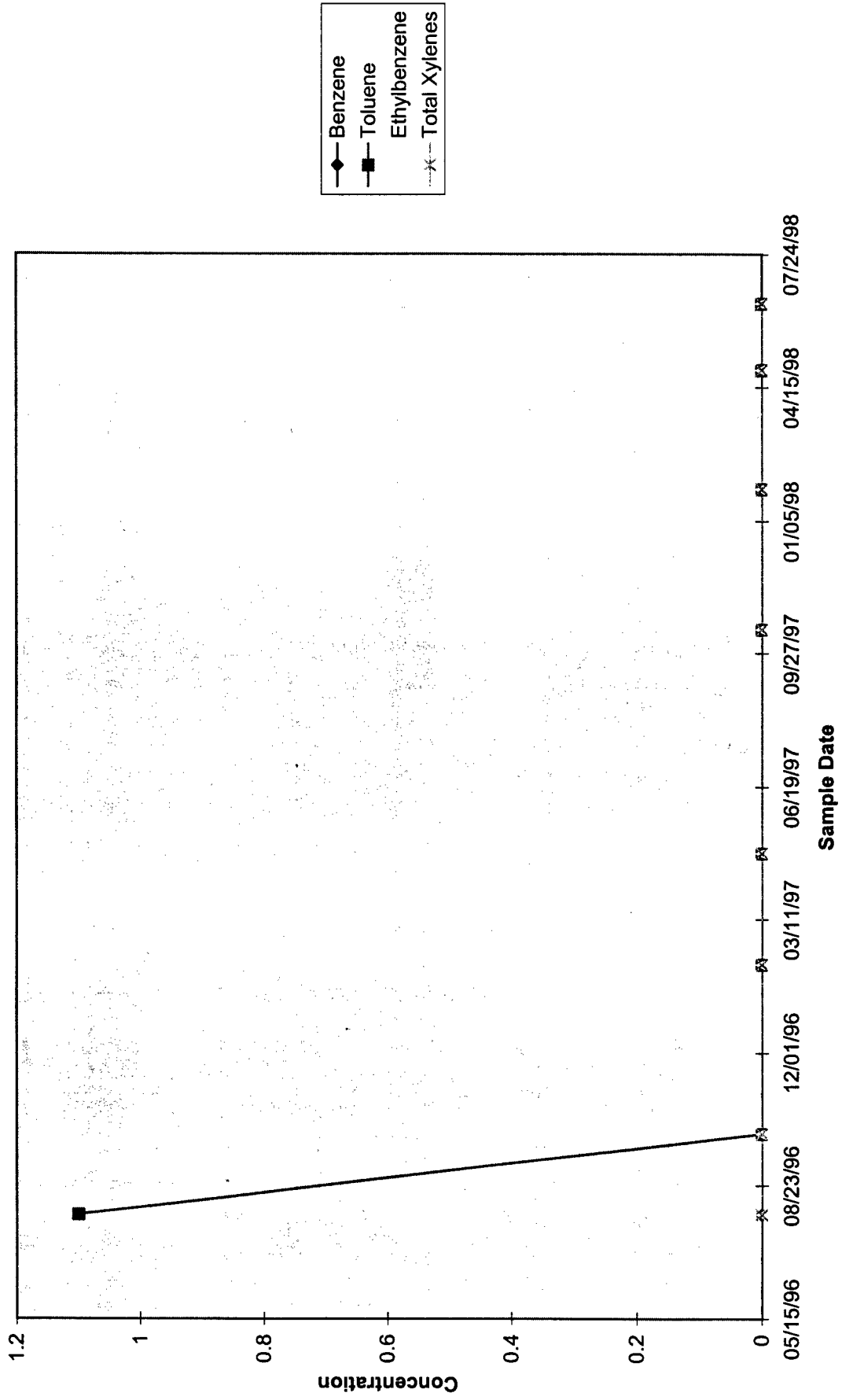
\*Concentrations in micrograms per liter (ug/L)

# MW-88



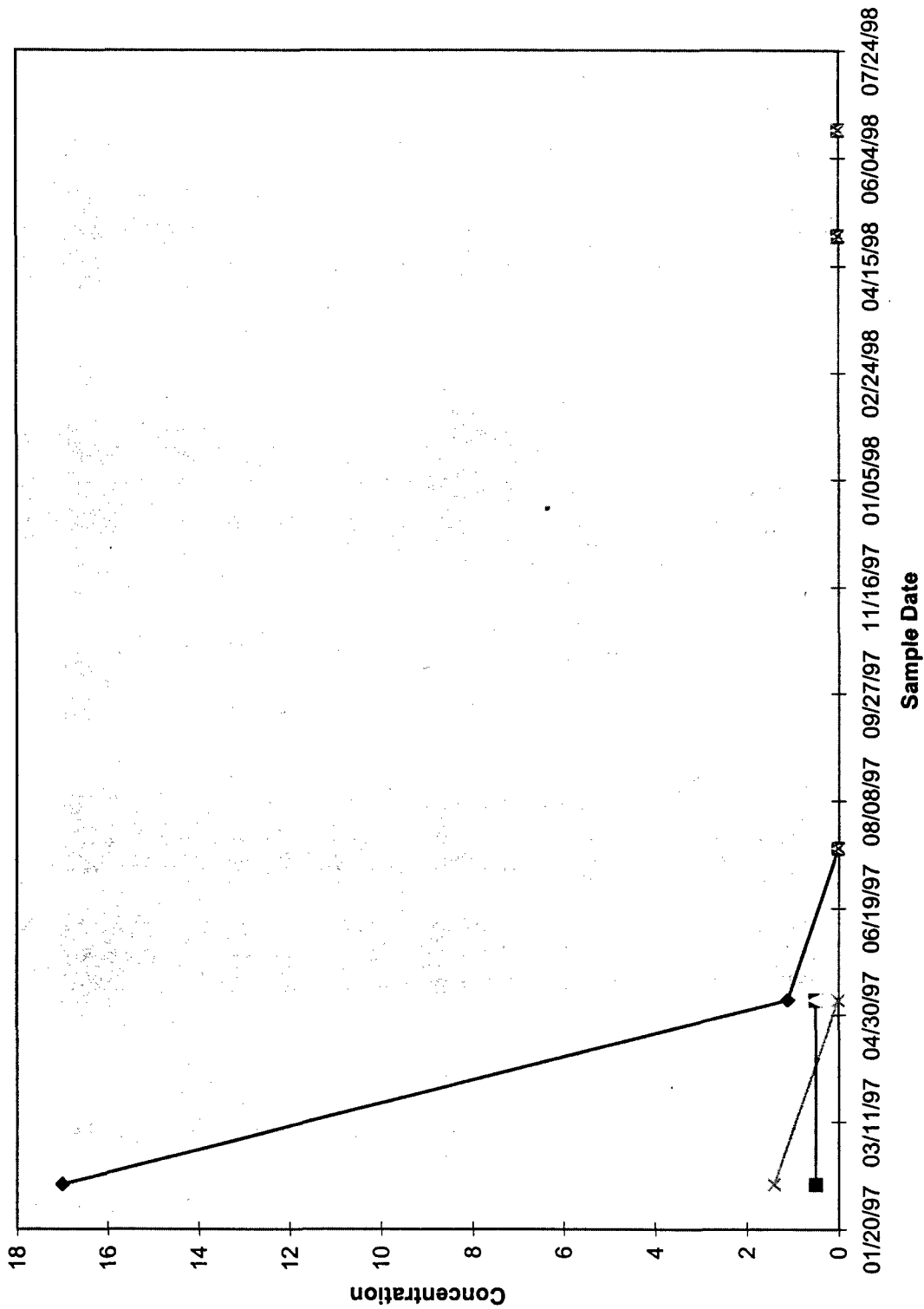
\*Concentrations in micrograms per liter (ug/L)

# MW-89



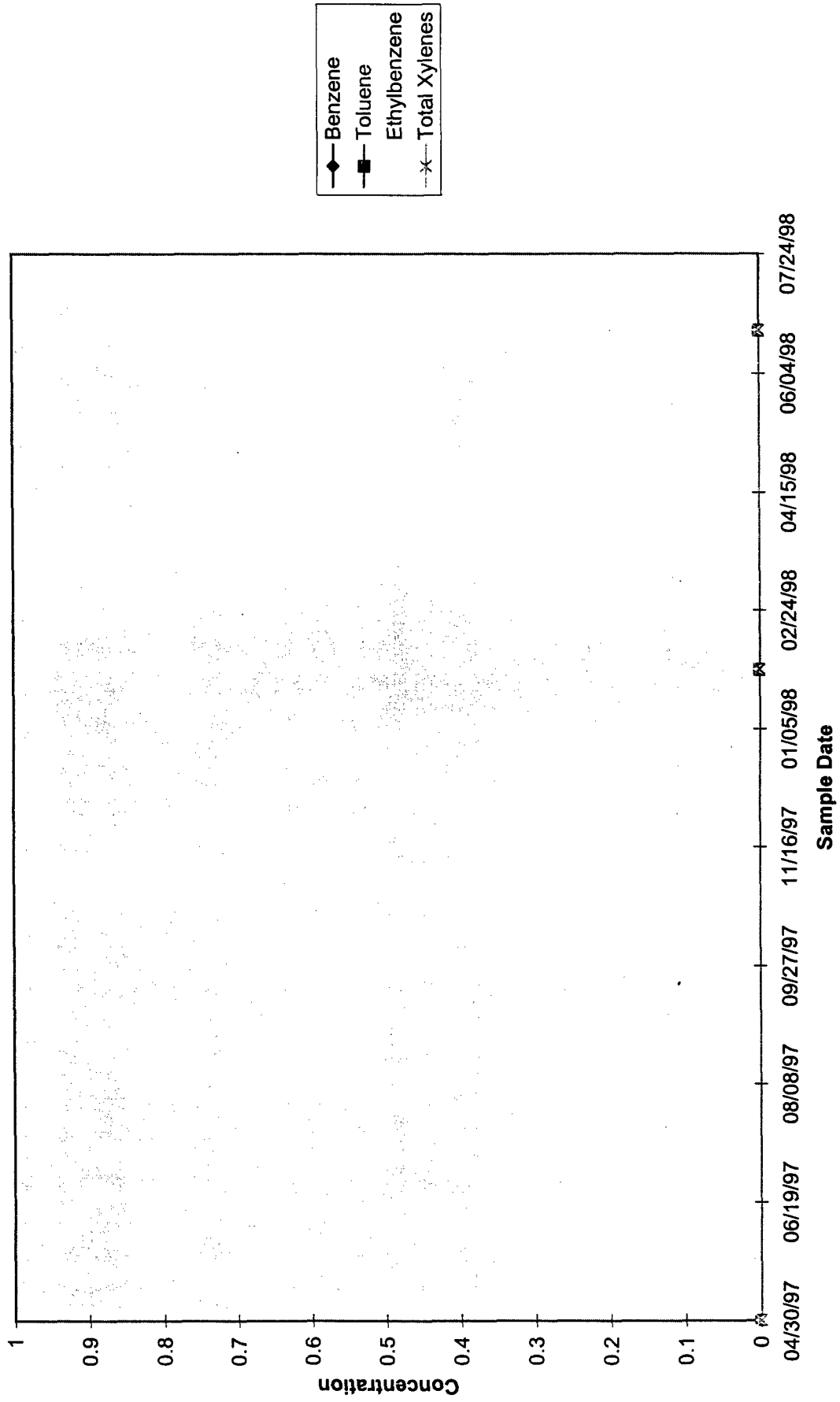
\*Concentrations in micrograms per liter (ug/L)

# MW-90



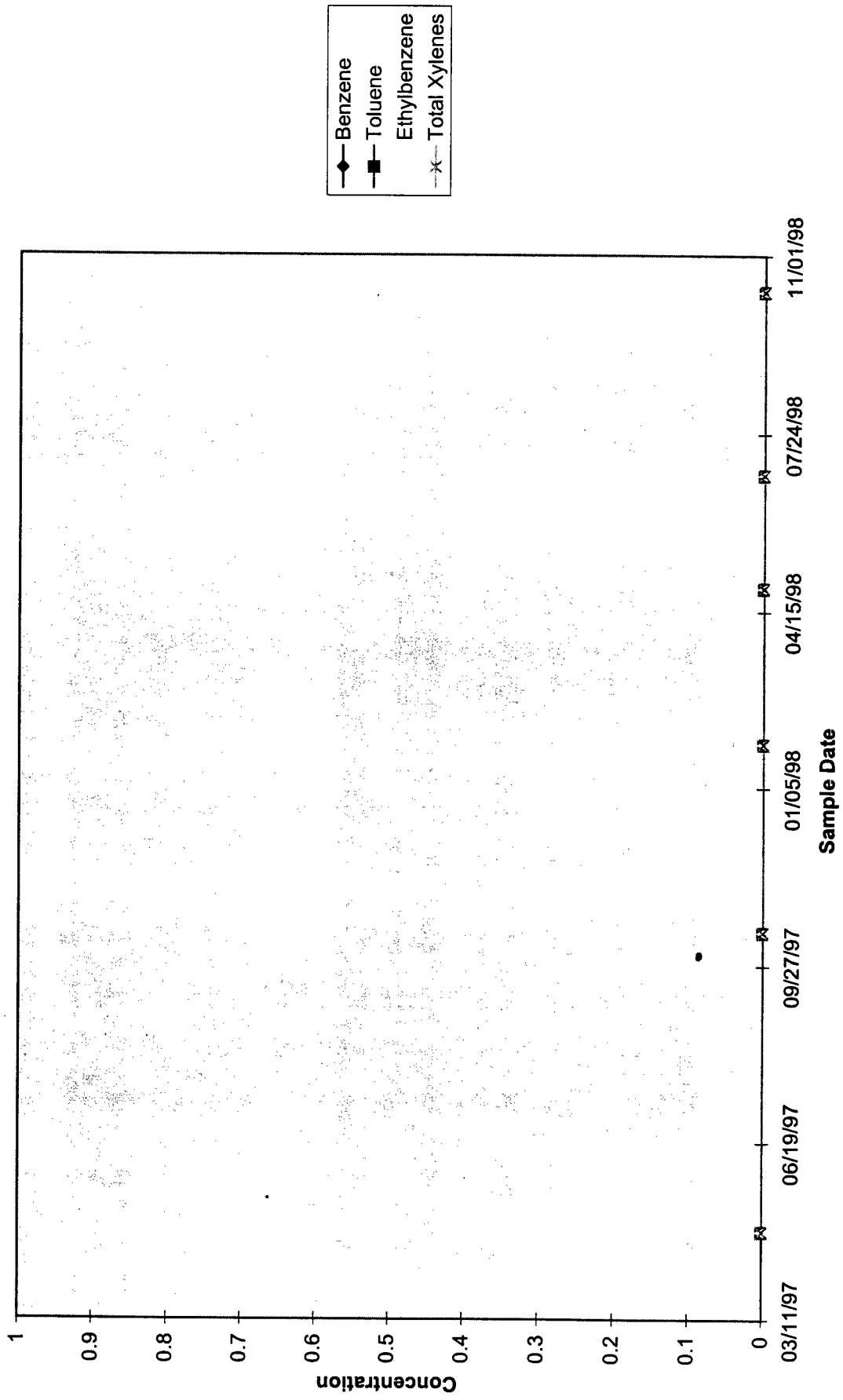
\*Concentrations in micrograms per liter (ug/L)

# MW-95



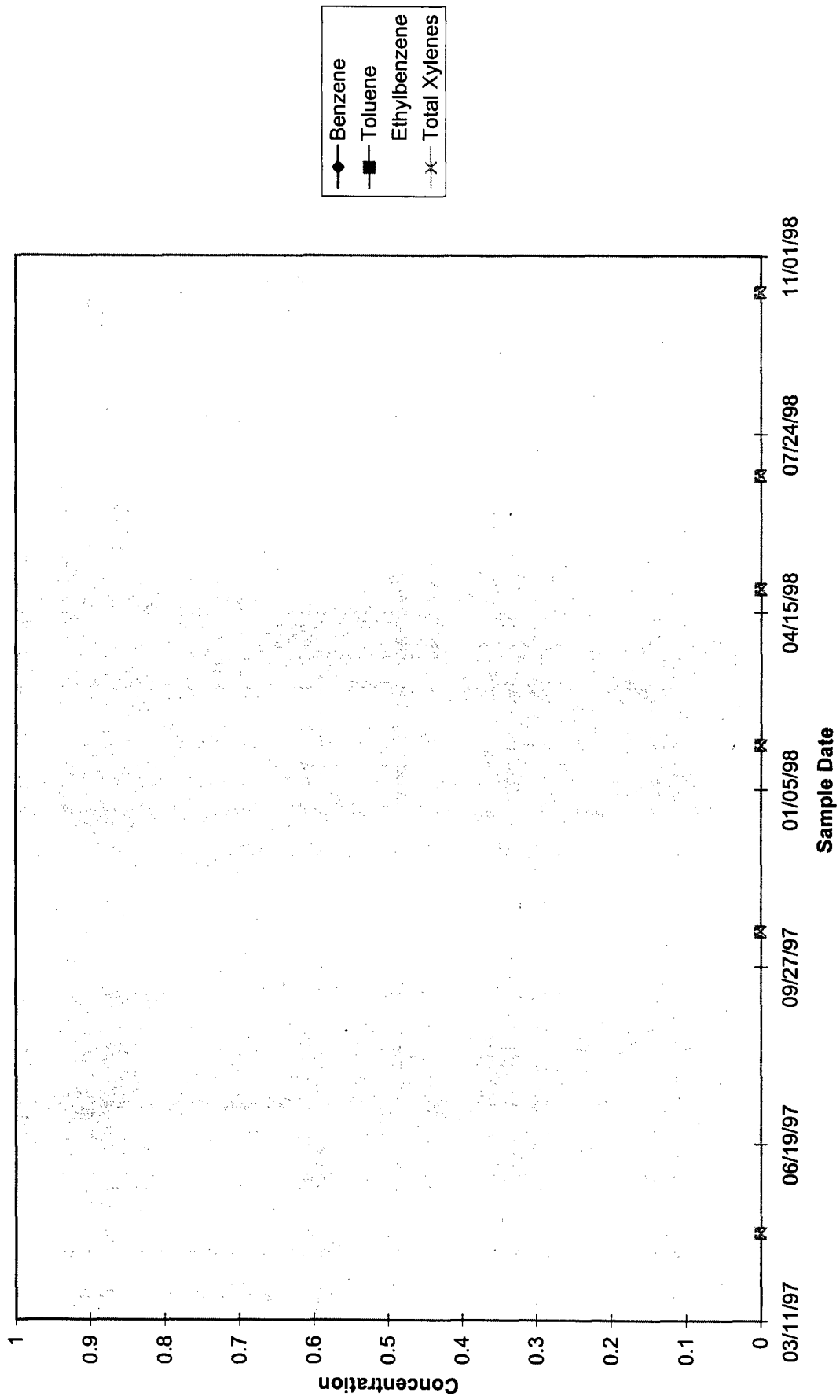
\*Concentrations in micrograms per liter (ug/L)

# MW-96



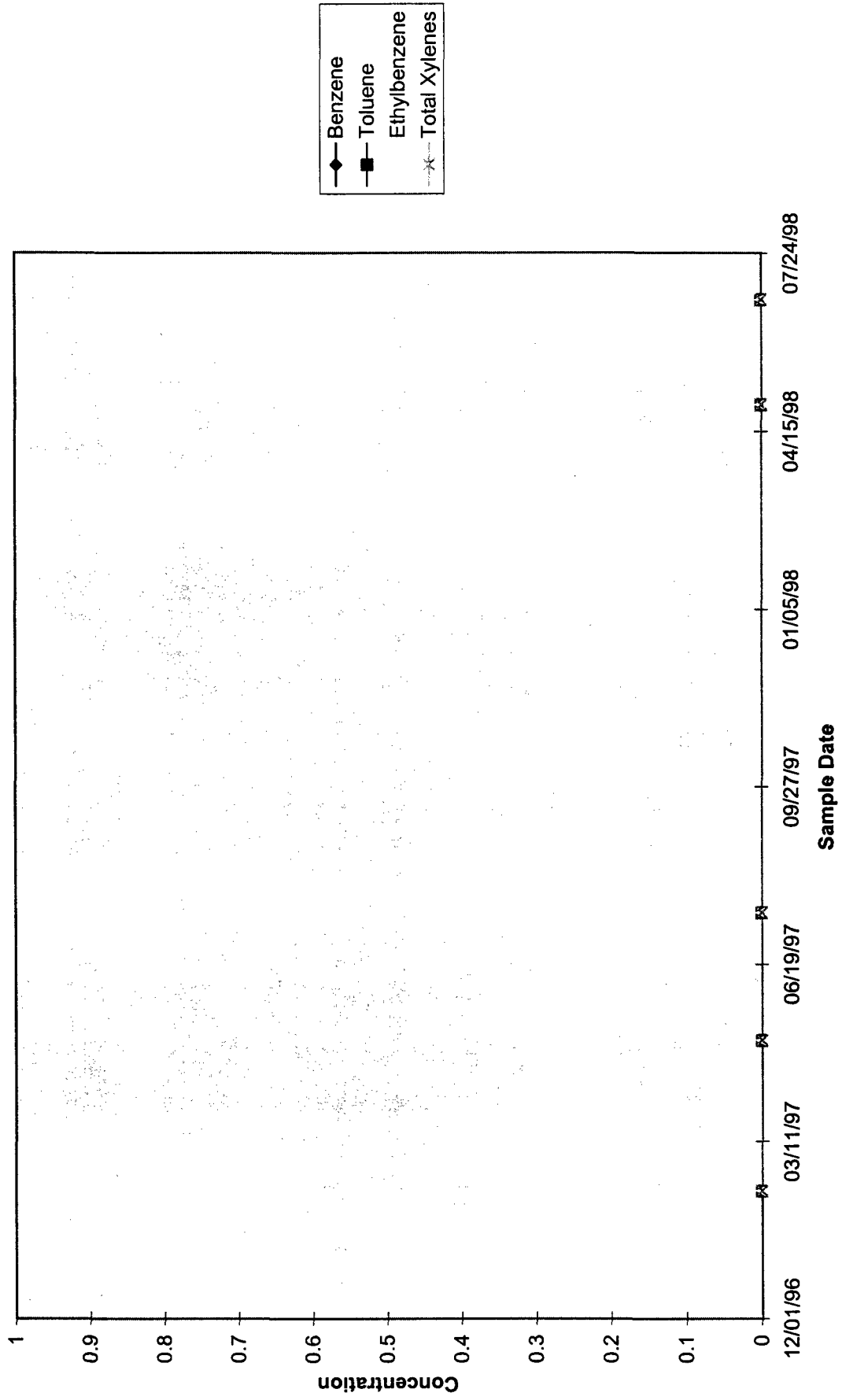
\*Concentrations in micrograms per liter (ug/L)

# MW-97



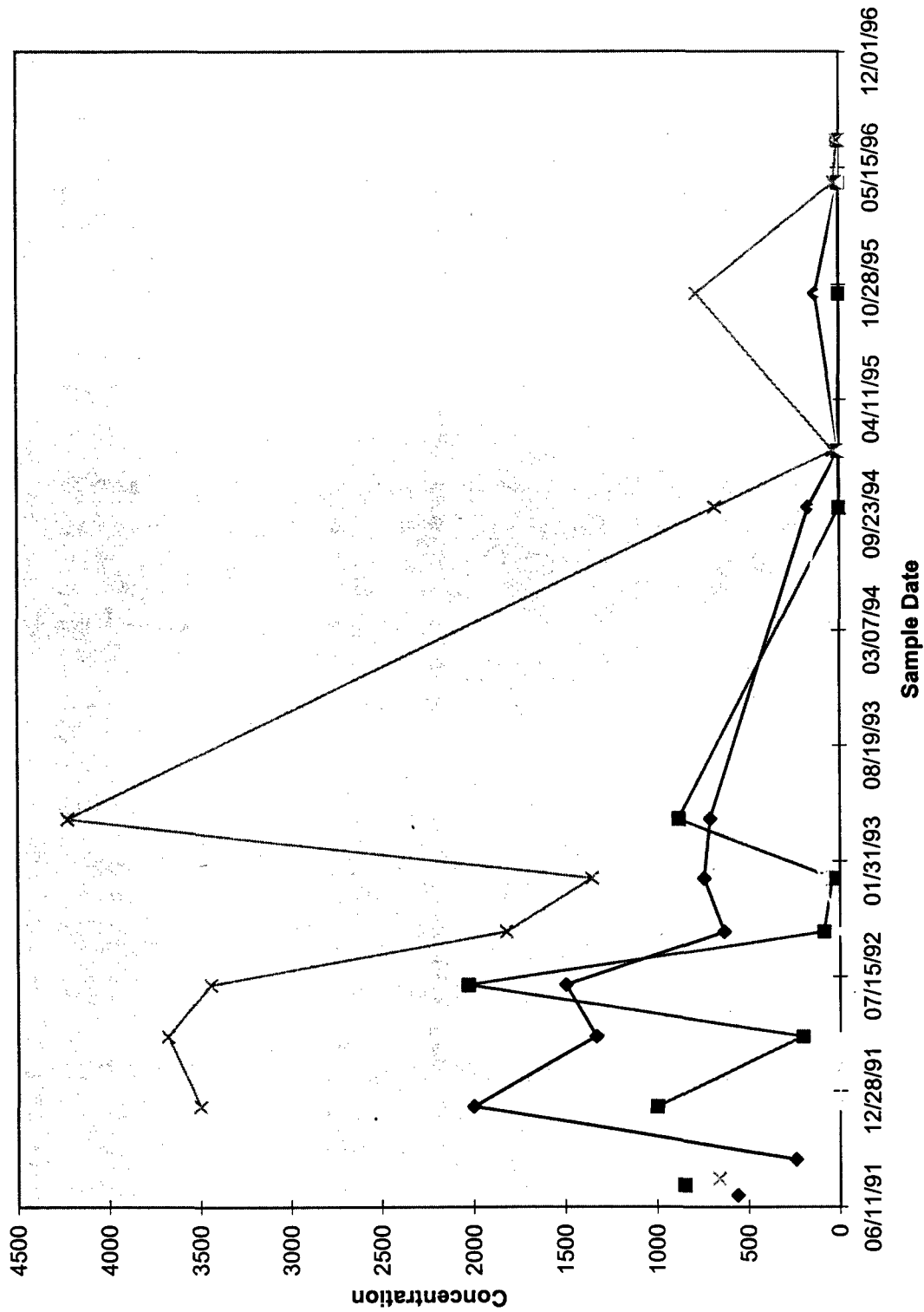
\*Concentrations in micrograms per liter (ug/L)

# MW-106



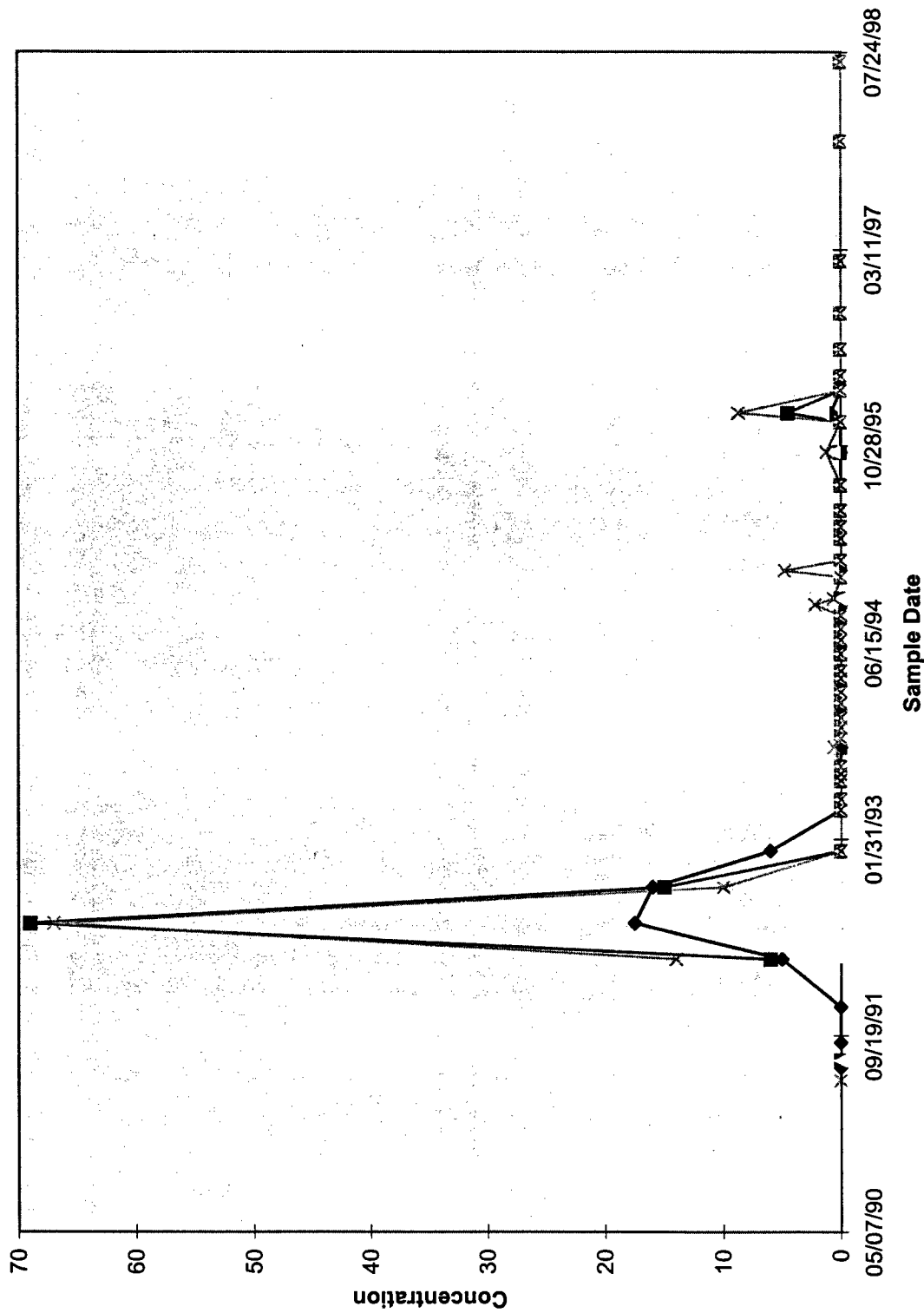
\*Concentrations in micrograms per liter (ug/L)

# Sump-16A



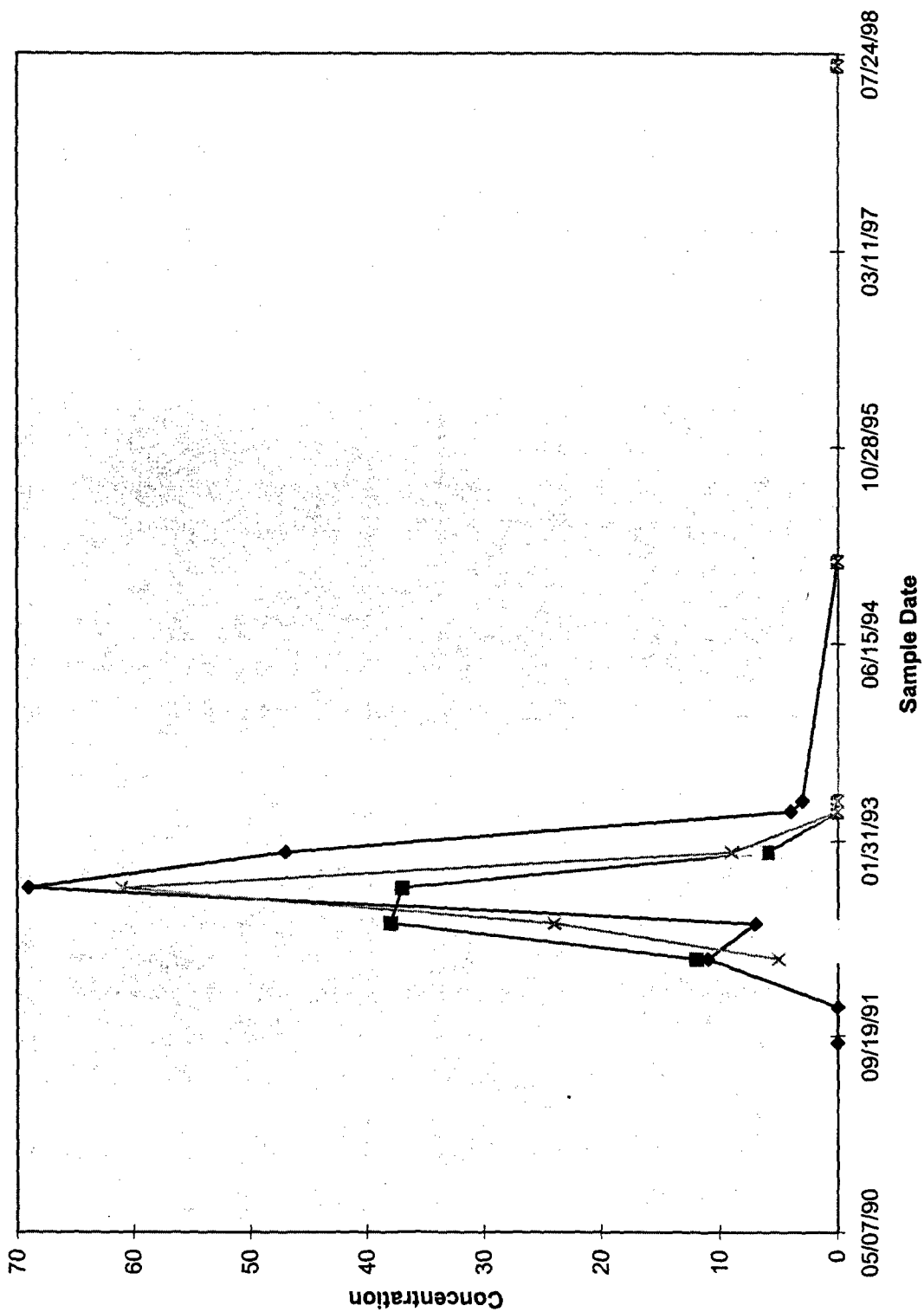
\*Concentrations in micrograms per liter (ug/L)

# SW-01



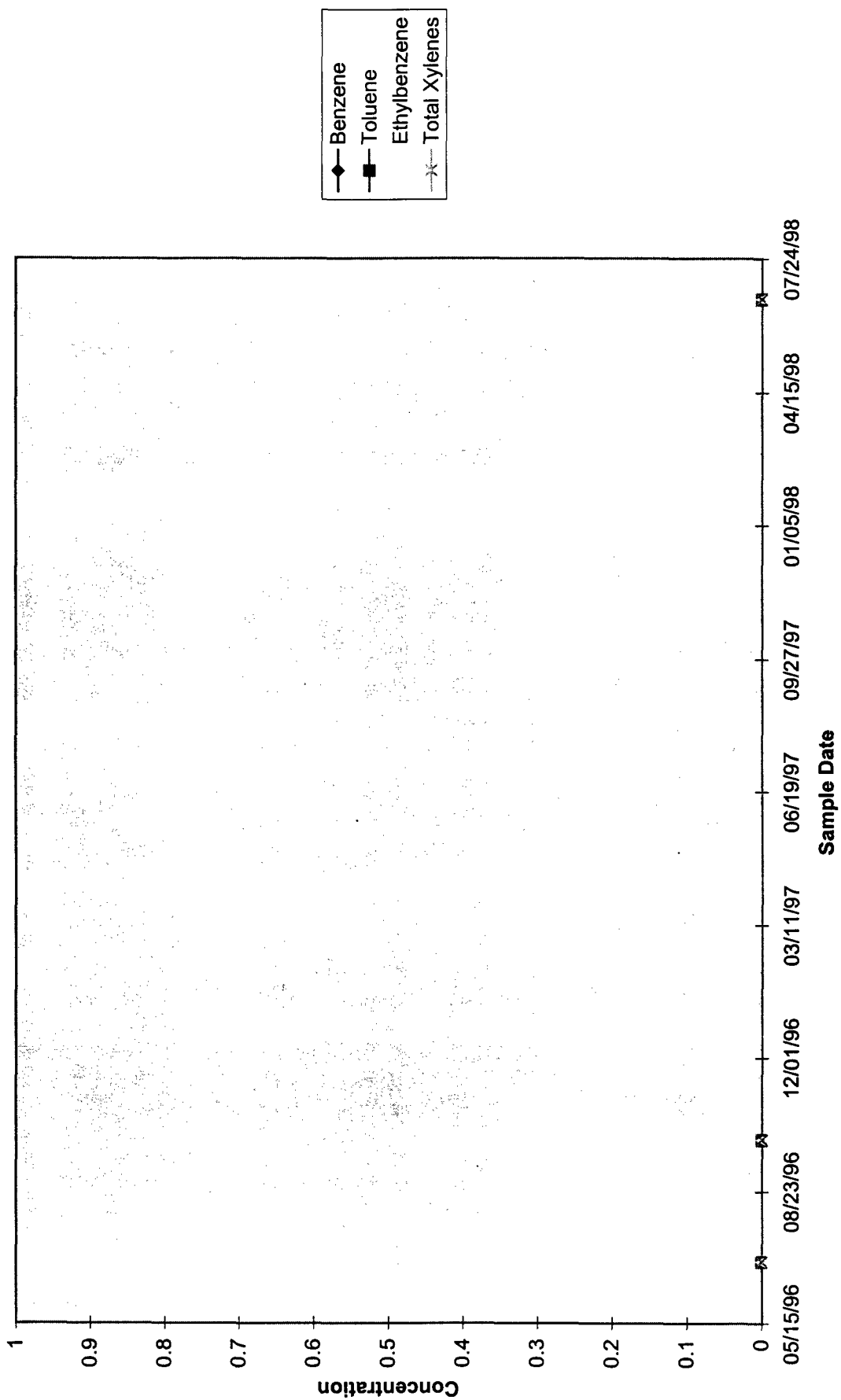
\*Concentrations in micrograms per liter (ug/L)

SW-02



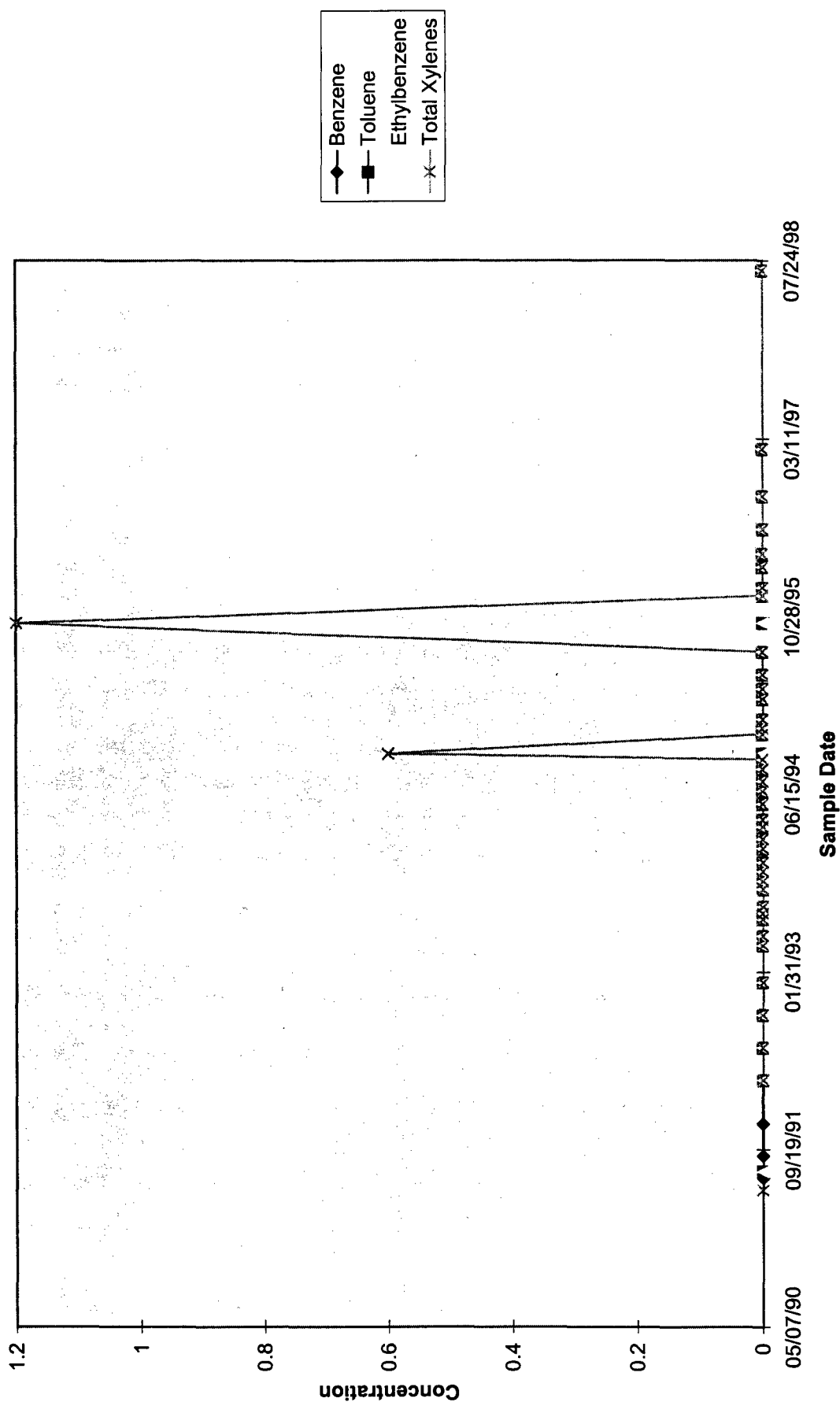
\*Concentrations in micrograms per liter (ug/L)

SW-03



\*Concentrations in micrograms per liter (ug/L)

# UIHS-ARROYO



\*Concentrations in micrograms per liter (ug/L)

## **Appendix E**

Laboratory Analytical Reports

Laboratory Analytical Report  
Quarterly Groundwater Sampling  
Event, October 1998



2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

CLIENT : MARATHON OIL COMPANY  
PROJECT # : 104332.40  
PROJECT NAME : INDIAN BASIN REMEDIATION

PINNACLE ID : 810048  
DATE RECEIVED : 10/13/98  
REPORT DATE : 11/5/98

| AEN<br>ID. # | CLIENT DESCRIPTION | MATRIX  | DATE<br>COLLECTED |
|--------------|--------------------|---------|-------------------|
| 01           | DI H2O             | AQUEOUS | 10/11/98          |
| 02           | INT RB             | AQUEOUS | 10/11/98          |
| 03           | MW-63              | AQUEOUS | 10/11/98          |
| 04           | MW-63RB            | AQUEOUS | 10/11/98          |
| 05           | MW-111             | AQUEOUS | 10/11/98          |
| 06           | MW-111RB           | AQUEOUS | 10/11/98          |
| 07           | MW-89              | AQUEOUS | 10/11/98          |
| 08           | MW-89RB            | AQUEOUS | 10/11/98          |
| 09           | MW-66              | AQUEOUS | 10/11/98          |
|              | MW-66RB            | AQUEOUS | 10/11/98          |
|              | MW-61A             | AQUEOUS | 10/11/98          |
| 12           | MW-61ARB           | AQUEOUS | 10/11/98          |
| 13           | MW-88              | AQUEOUS | 10/11/98          |
| 14           | MW-88RB            | AQUEOUS | 10/11/98          |
| 15           | MW-71              | AQUEOUS | 10/11/98          |
| 16           | MW-71RB            | AQUEOUS | 10/12/98          |
| 17           | MW-87ARB           | AQUEOUS | 10/12/98          |
| 18           | MW-87              | AQUEOUS | 10/12/98          |
| 19           | MW-87RB            | AQUEOUS | 10/12/98          |
| 20           | MW-60              | AQUEOUS | 10/12/98          |
| 21           | MW-60RB            | AQUEOUS | 10/12/98          |
| 22           | MW-95              | AQUEOUS | 10/12/98          |
| 23           | MW-95RB            | AQUEOUS | 10/12/98          |
| 24           | MW-97              | AQUEOUS | 10/12/98          |
| 25           | MW-97RB            | AQUEOUS | 10/12/98          |
| 26           | MW-96              | AQUEOUS | 10/12/98          |
| 27           | MW-82              | AQUEOUS | 10/12/98          |
| 28           | MW-68              | AQUEOUS | 10/12/98          |
| 29           | TRIP BLANK         | AQUEOUS | 10/1/98           |

# Environmental Services Laboratory, Inc.

17400 SW Upper Boones Ferry Road • Suite 270 • Portland, OR 97224 • (503) 670-8520

Kim McNeill  
Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

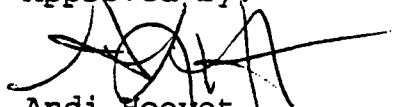
Date: 11/18/1998  
ESL Account No.: 90147  
ESL Job Number: 98.02179

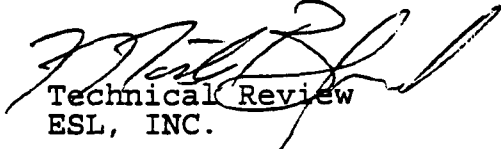
Project: 810048 / MOC  
Location:

Sample analysis in support of the project referenced above has been completed and results are presented on the following pages. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

| Sample<br>Number | Sample Description | Matrix<br>Type | Date<br>Taken | Date<br>Received |
|------------------|--------------------|----------------|---------------|------------------|
| 107186           | 810048-03 (MW-63)  | Water          | 10/11/1998    | 10/14/1998       |
| 107187           | 810048-15 (MW-71)  | Water          | 10/11/1998    | 10/14/1998       |
| 107188           | 810048-18 (MW-87)  | Water          | 10/12/1998    | 10/14/1998       |
| 107189           | 810048-22 (MW-95)  | Water          | 10/12/1998    | 10/14/1998       |
| 107190           | 810048-24 (MW-97)  | Water          | 10/12/1998    | 10/14/1998       |
| 107191           | 810048-27 (MW-82)  | Water          | 10/12/1998    | 10/14/1998       |
| 107192           | 810048-28 (MW-68)  | Water          | 10/12/1998    | 10/14/1998       |

Approved by:

  
Andi Hoevet  
Project Manager  
ESL, INC.

  
Technical Review  
ESL, INC.

The results from these samples relate only to the items tested. This report shall not be reproduced, except in full, without the written approval of the laboratory.

*ANALYTICAL SERVICES FOR THE ENVIRONMENT*

## ANALYTICAL REPORT

Kim McNeill  
Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

11/18/1998  
Job No.: 98.02179

Page: 2

Project Name: 810048 / MOC  
Date Received: 10/14/1998

Sample Number      Sample Description  
107186              810048-03 (MW-63)

| <u>PARAMETERS</u> | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|-------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Sulfate           | 375.4          | 28.1           | 5.0                 | mg/L         | 11/18/1998           |             |

Sample Number      Sample Description  
107187              810048-15 (MW-71)

| <u>PARAMETERS</u> | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|-------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Sulfate           | 375.4          | 550            | 250                 | mg/L         | 11/18/1998           | DIL         |

Sample Number      Sample Description  
107188              810048-18 (MW-87)

| <u>PARAMETERS</u> | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|-------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Sulfate           | 375.4          | 260            | 250                 | mg/L         | 11/18/1998           | DIL         |

Sample Number      Sample Description  
107189              810048-22 (MW-95)

| <u>PARAMETERS</u> | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|-------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Sulfate           | 375.4          | 19             | 5.0                 | mg/L         | 11/18/1998           |             |

Sample Number      Sample Description  
107190              810048-24 (MW-97)

| <u>PARAMETERS</u> | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|-------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Sulfate           | 375.4          | 200            | 50.0                | mg/L         | 11/18/1998           | DIL         |

Sample Number      Sample Description  
107191              810048-27 (MW-82)

| <u>PARAMETERS</u> | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|-------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Sulfate           | 375.4          | 190            | 50.0                | mg/L         | 11/18/1998           | DIL         |

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

mg = ppm      ug = ppb      su = standard units

Environmental Services Laboratory, Inc. (503) 670-8520 (503) 670-9243 FAX  
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## ANALYTICAL REPORT

Kim McNeill  
Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

11/18/1998  
Job No.: 98.02179

Page: 3

Project Name: 810048 / MOC  
Date Received: 10/14/1998

Sample Number      Sample Description  
107192              810048-28 (MW-68)

| <u>PARAMETERS</u> | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|-------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Sulfate           | 375.4          | 70             | 50.0                | mg/L         | 11/18/1998           | DIL         |

A sample result of ND indicates the parameter was Not Detected at the reporting limit.  
mg = ppm      ug = ppb      su = standard units

Environmental Services Laboratory, Inc. (503) 670-8520 (503) 670-9243 FAX  
17400 SW Upper Boones Ferry Rd., Suite 270, Portland, OR 97224

# QUALITY CONTROL REPORT CONTINUING CALIBRATION VERIFICATION

Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 11/18/1998  
Job Number: 98.02179

Contact: Kim McNeill  
Project: 810048 / MOC

| Analyte | CCV                   | Concentration<br>Found | Percent<br>Recovery | Date<br>Analyzed |
|---------|-----------------------|------------------------|---------------------|------------------|
|         | True<br>Concentration |                        |                     |                  |
| Sulfate | 139                   | 136                    | 97.8                | 11/18/1998       |

CCV - Continuing Calibration Verification

Environmental Services Laboratory, Inc. (503)670-8520 (503)670-9243 FAX  
17400 SW Upper Boones Ferry Rd., Suite 270, Portland, OR 97224

# QUALITY CONTROL REPORT MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 11/18/1998  
Job Number: 98.02179

Contact: Kim McNeill  
Project: 810048 / MOC

| Analyte | Matrix | Sample | Spike | Units | Percent | MSD    | Spike | Units | Percent | MS/MSD | Flags |
|---------|--------|--------|-------|-------|---------|--------|-------|-------|---------|--------|-------|
|         | Spike  |        |       |       |         | Result |       |       |         | Result |       |
| Sulfate | 82.4   | 28.1   | 50.0  | mg/L  | 108.6   | 77.0   | 50.0  | mg/L  | 97.8    | 10.4   |       |

QC Sample:

NOTE: Matrix Spike Samples may not be samples from this job.

MS = Matrix Spike

MSD = Matrix Spike Duplicate

RPD = Relative Percent Difference

dil. = Diluted Out

Environmental Services Laboratory, Inc. (503) 670-8520 (503) 670-9243 FAX  
17400 SW Upper Boones Ferry Rd., Portland, OR 97224

## QUALITY CONTROL REPORT BLANKS

Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 11/18/1998

Job Number: 98.02179

Contact: Kim McNeill  
Project: 810048 / MOC  
Location:

| Analyte | Blank<br>Analysis | Report<br>Limit | Units | Date<br>Analyzed |
|---------|-------------------|-----------------|-------|------------------|
| Sulfate | ND                | 5.0             | mg/L  | 11/18/1998       |

Environmental Services Laboratory, Inc. (503) 670-8520 (503) 670-9243 FAX  
17400 SW Upper Boones Ferry Rd., Portland, OR 97224

## QUALITY CONTROL REPORT DUPLICATES

Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 11/18/1998

Job Number: 98.02179

Contact: Kim McNeill  
Project: 810048 / MOC

| Analyte | Original<br>Analysis | Duplicate<br>Analysis | Units | RPD | Date<br>Analyzed | Flag |
|---------|----------------------|-----------------------|-------|-----|------------------|------|
| Sulfate | 28.1                 | 29.3                  | mg/L  | 4.2 | 11/18/1998       |      |

NOTE: Duplicates may not be samples from this job.

RPD - Relative Percent Difference

# FLAG GLOSSARY

|     |                                                                                                                                                                                                       |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A   | This sample does not have a typical gasoline pattern.                                                                                                                                                 |
| B1  | This sample does not have a typical diesel pattern.                                                                                                                                                   |
| B   | Analyte found in the associated blank as well as the sample.                                                                                                                                          |
| C   | The sample contains a lighter hydrocarbon than gasoline.                                                                                                                                              |
| CN  | See case narrative                                                                                                                                                                                    |
| CS  | Outside control limits or unusual matrix; see case narrative.                                                                                                                                         |
| D   | The sample extends to a heavier hydrocarbon range than gasoline.                                                                                                                                      |
| d   | Results on a dry weight basis                                                                                                                                                                         |
| DIL | Result was calculated from dilution.                                                                                                                                                                  |
| E   | The sample extends to a lighter hydrocarbon range than diesel.                                                                                                                                        |
| F   | The sample extends to a heavier hydrocarbon range than diesel.                                                                                                                                        |
| G   | The positive result for gasoline is due to single component contamination.                                                                                                                            |
| H   | The sample extends to a lighter hydrocarbon range than oil.                                                                                                                                           |
| I   | The oil pattern for this sample is not typical.                                                                                                                                                       |
| J   | The result for this compound is an estimated concentration.                                                                                                                                           |
| L   | The LCS recovery exceeded control limits. See the LCS page of this report.                                                                                                                            |
| LM  | The LCS recovery exceeded control limits; the MS/MSD were in control validating the batch.                                                                                                            |
| M   | MS and/or MSD percent recovery exceeds control limits.                                                                                                                                                |
| MD  | Unable to calculate MS/MSD recovery due to high amount of analyte; greater than 4 times spike level.                                                                                                  |
| MR  | The MS/MSD RPD is greater than method criteria. The sample was re-extracted and re-analyzed with similar results indicating a non-homogeneous sample.                                                 |
| MM  | The Matrix Spike exceeded control limits; LCS was in control validating the batch.                                                                                                                    |
| MI  | Outside control limits due to matrix interference.                                                                                                                                                    |
| N   | Manual integration performed on sample for quantification.                                                                                                                                            |
| N/A | Not Applicable.                                                                                                                                                                                       |
| NC  | Not calculable.                                                                                                                                                                                       |
| NO  | Not Analyzed.                                                                                                                                                                                         |
| P   | A post digestion spike was analyzed, and recoveries were within control limits.                                                                                                                       |
| Q   | Detection limits elevated due to sample matrix.                                                                                                                                                       |
| Q1  | Detection limits elevated due to high levels of non-target compounds. Sample(s) run at a dilution.                                                                                                    |
| R   | The duplicate RPD was greater than 20%. The sample was re-extracted and re-analyzed with similar results. This indicates a matrix interference in the sample, likely a non-homogeneity of the sample. |
| R1  | The duplicate RPD was greater than 20%. Visual inspection showed the sample to be non-homogeneous.                                                                                                    |
| RD  | RPD not applicable for results less than five times the reporting limit.                                                                                                                              |
| RH  | The Relative Percent Difference (RPD) between two columns was greater than 40%, the higher result was reported.                                                                                       |
| RL  | The Relative Percent Difference (RPD) between two columns was greater than 40%, the lower result was reported due to obvious interference with the higher result.                                     |
| RP  | MS/MSD RPD is greater than 20%                                                                                                                                                                        |
| SR  | Surrogate recovery outside control limits. See the surrogate page of the report.                                                                                                                      |
| SD  | Unable to quantitate surrogate due to sample dilution.                                                                                                                                                |
| SC  | Sample not provided to laboratory in proper sampling container.                                                                                                                                       |
| V   | Volatile analysis was requested, sample container received with headspace.                                                                                                                            |
| X1  | The duplicate RPD was greater than 20%. Due to insufficient sample, re-analysis was not possible.                                                                                                     |
| X   | Sample was analyzed outside recommended holding times.                                                                                                                                                |
| Y   | The result for this parameter was greater than the TCLP regulatory limit.                                                                                                                             |
| Z   | The pattern seen for the parameter being analyzed is not typical.                                                                                                                                     |

Pinnacle Laboratories, Inc.

2709-D Pan American Freeway, NE

Albuquerque, New Mexico 87107

(505) 344-3777 Fax (505) 344-4413

| SAMPLE ID         | DATE     | TIME | MATRIX | LAB ID | Metals (8) RCRA | RCRA TCLP METALS | Metals-13 PP List | Metals-TAT Na, Ca, Mg, K | Alk (Bicarb + Carb), <del>Na</del> , Cl | CN | TDS | Gen Chemistry FL | SULFATE <sup>added</sup> 11/14/98 | Oil and Grease | Volatile Organics GC/MS (8260) | BOD | COD | PESTICIDES/PCB (608/8080) | 8270 BY GC/MS | PNA (8310) | 8240 (TCLP 1311) ZHE | Herbicides (615/8150) | Base/Neutral Acid Compounds GC/MS (525/8270) | URANIUM | RADIUM 226+228 | Gross Alpha/Beta | TO-14 | NUMBER OF CONTAINERS |
|-------------------|----------|------|--------|--------|-----------------|------------------|-------------------|--------------------------|-----------------------------------------|----|-----|------------------|-----------------------------------|----------------|--------------------------------|-----|-----|---------------------------|---------------|------------|----------------------|-----------------------|----------------------------------------------|---------|----------------|------------------|-------|----------------------|
| 816048-03 (MW.63) | 10/11/98 | 0915 | As     | 165912 |                 |                  |                   | X                        | X                                       |    |     |                  | X                                 |                |                                |     |     |                           |               |            |                      |                       |                                              |         |                |                  |       | 2                    |
| -07 (MW.89)       |          | 1145 |        | 913    |                 |                  |                   |                          |                                         | X  |     |                  |                                   |                |                                |     |     |                           |               |            |                      |                       |                                              |         |                |                  |       | 1                    |
| -09 (MW.66)       |          | 1255 |        | 914    |                 |                  |                   |                          |                                         | X  |     |                  |                                   |                |                                |     |     |                           |               |            |                      |                       |                                              |         |                |                  |       | 1                    |
| -11 (MW.61A)      |          | 1430 |        | 915    |                 |                  |                   |                          |                                         |    | X   |                  |                                   |                |                                |     |     |                           |               |            |                      |                       |                                              |         |                |                  |       | 1                    |
| -15 (MW.71)       |          | 1710 |        | 916    |                 |                  |                   | X                        | X                                       |    | X   |                  |                                   |                |                                |     |     |                           |               |            |                      |                       |                                              |         |                |                  |       | 3                    |
| -18 (MW.87)       | 10/12    | 1630 |        | 917    |                 |                  |                   | X                        | X                                       |    |     |                  | X                                 |                |                                |     |     |                           |               |            |                      |                       |                                              |         |                |                  |       | 2                    |
| -22 (MW.95)       |          | 1255 |        | 918    |                 |                  |                   | X                        | X                                       |    |     |                  | X                                 |                |                                |     |     |                           |               |            |                      |                       |                                              |         |                |                  |       | 2                    |
| -24 (MW.97)       |          | 1410 |        | 919    |                 |                  |                   | X                        | X                                       |    |     |                  | X                                 |                |                                |     |     |                           |               |            |                      |                       |                                              |         |                |                  |       | 2                    |
| -27 (MW.82)       |          | 1550 |        | 920    |                 |                  |                   | X                        | X                                       |    |     |                  | X                                 |                |                                |     |     |                           |               |            |                      |                       |                                              |         |                |                  |       | 2                    |
| -28 (MW.68)       |          | 1630 |        | 921    |                 |                  |                   | X                        | X                                       |    |     |                  | X                                 |                |                                |     |     |                           |               |            |                      |                       |                                              |         |                |                  |       | 2                    |

| PROJECT INFORMATION   |                 | SAMPLE RECEIPT             |           | SAMPLES SENT TO:   |   | RELINQUISHED BY: |       | RELINQUISHED BY: |       |
|-----------------------|-----------------|----------------------------|-----------|--------------------|---|------------------|-------|------------------|-------|
| PROJECT #:            | 810648          | Total Number of Containers | 18        | PENSACOLA - STL-FL |   | Signature:       | Time: | Signature:       | Time: |
| PROJ. NAME:           | MOE             | Chain of Custody Seals     | 2         | PORTLAND - ESL-OR  | X | Signature:       | Time: | Signature:       | Time: |
| QC LEVEL:             | STD IV          | Received Intact?           | 48        | STL-CT             |   | Signature:       | Time: | Signature:       | Time: |
| QC REQUIRED:          | MS MSD BLANK    | Received Good Cond./Cold   | 37        | STL-NEW JERSEY     |   | Signature:       | Time: | Signature:       | Time: |
| IAT:                  | STANDARD RUSHII | LAB NUMBER: 98-02005-1     |           | N. CREEK           |   | Signature:       | Time: | Signature:       | Time: |
| DUE DATE:             | 10/23           | COMMENTS:                  | 98.020179 | BARRINGER          |   | Signature:       | Time: | Signature:       | Time: |
| RUSH SURCHARGE:       | 0               |                            |           | SEQUOIA            |   | Signature:       | Time: | Signature:       | Time: |
| CLIENT DISCOUNT:      | NA              |                            |           |                    |   | Signature:       | Time: | Signature:       | Time: |
| SPECIAL CERTIFICATION |                 |                            |           |                    |   | Signature:       | Time: | Signature:       | Time: |
| REQUIRED: YES (NO)    |                 |                            |           |                    |   | Signature:       | Time: | Signature:       | Time: |

PINNACLE  
LABORATORIES

2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

Pinnacle Lab ID number      **810048**  
November 05, 1998

MARATHON OIL COMPANY  
P.O. BOX 552  
MIDLAND, TX 79702-0552

Project Name                      INDIAN BASIN REMEDIATION  
Project Number                  104332.40

Attention:      PAUL PEACOCK

On 10/13/98 Pinnacle Laboratories, Inc. Inc., (ADHS License No. AZ0592), received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

EPA method 8021 was performed by Pinnacle Laboratories, Inc., Albuquerque, NM.

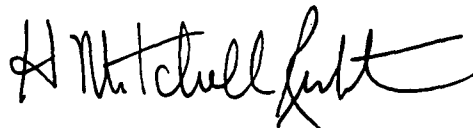
EPA methods 8310 and 376.1 were performed by Severn Trent (FL) Inc., Pensacola, FL.

All other parameters were performed by ESL (OR) Inc., Durham, OR.

If you have any questions or comments, please do not hesitate to contact us at (505)344-3777.



Kimberly D. McNeill  
Project Manager



H. Mitchell Rubenstein, Ph. D.  
General Manager

MR: mt

Enclosure



2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

CLIENT : MARATHON OIL COMPANY  
PROJECT # : 104332.40  
PROJECT NAME : INDIAN BASIN REMEDIATION

PINNACLE ID : 810048  
DATE RECEIVED : 10/13/98  
REPORT DATE : 11/5/98

| AEN<br>ID. # | CLIENT DESCRIPTION | MATRIX  | DATE<br>COLLECTED |
|--------------|--------------------|---------|-------------------|
| 01           | DI H2O             | AQUEOUS | 10/11/98          |
| 02           | INT RB             | AQUEOUS | 10/11/98          |
| 03           | MW-63              | AQUEOUS | 10/11/98          |
| 04           | MW-63RB            | AQUEOUS | 10/11/98          |
| 05           | MW-111             | AQUEOUS | 10/11/98          |
| 06           | MW-111RB           | AQUEOUS | 10/11/98          |
| 07           | MW-89              | AQUEOUS | 10/11/98          |
| 08           | MW-89RB            | AQUEOUS | 10/11/98          |
| 09           | MW-66              | AQUEOUS | 10/11/98          |
|              | MW-66RB            | AQUEOUS | 10/11/98          |
|              | MW-61A             | AQUEOUS | 10/11/98          |
| 12           | MW-61ARB           | AQUEOUS | 10/11/98          |
| 13           | MW-88              | AQUEOUS | 10/11/98          |
| 14           | MW-88RB            | AQUEOUS | 10/11/98          |
| 15           | MW-71              | AQUEOUS | 10/11/98          |
| 16           | MW-71RB            | AQUEOUS | 10/12/98          |
| 17           | MW-87ARB           | AQUEOUS | 10/12/98          |
| 18           | MW-87              | AQUEOUS | 10/12/98          |
| 19           | MW-87RB            | AQUEOUS | 10/12/98          |
| 20           | MW-60              | AQUEOUS | 10/12/98          |
| 21           | MW-60RB            | AQUEOUS | 10/12/98          |
| 22           | MW-95              | AQUEOUS | 10/12/98          |
| 23           | MW-95RB            | AQUEOUS | 10/12/98          |
| 24           | MW-97              | AQUEOUS | 10/12/98          |
| 25           | MW-97RB            | AQUEOUS | 10/12/98          |
| 26           | MW-96              | AQUEOUS | 10/12/98          |
| 27           | MW-82              | AQUEOUS | 10/12/98          |
| 28           | MW-68              | AQUEOUS | 10/12/98          |
| 29           | TRIP BLANK         | AQUEOUS | 10/1/98           |



2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

# GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : 104332.40  
PROJECT NAME : INDIAN BASIN REMEDIATION

PINNACLE I.D.: 810048

| SAMPLE        |             |            | DATE     | DATE      | DATE     | DIL.   |
|---------------|-------------|------------|----------|-----------|----------|--------|
| ID. #         | CLIENT I.D. | MATRIX     | SAMPLED  | EXTRACTED | ANALYZED | FACTOR |
| 01            | DI H2O      | AQUEOUS    | 10/11/98 | NA        | 10/15/98 | 1      |
| 02            | INT RB      | AQUEOUS    | 10/11/98 | NA        | 10/15/98 | 1      |
| 04            | MW-63       | AQUEOUS    | 10/11/98 | NA        | 10/15/98 | 1      |
| PARAMETER     |             | DET. LIMIT | UNITS    | 01        | 02       | 04     |
| BENZENE       |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |
| TOLUENE       |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |
| ETHYLBENZENE  |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |
| TOTAL XYLENES |             | 0.5        | UG/L     | 45        | < 0.5    | < 0.5  |

## SURROGATE:

BROMOFLUOROBENZENE (%)

119

118

105

SURROGATE LIMITS ( 80 - 120 )

## CHEMIST NOTES:

N/A



2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

### GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : 104332.40  
PROJECT NAME : INDIAN BASIN REMEDIATION

PINNACLE I.D.: 810048

| SAMPLE        |             | MATRIX     | DATE     | DATE      | DATE     | DIL.   |
|---------------|-------------|------------|----------|-----------|----------|--------|
| ID. #         | CLIENT I.D. |            | SAMPLED  | EXTRACTED | ANALYZED | FACTOR |
| 05            | MW-63RB     | AQUEOUS    | 10/11/98 | NA        | 10/16/98 | 1      |
| 06            | MW-111      | AQUEOUS    | 10/11/98 | NA        | 10/16/98 | 1      |
| 07            | MW-111RB    | AQUEOUS    | 10/11/98 | NA        | 10/16/98 | 1      |
| PARAMETER     |             | DET. LIMIT | UNITS    | 05        | 06       | 07     |
| BENZENE       |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |
| TOLUENE       |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |
| ETHYLBENZENE  |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |
| TOTAL XYLENES |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |

#### SURROGATE:

BROMOFLUOROBENZENE (%)

112

112

117

SURROGATE LIMITS ( 80 - 120 )

#### CHEMIST NOTES:

N/A



2709-D Pan American Freeway NE  
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# GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : 104332.40  
PROJECT NAME : INDIAN BASIN REMEDIATION

PINNACLE I.D.: 810048

| SAMPLE         |             | MATRIX     | DATE     | DATE      | DATE     | DIL.   |
|----------------|-------------|------------|----------|-----------|----------|--------|
| ID. #          | CLIENT I.D. |            | SAMPLED  | EXTRACTED | ANALYZED | FACTOR |
| 08             | MW-89RB     | AQUEOUS    | 10/11/98 | NA        | 10/16/98 | 1      |
| 09             | MW-66       | AQUEOUS    | 10/11/98 | NA        | 10/16/98 | 1      |
| 10             | MW-66RB     | AQUEOUS    | 10/11/98 | NA        | 10/16/98 | 1      |
| PARAMETER      |             | DET. LIMIT | UNITS    | 08        | 09       | 10     |
| BENZENE        |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |
| TOLUENE        |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |
| ETHYLBENZENE   |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |
| METHYL XYLENES |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |

## SURROGATE:

BROMOFLUOROBENZENE (%)

112

112

110

SURROGATE LIMITS ( 80 - 120 )

## CHEMIST NOTES:

N/A



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# GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : 104332.40  
PROJECT NAME : INDIAN BASIN REMEDIATION

PINNACLE I.D.: 810048

| SAMPLE        |             | MATRIX     | DATE     | DATE      | DATE     | DIL.   |
|---------------|-------------|------------|----------|-----------|----------|--------|
| ID. #         | CLIENT I.D. |            | SAMPLED  | EXTRACTED | ANALYZED | FACTOR |
| 11            | MW-61A      | AQUEOUS    | 10/11/98 | NA        | 10/19/98 | 5      |
| 12            | MW-61ARB    | AQUEOUS    | 10/11/98 | NA        | 10/16/98 | 1      |
| 13            | MW-88       | AQUEOUS    | 10/11/98 | NA        | 10/16/98 | 1      |
| PARAMETER     |             | DET. LIMIT | UNITS    | 11        | 12       | 13     |
| BENZENE       |             | 0.5        | UG/L     | 4.5       | < 0.5    | < 0.5  |
| TOLUENE       |             | 0.5        | UG/L     | 15        | < 0.5    | < 0.5  |
| ETHYLBENZENE  |             | 0.5        | UG/L     | 22        | < 0.5    | < 0.5  |
| TOTAL XYLENES |             | 0.5        | UG/L     | 61        | < 0.5    | < 0.5  |

## SURROGATE:

|                               |       |     |     |
|-------------------------------|-------|-----|-----|
| BROMOFLUOROBENZENE (%)        | 124 * | 112 | 111 |
| SURROGATE LIMITS ( 80 - 120 ) |       |     |     |

CHEMIST NOTES: \*= HIGH SURROGATE RECOVERY DUE TO MATRIX EFFECT.



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# GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : 104332.40  
PROJECT NAME : INDIAN BASIN REMEDIATION

PINNACLE I.D.: 810048

| SAMPLE        |             | MATRIX     | DATE     | DATE      | DATE     | DIL.   |
|---------------|-------------|------------|----------|-----------|----------|--------|
| ID. #         | CLIENT I.D. |            | SAMPLED  | EXTRACTED | ANALYZED | FACTOR |
| 14            | MW-88RB     | AQUEOUS    | 10/11/98 | NA        | 10/16/98 | 1      |
| 15            | MW-71       | AQUEOUS    | 10/11/98 | NA        | 10/19/98 | 1      |
| 16            | MW-71RB     | AQUEOUS    | 10/12/98 | NA        | 10/16/98 | 1      |
| PARAMETER     |             | DET. LIMIT | UNITS    | 14        | 15       | 16     |
| BENZENE       |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |
| TOLUENE       |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |
| ETHYLBENZENE  |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |
| TOTAL XYLENES |             | 0.5        | UG/L     | < 0.5     | < 0.5    | 0.5    |

SURROGATE:  
BROMOFLUOROBENZENE (%) 110 107 115  
SURROGATE LIMITS ( 80 - 120 )

CHEMIST NOTES:  
N/A



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Fax (505) 344-4413

# GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : 104332.40  
PROJECT NAME : INDIAN BASIN REMEDIATION

PINNACLE I.D.: 810048

| SAMPLE        |             | MATRIX     | DATE     | DATE      | DATE     | DIL.   |
|---------------|-------------|------------|----------|-----------|----------|--------|
| ID. #         | CLIENT I.D. |            | SAMPLED  | EXTRACTED | ANALYZED | FACTOR |
| 17            | MW-87ARB    | AQUEOUS    | 10/12/98 | NA        | 10/16/98 | 1      |
| 18            | MW-87       | AQUEOUS    | 10/12/98 | NA        | 10/16/98 | 1      |
| 19            | MW-87RB     | AQUEOUS    | 10/12/98 | NA        | 10/16/98 | 1      |
| PARAMETER     |             | DET. LIMIT | UNITS    | 17        | 18       | 19     |
| BENZENE       |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |
| TOLUENE       |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |
| ETHYLBENZENE  |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |
| TOTAL XYLENES |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |

## SURROGATE:

BROMOFLUOROBENZENE (%)

120

116

117

SURROGATE LIMITS ( 80 - 120 )

## CHEMIST NOTES:

N/A



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Fax (505) 344-4413

# GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : 104332.40  
PROJECT NAME : INDIAN BASIN REMEDIATION

PINNACLE I.D.: 810048

| SAMPLE        |             | MATRIX     | DATE     | DATE      | DATE     | DIL.   |
|---------------|-------------|------------|----------|-----------|----------|--------|
| ID. #         | CLIENT I.D. |            | SAMPLED  | EXTRACTED | ANALYZED | FACTOR |
| 20            | MW-60       | AQUEOUS    | 10/12/98 | NA        | 10/16/98 | 1      |
| 21            | MW-60RB     | AQUEOUS    | 10/12/98 | NA        | 10/16/98 | 1      |
| 23            | MW-85RB     | AQUEOUS    | 10/12/98 | NA        | 10/16/98 | 1      |
| PARAMETER     |             | DET. LIMIT | UNITS    | 20        | 21       | 23     |
| BENZENE       |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |
| TOLUENE       |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |
| METHYLBENZENE |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |
| TOTAL XYLENES |             | 0.5        | UG/L     | < 0.5     | < 0.5    | < 0.5  |

## SURROGATE:

BROMOFLUOROBENZENE (%)

114

120

120

SURROGATE LIMITS ( 80 - 120 )

## CHEMIST NOTES:

N/A



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# GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : 104332.40  
PROJECT NAME : INDIAN BASIN REMEDIATION

PINNACLE I.D.: 810048

| SAMPLE        |             | MATRIX     | DATE     | DATE      | DATE     | DIL.   |
|---------------|-------------|------------|----------|-----------|----------|--------|
| ID. #         | CLIENT I.D. |            | SAMPLED  | EXTRACTED | ANALYZED | FACTOR |
| 24            | MW-97       | AQUEOUS    | 10/12/98 | NA        | 10/16/98 | 5      |
| 25            | MW-97RB     | AQUEOUS    | 10/12/98 | NA        | 10/16/98 | 1      |
| 26            | MW-96       | AQUEOUS    | 10/12/98 | NA        | 10/16/98 | 1      |
| PARAMETER     |             | DET. LIMIT | UNITS    | 24        | 25       | 26     |
| BENZENE       |             | 0.5        | UG/L     | < 2.5     | < 0.5    | < 0.5  |
| TOLUENE       |             | 0.5        | UG/L     | < 2.5     | < 0.5    | < 0.5  |
| ETHYLBENZENE  |             | 0.5        | UG/L     | < 2.5     | < 0.5    | < 0.5  |
| TOTAL XYLENES |             | 0.5        | UG/L     | < 2.5     | < 0.5    | < 0.5  |

SURROGATE:  
BROMOFLUOROBENZENE (%) 107 109 109  
SURROGATE LIMITS ( 80 - 120 )

CHEMIST NOTES:  
N/A



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# GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : 104332.40  
PROJECT NAME : INDIAN BASIN REMEDIATION

PINNACLE I.D.: 810048

| PROJECT NAME       |             | INDIAN BASIN REMEDIATION |          |           |          |        |
|--------------------|-------------|--------------------------|----------|-----------|----------|--------|
| SAMPLE             |             |                          | DATE     | DATE      | DATE     | DIL.   |
| ID. #              | CLIENT I.D. | MATRIX                   | SAMPLED  | EXTRACTED | ANALYZED | FACTOR |
| 29                 | MW-71       | AQUEOUS                  | 10/11/98 | NA        | 10/16/98 | 1      |
| PARAMETER          |             | DET. LIMIT               | UNITS    | 29        |          |        |
| BENZENE            |             | 0.5                      | UG/L     | < 0.5     |          |        |
| TOLUENE            |             | 0.5                      | UG/L     | < 0.5     |          |        |
| ETHYLBENZENE       |             | 0.5                      | UG/L     | < 0.5     |          |        |
| TOTAL XYLENES      |             | 0.5                      | UG/L     | < 0.5     |          |        |
| THYL-t-BUTYL ETHER |             | 2.5                      | UG/L     | < 2.5     |          |        |

## SURROGATE:

BROMOFLUOROBENZENE (%)

97

SURROGATE LIMITS ( 80 - 120 )

## CHEMIST NOTES:

N/A



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GAS CHROMATOGRAPHY RESULTS  
REAGENT BLANK

|              |                            |                |            |
|--------------|----------------------------|----------------|------------|
| TEST         | : EPA 8021 MODIFIED        | PINNACLE I.D.  | : 810048   |
| BLANK I. D.  | : 101598B                  | DATE EXTRACTED | : NA       |
| CLIENT       | : MARATHON OIL COMPANY     | DATE ANALYZED  | : 10/15/98 |
| PROJECT #    | : 104332.40                | SAMPLE MATRIX  | : AQUEOUS  |
| PROJECT NAME | : INDIAN BASIN REMEDIATION |                |            |

| PARAMETER     | UNITS |      |
|---------------|-------|------|
| BENZENE       | UG/L  | <0.5 |
| TOLUENE       | UG/L  | <0.5 |
| ETHYLBENZENE  | UG/L  | <0.5 |
| TOTAL XYLENES | UG/L  | <0.5 |

SURROGATE:

MONOFLUOROBENZENE (%)

113

SURROGATE LIMITS: ( 80 - 120 )

CHEMIST NOTES:

N/A



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GAS CHROMATOGRAPHY RESULTS  
REAGENT BLANK

|              |                            |                |            |
|--------------|----------------------------|----------------|------------|
| TEST         | : EPA 8021 MODIFIED        | PINNACLE I.D.  | : 810048   |
| BLANK I. D.  | : 101698                   | DATE EXTRACTED | : NA       |
| CLIENT       | : MARATHON OIL COMPANY     | DATE ANALYZED  | : 10/16/98 |
| PROJECT #    | : 104332.40                | SAMPLE MATRIX  | : AQUEOUS  |
| PROJECT NAME | : INDIAN BASIN REMEDIATION |                |            |

| PARAMETER     | UNITS |      |
|---------------|-------|------|
| BENZENE       | UG/L  | <0.5 |
| TOLUENE       | UG/L  | <0.5 |
| ETHYLBENZENE  | UG/L  | <0.5 |
| TOTAL XYLENES | UG/L  | <0.5 |

SURROGATE:

1,2,4-TRIMETHYLBENZENE (%)

110

SURROGATE LIMITS: ( 80 - 120 )

CHEMIST NOTES:

N/A



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GAS CHROMATOGRAPHY RESULTS  
REAGENT BLANK

|              |                            |                |            |
|--------------|----------------------------|----------------|------------|
| TEST         | : EPA 8021 MODIFIED        | PINNACLE I.D.  | : 810048   |
| BLANK I. D.  | : 101698B                  | DATE EXTRACTED | : NA       |
| CLIENT       | : MARATHON OIL COMPANY     | DATE ANALYZED  | : 10/16/98 |
| PROJECT #    | : 104332.40                | SAMPLE MATRIX  | : AQUEOUS  |
| PROJECT NAME | : INDIAN BASIN REMEDIATION |                |            |

| PARAMETER     | UNITS |      |
|---------------|-------|------|
| BENZENE       | UG/L  | <0.5 |
| TOLUENE       | UG/L  | <0.5 |
| ETHYLBENZENE  | UG/L  | <0.5 |
| TOTAL XYLENES | UG/L  | <0.5 |

SURROGATE:

MOFLUOROBENZENE (%)

109

SURROGATE LIMITS:

( 80 - 120 )

CHEMIST NOTES:

N/A



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GAS CHROMATOGRAPHY RESULTS  
REAGENT BLANK

|              |                            |                |            |
|--------------|----------------------------|----------------|------------|
| TEST         | : EPA 8021 MODIFIED        | PINNACLE I.D.  | : 810048   |
| BLANK I. D.  | : 101998                   | DATE EXTRACTED | : NA       |
| CLIENT       | : MARATHON OIL COMPANY     | DATE ANALYZED  | : 10/19/98 |
| PROJECT #    | : 104332.40                | SAMPLE MATRIX  | : AQUEOUS  |
| PROJECT NAME | : INDIAN BASIN REMEDIATION |                |            |

| PARAMETER     | UNITS |      |
|---------------|-------|------|
| BENZENE       | UG/L  | <0.5 |
| TOLUENE       | UG/L  | <0.5 |
| ETHYLBENZENE  | UG/L  | <0.5 |
| TOTAL XYLENES | UG/L  | <0.5 |

SURROGATE:

BROMOFLUOROBENZENE (%)

106

SURROGATE LIMITS: ( 80 - 120 )

CHEMIST NOTES:

N/A



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GAS CHROMATOGRAPHY QUALITY CONTROL  
MSMSD

TEST : EPA 8021 MODIFIED  
MSMSD # : 810042-08  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : 104332.40  
PROJECT NAME : INDIAN BASIN REMEDIATION

PINNACLE I.D. : 810048  
DATE EXTRACTED : NA  
DATE ANALYZED : 10/15/98  
SAMPLE MATRIX : AQUEOUS  
UNITS : UG/L

| PARAMETER     | SAMPLE<br>RESULT | CONC<br>SPIKE | SPIKED<br>SAMPLE | %<br>REC | DUP<br>SPIKE | DUP<br>% REC | RPD | REC<br>LIMITS | RPD<br>LIMITS |
|---------------|------------------|---------------|------------------|----------|--------------|--------------|-----|---------------|---------------|
| BENZENE       | <0.5             | 10.0          | 8.6              | 86       | 8.9          | 89           | 3   | ( 80 - 120 )  | 20            |
| TOLUENE       | <0.5             | 10.0          | 9.8              | 98       | 10.1         | 101          | 3   | ( 80 - 120 )  | 20            |
| ETHYLBENZENE  | <0.5             | 10.0          | 10.2             | 102      | 10.5         | 105          | 3   | ( 80 - 120 )  | 20            |
| TOTAL XYLENES | <0.5             | 30.0          | 29.8             | 99       | 30.2         | 101          | 1   | ( 80 - 120 )  | 20            |

CHEMIST NOTES:  
N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

GAS CHROMATOGRAPHY QUALITY CONTROL  
MSMSD



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GAS CHROMATOGRAPHY QUALITY CONTROL  
MSMSD

TEST : EPA 8021 MODIFIED  
MSMSD # : 810048-20  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : 104332.40  
PROJECT NAME : INDIAN BASIN REMEDIATION

PINNACLE I.D. : 810048  
DATE EXTRACTED : NA  
DATE ANALYZED : 10/16/98  
SAMPLE MATRIX : AQUEOUS  
UNITS : UG/L

| PARAMETER     | SAMPLE<br>RESULT | CONC<br>SPIKE | SPIKED<br>SAMPLE | %<br>REC | DUP<br>SPIKE | DUP<br>% REC | RPD | REC<br>LIMITS | RPD<br>LIMITS |
|---------------|------------------|---------------|------------------|----------|--------------|--------------|-----|---------------|---------------|
| BENZENE       | <0.5             | 10.0          | 9.4              | 94       | 9.6          | 96           | 2   | ( 80 - 120 )  | 20            |
| TOLUENE       | <0.5             | 10.0          | 10.4             | 104      | 10.7         | 107          | 3   | ( 80 - 120 )  | 20            |
| ETHYLBENZENE  | <0.5             | 10.0          | 10.7             | 107      | 11.2         | 112          | 5   | ( 80 - 120 )  | 20            |
| TOTAL XYLENES | <0.5             | 30.0          | 31.4             | 105      | 32.5         | 108          | 3   | ( 80 - 120 )  | 20            |

CHEMIST NOTES:  
N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



**Severn Trent Laboratories**

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**SIGNATURE PAGE**

Reviewed by:



STL Project Manager

Client: PINNACLE LABORATORIES  
ALBUQUERQUE, NEW MEXICO

Project Name: MOC  
Project Number: 810048  
Project Location: INDIAN BASIN REMEDIATION  
Accession Number: 810238

OCT 28 1998

Project Manager: KIMBERLY D. MCNEILL  
Sampled By: N/S

**Other Laboratory Locations:**

- 149 Rangeway Road, North Billerica MA 01862
- 16203 Park Row, Suite 110, Houston TX 77084
- 200 Monroe Turnpike, Monroe CT 06468

- 120 Southcenter Court, Suite 300, Morrisville NC 27560
- 315 Fullerton Avenue, Newburgh NY 12550
- Westfield Executive Park, 53 Southampton Road, Westfield MA 01085
- 628 Route 10, Whippany NJ 07981

a part of

Severn Trent Services Ltd

SEVERN TRENT LABORATORIES

11 East Olive Road Pensacola, Florida 32514 (850) 474-1001

Analysis Report

Analysis: Group of Single Wetchem

|                   |                          |
|-------------------|--------------------------|
| Accession:        | 810238                   |
| Client:           | PINNACLE LABORATORIES    |
| Project Number:   | 810048                   |
| Project Name:     | MOC                      |
| Project Location: | INDIAN BASIN REMEDIATION |
| Department:       | WET CHEM                 |

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Date 16-Oct-98

## "FINAL REPORT FORMAT - MULTIPLE"

Accession: 810238  
Client: PINNACLE LABORATORIES  
Project Number: 810048  
Project Name: MOC  
Project Location: INDIAN BASIN REMEDIATION  
Test: Group of Single Wetchem  
QcLevel: II

| Parameter:           | Unit: | Result: | R.L:        | Batch: | Q: |
|----------------------|-------|---------|-------------|--------|----|
| Client ID: 810048-22 |       |         | Lab ID: 001 |        |    |
| SULFIDE (376.1)      | MG/L  | ND      | 1           | FEW060 |    |
| Comments:            |       |         |             |        |    |
| Client ID: 810048-03 |       |         | Lab ID: 002 |        |    |
| SULFIDE (376.1)      | MG/L  | ND      | 1           | FEW060 |    |
| Comments:            |       |         |             |        |    |
| Client ID: 810048-15 |       |         | Lab ID: 003 |        |    |
| SULFIDE (376.1)      | MG/L  | 15      | 1           | FEW060 |    |
| Comments:            |       |         |             |        |    |
| Client ID: 810048-18 |       |         | Lab ID: 004 |        |    |
| SULFIDE (376.1)      | MG/L  | ND      | 1           | FEW060 |    |
| Comments:            |       |         |             |        |    |
| Client ID: 810048-24 |       |         | Lab ID: 005 |        |    |
| SULFIDE (376.1)      | MG/L  | ND      | 1           | FEW060 |    |
| Comments:            |       |         |             |        |    |
| Client ID: 810048-27 |       |         | Lab ID: 006 |        |    |
| SULFIDE (376.1)      | MG/L  | ND      | 1           | FEW060 |    |
| Comments:            |       |         |             |        |    |
| Client ID: 810048-28 |       |         | Lab ID: 007 |        |    |
| SULFIDE (376.1)      | MG/L  | ND      | 1           | FEW060 |    |
| Comments:            |       |         |             |        |    |

[0] Page 2  
Date 16-Oct-98

## "FINAL REPORT FORMAT - MULTIPLE"

Accession: 810238  
Client: PINNACLE LABORATORIES  
Project Number: 810048  
Project Name: MOC  
Project Location: INDIAN BASIN REMEDIATION  
Test: Group of Single Wetchem

| Client ID: | Lab Matrix:<br>ID: | Date/Time<br>Sampled: | Date<br>Received: |
|------------|--------------------|-----------------------|-------------------|
| 810048-22  | 001 WATER          | 12-OCT-98 1215        | 14-OCT-98         |
| 810048-03  | 002 WATER          | 11-OCT-98 0915        | 14-OCT-98         |
| 810048-15  | 003 WATER          | 11-OCT-98 1710        | 14-OCT-98         |
| 810048-18  | 004 WATER          | 12-OCT-98 1030        | 14-OCT-98         |
| 810048-24  | 005 WATER          | 12-OCT-98 1410        | 14-OCT-98         |
| 810048-27  | 006 WATER          | 12-OCT-98 1550        | 14-OCT-98         |
| 810048-28  | 007 WATER          | 12-OCT-98 1630        | 14-OCT-98         |

[0] Page 3  
Date 16-Oct-98

## "Method Report Summary"

Accession Number: 810238  
Client: PINNACLE LABORATORIES  
Project Number: 810048  
Project Name: MOC  
Project Location: INDIAN BASIN REMEDIATION  
Test: Group of Single Wetchem

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| Client Sample Id: | Parameter:      | Unit: | Result: |
|-------------------|-----------------|-------|---------|
| 810048-15         | SULFIDE (376.1) | MG/L  | 15      |

Analysis Report

Analysis: POLYNUCLEAR AROMATICS BY 8310

|                   |                          |
|-------------------|--------------------------|
| Accession:        | 810238                   |
| Client:           | PINNACLE LABORATORIES    |
| Project Number:   | 810048                   |
| Project Name:     | MOC                      |
| Project Location: | INDIAN BASIN REMEDIATION |
| Department:       | SEMI-VOLATILE FUELS      |

## "FINAL REPORT FORMAT - SINGLE"

Accession: 810238  
Client: PINNACLE LABORATORIES  
Project Number: 810048  
Project Name: MOC  
Project Location: INDIAN BASIN REMEDIATION  
Test: POLYNUCLEAR AROMATICS BY 8310  
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.  
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.  
Matrix: WATER  
QC Level: II

Lab Id: 001  
Client Sample Id: 810048-22  
Batch: PAW236  
Blank: A  
Dry Weight %: N/A  
Sample Date/Time: 12-OCT-98 1215  
Received Date: 14-OCT-98  
Extraction Date: 16-OCT-98  
Analysis Date: 21-OCT-98

| Parameter:             | Units:    | Results: | Rpt Lmts: | Q: |
|------------------------|-----------|----------|-----------|----|
| ACENAPHTHENE           | UG/L      | ND       | 1         |    |
| ACENAPHTHYLENE         | UG/L      | ND       | 1         |    |
| ANTHRACENE             | UG/L      | ND       | 1         |    |
| BENZO(a)ANTHRACENE     | UG/L      | ND       | 1         |    |
| BENZO(a)PYRENE         | UG/L      | ND       | 1         |    |
| BENZO(b)FLUORANTHENE   | UG/L      | ND       | 1         |    |
| BENZO(g,h,i)PERYLENE   | UG/L      | ND       | 1         |    |
| BENZO(k)FLUORANTHENE   | UG/L      | ND       | 1         |    |
| CHRYSENE               | UG/L      | ND       | 1         |    |
| DIBENZO(a,h)ANTHRACENE | UG/L      | ND       | 1         |    |
| FLUORANTHENE           | UG/L      | ND       | 1         |    |
| FLUORENE               | UG/L      | ND       | 1         |    |
| INDENO(1,2,3-cd)PYRENE | UG/L      | ND       | 1         |    |
| NAPHTHALENE            | UG/L      | ND       | 1         |    |
| PHENANTHRENE           | UG/L      | ND       | 1         |    |
| PYRENE                 | UG/L      | ND       | 1         |    |
| 1-METHYLNAPHTHALENE    | UG/L      | 1        | 1         |    |
| 2-METHYLNAPHTHALENE    | UG/L      | ND       | 1         |    |
| 2-CHLOROANTHRACENE     | %REC/SURR | 90       | 28-138    |    |
| ANALYST                | INITIALS  | HAH      |           |    |

Comments:

[0] Page 2  
Date 22-Oct-98

## "Method Report Summary"

Accession Number: 810238  
Client: PINNACLE LABORATORIES  
Project Number: 810048  
Project Name: MOC  
Project Location: INDIAN BASIN REMEDIATION  
Test: POLYNUCLEAR AROMATICS BY 8310

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| Client Sample Id: | Parameter:          | Unit: | Result: |
|-------------------|---------------------|-------|---------|
| 810048-22         | 1-METHYLNAPHTHALENE | UG/L  | 1       |

## Data Qualifiers for Final Report

STL-Pensacola Inorganic/Organic and AFCEE Projects (under QAPP)

|                       |                                                                                                          |                                                                                                                              |
|-----------------------|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| J4                    | (For positive results)                                                                                   | Temperature limits exceeded ( $\leq 2^{\circ}\text{C}$ or $\geq 6^{\circ}\text{C}$ )                                         |
| J5                    | (TICs)                                                                                                   | The reported value is quantitated as a TIC; therefore, it is estimated                                                       |
| J6                    | (For positive results)                                                                                   | Surrogate %R is > upper control limit (UCL) or < lower control limit (LCL)                                                   |
| J7                    | (For positive results)                                                                                   | The reported value is > the laboratory MDL and < lowest calibration standards; therefore, the quantitation is an estimation. |
| J (AFCEE description) | The analyte was positively identified, the quantitation is an estimation                                 |                                                                                                                              |
| R1                    | (For nondetects)                                                                                         | Temperature limits exceeded ( $\leq 2^{\circ}\text{C}$ or $\geq 6^{\circ}\text{C}$ )                                         |
| R2                    | Improper preservation, no preservative present in sample upon receipt                                    |                                                                                                                              |
| R3                    | Improper preservation, incorrect preservative present in sample upon receipt                             |                                                                                                                              |
| R4                    | Holding time exceeded                                                                                    |                                                                                                                              |
| R5                    | Collection requirements not met, improper container used for sample                                      |                                                                                                                              |
| R6                    | Surrogate %R is < LCL and analyte is not detected or surrogate %R is < 10% for detects and nondetects    |                                                                                                                              |
| R (AFCEE description) | The data are unusable due to deficiencies in the ability to analyze the sample and meet QC criteria      |                                                                                                                              |
| F                     | < laboratory or AFCEE RL and > laboratory MDL                                                            |                                                                                                                              |
| F (AFCEE description) | The analyte was positively identified but the associated numerical value is below the AFCEE or lab RL    |                                                                                                                              |
| U2                    | $\leq$ Laboratory MDL (value for result will be the MDL, never below the MDL)                            |                                                                                                                              |
| U (AFCEE description) | The analyte was analyzed for but not detected. The associated numerical value is at or below the MDL     |                                                                                                                              |
| B (AFCEE description) | The analyte was found in the associated blank, as well as in the sample                                  |                                                                                                                              |
| @                     | Adjusted reporting limit due to sample matrix (dilution prior to digestion and/or analysis)              |                                                                                                                              |
| +                     | Elevated reporting limit due to dilution into calibration range                                          |                                                                                                                              |
| *                     | Elevated reporting limit due to matrix interference (dilution prior to digestion and/or analysis)        |                                                                                                                              |
| #                     | Elevated reporting limit due to insufficient sample size                                                 |                                                                                                                              |
| D                     | Diluted out                                                                                              |                                                                                                                              |
| A2                    | Surrogate %R is > UCL (upper control limit) and analyte is not detected. No corrective action required   |                                                                                                                              |
| M                     | A matrix effect was present (sample was analyzed twice to confirm or chromatogram had interfering peaks) |                                                                                                                              |
| S                     | Incorrect sample amount was submitted to the laboratory for analysis                                     |                                                                                                                              |

ND = Not Detected at or above the STL-Pensacola reporting limit (RL)

N/S = Not Submitted

N/A = Not Applicable

IDL = Laboratory Instrument Detection Limit

MDL = Laboratory Method Detection Limit

RL = Reporting Limit (AFCEE RLs are listed in the AFCEE QAPP)

STL-Pensacola uses the most current promulgated methods contained in the reference manuals

**Any time** a sample arrives at the laboratory improperly preserved (at improper pH or temperature) or after holding time has expired or prepared or analyzed after holding time, client must be notified in writing (i.e. case narrative)

Florida Projects Inorganic/Organic

|                    |                                                                                                             |
|--------------------|-------------------------------------------------------------------------------------------------------------|
| Y1                 | Improper preservation, no preservative present in sample upon receipt                                       |
| Y2                 | Improper preservation, incorrect preservative present in sample upon receipt                                |
| Y3                 | Improper preservation, sample temperature exceeded EPA temperature limits of 2-6°C upon receipt             |
| Y (FL description) | The analysis was from an unpreserved or improperly preserved sample. Data may not be accurate               |
| Q                  | Sample held beyond the accepted holding time                                                                |
| I                  | The reported value is < Laboratory RL and > laboratory MDL                                                  |
| U1                 | The reported value is $\leq$ Laboratory MDL (value for sample result is reported as the MDL)                |
| U (FL description) | Indicates the compound was analyzed for but not detected                                                    |
| T                  | The reported value is < Laboratory MDL (value shall not be used for statistical analysis)                   |
| V                  | The analyte was detected in both the sample and the associated method blank                                 |
| J1                 | Surrogate recovery limits have been exceeded                                                                |
| J2                 | The sample matrix interfered with the ability to make any accurate determinations                           |
| J3                 | The reported value failed to meet the established quality control criteria for either precision or accuracy |
| J (FL description) | Estimated value; not accurate                                                                               |

ICR Projects Inorganic/Organic

A1 Acceptable

R6

Rejected

Examples: ICR Flags

R6 = Laboratory extracted the sample but the refrigerator malfunctioned so the extract became warm and client was notified

R6 = Sample arrived in laboratory in good condition; however, the laboratory did not analyze it within EPA's established holding time limit

CLP and CLP-like Projects: Refer to referenced CLP Statement of Work (SOW) for explanation of data qualifiers

SEVERN TRENT LABORATORIES

11 East Olive Road Pensacola, Florida 32514 (850) 474-1001

Quality Control Report

Analysis: Group of Single Wetchem

|                   |                          |
|-------------------|--------------------------|
| Accession:        | 810238                   |
| Client:           | PINNACLE LABORATORIES    |
| Project Number:   | 810048                   |
| Project Name:     | MOC                      |
| Project Location: | INDIAN BASIN REMEDIATION |
| Department:       | WET CHEM                 |

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Date 16-Oct-98

## "WetChem Quality Control Report"

|                |           |
|----------------|-----------|
| Parameter:     | SULFIDE   |
| Batch Id:      | FEW060    |
| Blank Result:  | <1        |
| Anal. Method:  | 376.1     |
| Prep. Method:  | N/A       |
| Analysis Date: | 12-OCT-98 |
| Prep. Date:    | 12-OCT-98 |

## Sample Duplication

|             |          |
|-------------|----------|
| Sample Dup: | 810160-1 |
| Rept Limit: | <1       |

|                |        |
|----------------|--------|
| Sample Result: | 1.38   |
| Dup Result:    | 1.30   |
| Sample RPD:    | 0.08 G |
| Max RPD:       | 1      |
| Dry Weight%    | N/A    |

## Matrix Spike

|                |          |
|----------------|----------|
| Sample Spiked: | 810160-1 |
| Rept Limit:    | <1       |

|                |        |
|----------------|--------|
| Sample Result: | <1     |
| Spiked Result: | 9.2    |
| Spike Added:   | 10.0   |
| % Recovery:    | 92     |
| % Rec Limits:  | 78-111 |
| Dry Weight%    | N/A    |

## ICV

|               |        |
|---------------|--------|
| ICV Result:   | 18.2   |
| True Result:  | 20.0   |
| % Recovery:   | 91     |
| % Rec Limits: | 90-110 |

## LCS

|               |  |
|---------------|--|
| LCS Result:   |  |
| True Result:  |  |
| % Recovery:   |  |
| % Rec Limits: |  |

SEVERN TRENT LABORATORIES

11 East Olive Road Pensacola, Florida 32514 (850) 474-1001

[0] Page 2  
Date 16-Oct-98

"Quality Control Comments"

Batch Id:                      Comments:

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FEW060

810238-1,2,3,4,5,6,7 were added to the batch on 14-Oct-98.

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Date 16-Oct-98

## ----- Common Footnotes WetChem -----

N/A = NOT APPLICABLE.  
N/S = NOT SUBMITTED.  
N/C = SAMPLE AND DUPLICATE RESULTS ARE AT OR BELOW STL REPORTING LIMIT;  
THEREFORE, THE RPD IS "NOT CALCULABLE" AND NO CONTROL LIMITS APPLY.  
N/D = NOT DETECTED AT OR ABOVE THE STL-PENSACOLA REPORTING LIMIT (RL).  
R = REACTIVE  
T = TOTAL  
G = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X STL REPORTING LIMIT AND  
THE ABSOLUTE DIFFERENCE BETWEEN THE SAMPLE AND DUPLICATE RESULT IS AT  
OR BELOW STL REPORTING LIMIT; THEREFORE, THE RESULTS ARE "IN CONTROL".  
Q = THE ANALYTICAL (POST-DISTILLATION) SPIKE IS REPORTED DUE TO PERCENT RECOVERY  
BEING OUTSIDE ACCEPTANCE LIMITS ON THE MATRIX (PRE-DISTILLATION) SPIKE.  
# = ELEVATED REPORTING LIMIT DUE TO INSUFFICIENT SAMPLE.  
+ = ELEVATED REPORTING LIMIT DUE TO DILUTION INTO CALIBRATION RANGE.  
\* = ELEVATED REPORTING LIMIT DUE TO MATRIX INTERFERENCE (DILUTION PRIOR DIGESTION  
AND/OR ANALYSIS).  
@ = ADJUSTED REPORTING LIMIT DUE TO SAMPLE MATRIX (DILUTION PRIOR TO DIGESTION  
AND/OR ANALYSIS).  
P = ANALYTICAL (POST DIGESTION) SPIKE.  
I = DUPLICATE INJECTION.  
& = AUTOMATED  
F = SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.  
N/C+ = NOT CALCULABLE  
H = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X STL REPORTING LIMIT AND THE  
ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE STL REPORTING  
LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".  
A = SAMPLE AND DUPLICATE RESULTS ARE "OUT OF CONTROL".  
Z = THE SAMPLE RESULT FOR THE SPIKE IS BELOW THE REPORTING LIMIT. HOWEVER,  
THIS RESULT IS REPORTED FOR ACCURATE QC CALCULATIONS.  
NH= SAMPLE AND / OR DUPLICATE RESULT IS BELOW 5 X STL REPORTING LIMIT  
AND THE ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE STL  
REPORTING LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".  
SAMPLE IS NON-HOMOGENEOUS.  
(\*) = REPORTING LIMITS RAISED DUE TO CLP METHOD NOT REQUIRING A CONCENTRATION STEP FOR CN.  
(CA) = SEE CORRECTIVE ACTIONS FORM.  
\*\*= MATRIX INTERFERENCE  
SW-846, 3rd Edition, latest EPA-approved edition.  
EPA 600/4-79-020, Revised March 1983.  
STANDARD METHODS, For the Examination of Water and Wastewater, latest EPA-approved edition.  
NIOSH Manual of Analytical Methods, 4th Edition.  
ANNUAL BOOK OF ASTM STANDARDS, VOLUMES 11.01 and 11.02, latest EPA-approved edition.  
METHODS FOR THE DETERMINATION OF INORGANIC SUBSTANCES IN ENVIRONMENTAL SAMPLES,  
EPA600/R-93/100, AUGUST 1993  
METHODS FOR SOIL ANALYSIS, PART 2, CHEMICAL AND MICROBIOLOGICAL PROPERTIES, 2ND EDITION.  
STL-PN USES THE MOST CURRENT PROMULGATED METHODS FROM THE REFERENCES LISTED ABOVE.

1. COLIFORM. COLIFORM PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN  
THE LOGARITHM OF COLONIES PER 100 MLS OF SAMPLE ON DUPLICATE PLATES.
2. PH. PH PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN THE  
SAMPLE AND DUPLICATE ANALYSIS.
3. FLASHPOINT. FLASHPOINT PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN  
THE SAMPLE AND DUPLICATE ANALYSIS.

RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION).  
RPD LMTS = REPORTING LIMITS BASED ON METHOD DETECTION LIMIT STUDIES.

DPH = DOLLY P. HWANG      RB = REBECCA BROWN      WH = WENDY HAGGARD  
ED = ESTHER DANTIN      CR = CYNTHIA ROBERTS      AB = AMY BRADLEY  
BE = BETTY EVERTON      PLD = PAULA L. DOUGHTY      JTZ = JONATHAN T. ZIENTARSKI  
RH = RICKY HAGENDORFER      LT = LISA TORRES

SEVERN TRENT LABORATORIES

11 East Olive Road Pensacola, Florida 32514 (850) 474-1001

Quality Control Report

Analysis: POLYNUCLEAR AROMATICS BY 8310

|                   |                          |
|-------------------|--------------------------|
| Accession:        | 810238                   |
| Client:           | PINNACLE LABORATORIES    |
| Project Number:   | 810048                   |
| Project Name:     | MOC                      |
| Project Location: | INDIAN BASIN REMEDIATION |
| Department:       | SEMI-VOLATILE FUELS      |

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Date 22-Oct-98

## "QC Report"

Title: Water Blank  
Batch: PAW236  
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.  
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Blank Id: A Date Analyzed: 21-OCT-98 Date Extracted: 16-OCT-98

| Parameters:             | Units:    | Results: | Reporting Limits: |
|-------------------------|-----------|----------|-------------------|
| ACENAPHTHENE            | UG/L      | ND       | 1                 |
| ACENAPHTHYLENE          | UG/L      | ND       | 1                 |
| ANTHRACENE              | UG/L      | ND       | 1                 |
| BENZO(a) ANTHRACENE     | UG/L      | ND       | 1                 |
| BENZO(a) PYRENE         | UG/L      | ND       | 1                 |
| BENZO(b) FLUORANTHENE   | UG/L      | ND       | 1                 |
| BENZO(g,h,i) PERYLENE   | UG/L      | ND       | 1                 |
| BENZO(k) FLUORANTHENE   | UG/L      | ND       | 1                 |
| CHRYSENE                | UG/L      | ND       | 1                 |
| DIBENZO(a,h) ANTHRACENE | UG/L      | ND       | 1                 |
| FLUORANTHENE            | UG/L      | ND       | 1                 |
| FLUORENE                | UG/L      | ND       | 1                 |
| INDENO(1,2,3-cd) PYRENE | UG/L      | ND       | 1                 |
| NAPHTHALENE             | UG/L      | ND       | 1                 |
| PHENANTHRENE            | UG/L      | ND       | 1                 |
| PYRENE                  | UG/L      | ND       | 1                 |
| 1-METHYLNAPHTHALENE     | UG/L      | ND       | 1                 |
| 2-METHYLNAPHTHALENE     | UG/L      | ND       | 1                 |
| 2-CHLOROANTHRACENE      | %REC/SURR | 81       | 28-138            |
| ANALYST                 | INITIALS  | HAH      |                   |

Comments:

[0] Page 2  
Date 22-Oct-98

## "QC Report"

Title: Water LCS  
Batch: PAW236  
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.  
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

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RS Date Analyzed: 21-OCT-98

RS Date Extracted: 16-OCT-98

| Parameters:           | Spike<br>Added | Sample<br>Conc | RS<br>Conc | RS<br>%Rec | Rec<br>Lmts |
|-----------------------|----------------|----------------|------------|------------|-------------|
| ACENAPHTHYLENE        | 9.7            | <1             | 12.5       | 129*       | 45-127      |
| BENZO(k) FLUORANTHENE | 9.2            | <1             | 12.6       | 137*       | 68-131      |
| CHRYSENE              | 9.6            | <1             | 12.6       | 131        | 69-131      |
| PHENANTHRENE          | 9.2            | <1             | 12.5       | 136*       | 63-124      |
| PYRENE                | 9.7            | <1             | 12.8       | 132*       | 61-126      |

## Surrogates:

2-CHLOROANTHRACENE

122 28-138

## Comments:

LCS HAD RECOVERY(S) AND/OR RPD(S) OUTSIDE ACCEPTANCE LIMITS. SEE MATRIX SPIKE/  
MATRIX SPIKE DUPLICATE DATA.

## Notes:

N/S = NOT SUBMITTED N/A = NOT APPLICABLE D = DILUTED OUT  
UG/L = PARTS PER BILLION. < = LESS THAN REPORTING LIMIT.

\* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS.

SOURCES FOR CONTROL LIMITS ARE INTERNAL LABORATORY QUALITY ASSURANCE  
PROGRAM AND REFERENCED METHOD.

[0] Page 3  
Date 22-Oct-98

## "QC Report"

Title: Water Matrix Spike/Matrix Spike Duplicate  
Batch: PAW236  
Analysis Method: 8310/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.  
Extraction Method: 3510/Test Methods for Evaluating Solid and Haz Waste, SW-846, 3rd Ed.

Dry Weight %: N/A  
Sample Spiked: 810238-1

MS Date Analyzed: 21-OCT-98  
MSD Date Analyzed: 21-OCT-98

MS Date Extracted: 16-OCT-98  
MSD Date Extracted: 16-OCT-98

| Parameters:           | Spike Added | Sample Conc | MS Conc | MS %Rec | MSD Conc | MSD %Rec | RPD | Rec Lmts  |
|-----------------------|-------------|-------------|---------|---------|----------|----------|-----|-----------|
| ACENAPHTHYLENE        | 9.7         | <1          | 9.8     | 101     | 8.5      | 88       | 14  | 51 18-146 |
| BENZO(k) FLUORANTHENE | 9.2         | <1          | 5.6     | 61      | 5.0      | 54       | 12  | 40 26-137 |
| CHRYSENE              | 9.6         | <1          | 7.2     | 75      | 6.5      | 68       | 10  | 69 16-156 |
| PHENANTHRENE          | 9.2         | <1          | 10.4    | 113     | 8.7      | 95       | 17  | 36 30-145 |
| PYRENE                | 9.7         | <1          | 10.1    | 104     | 9.7      | 100      | 4   | 41 39-137 |

Surrogates:  
2-CHLOROANTHRACENE 101 88 28-138

Comments:

## Notes:

N/S = NOT SUBMITTED N/A = NOT APPLICABLE D = DILUTED OUT  
UG/L = PARTS PER BILLION. < = LESS THAN REPORTING LIMIT.  
\* = VALUES OUTSIDE OF QUALITY CONTROL LIMITS.  
SOURCES FOR CONTROL LIMITS ARE INTERNAL LABORATORY QUALITY ASSURANCE PROGRAM AND REFERENCED METHOD.

## Common Notation for Organic Reporting

N/S = NOT SUBMITTED  
N/A = NOT APPLICABLE  
UG = MICROGRAMS  
UG/L = PARTS PER BILLION  
UG/KG = PARTS PER BILLION  
MG/M3 = MILLIGRAM PER CUBIC METER  
PPMV = PART PER MILLION BY VOLUME  
MG/KG = PARTS PER MILLION  
MG/L = PARTS PER MILLION  
< = LESS THAN  
ND = NOT DETECTED AT OR ABOVE THE STL-PENSACOLA REPORTING LIMIT (RL).  
E = EXCEED THE CALIBRATION CURVE; THEREFORE, RESULTS ARE ESTIMATED.

SOURCES FOR CONTROL LIMITS ARE INTERNAL LABORATORY QUALITY ASSURANCE PROGRAM AND REFERENCED METHOD.

ORGANIC SOILS ARE REPORTED ON A DRYWEIGHT BASIS.

RPT LMITS = REPORTING LIMITS BASED ON METHOD DETECTION LIMIT STUDIES.

RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION)

AEN/GC/FID  
AEN GAS CHROMATOGRAPHIC METHOD EMPLOYING DIRECT INJECTION ON COLUMN WITH FLAME IONIZATION DETECTOR (FID).

AEN/GC/FIX  
AEN GAS CHROMATOGRAPHIC METHOD FOR ANALYSIS OF FIXED GASES EMPLOYING DIRECT INJECTION ON COLUMN WITH THERMAL CONDUCTIVITY DETECTOR (TCD) AND FLAME IONIZATION DETECTOR (FID).

GC/FPD  
AEN GAS CHROMATOGRAPHIC METHOD EMPLOYING DIRECT INJECTION ON COLUMN WITH FLAME PHOTOMETRIC DETECTOR (FPD) IN SULFUR-SPECIFIC MODE.

AEN/GC/PID  
AEN GAS CHROMATOGRAPHIC METHOD EMPLOYING DIRECT INJECTION ON COLUMN WITH PHOTOIONIZATION DETECTOR (PID).

AEN/GC/TCD  
AEN GAS CHROMATOGRAPHIC METHOD EMPLOYING DIRECT INJECTION ON COLUMN WITH THERMAL CONDUCTIVITY DETECTOR (TCD).

SW-846 METHOD 9020  
PARTICULATE MATTER IS REMOVED BY ALLOWING PARTICULATES TO SETTLE IN THE SAMPLE CONTAINER AND DECANTING THE SUPERNATANT LIQUID. EXCESSIVE PARTICULATES ARE REMOVED BY FILTRATION OF THE SUPERNATANT LIQUID.

RSK 175  
SAMPLE PREPARATION AND CALCULATIONS FOR DISSOLVED GAS ANALYSIS IN WATER SAMPLES USING A GC HEADSPACE EQUILIBRATION TECHNIQUE, RSK SOP-175, ROBERT S. KERR ENVIRONMENTAL RESEARCH LABORATORY, USEPA, AUGUST 11, 1994.

AEN-PN USES THE MOST CURRENT PROMULGATED METHODS CONTAINED IN THE REFERENCE MANUALS.

SW = STEVE WILHITE  
RW = RITA WINGO  
KS = KENDALL SMITH  
LBL = LISA BIZZELL-LOWE  
LP = LEVERNE PETERSON  
PLD = PAULA DOUGHTY  
DK = DARLENE KINCHEN  
= BECKY TREMMEL  
= HOLLIE HOFFMAN

**Severn Trent Laboratories of Florida**  
**PROJECT SAMPLE INSPECTION FORM**

Lab Accession #: 810238

Date Received: 14-Oct-98

1. Was there a Chain of Custody? Yes No<sup>+</sup>
2. Was Chain of Custody properly filled out and relinquished? Yes No<sup>+</sup>
3. Were samples received cold? Yes No<sup>+</sup> N/A  
(Criteria: 2° - 6°C: STL-SOP 1055)
4. Were all samples properly labeled and identified? Yes No<sup>+</sup>
5. Did samples require splitting? Yes<sup>+</sup> No  
Req By: PM Client Other<sup>+</sup>
6. Were samples received in proper containers for analysis requested? Yes No<sup>+</sup>
7. Were all sample containers received intact? Yes No<sup>+</sup>

8. Were samples checked for preservative? Yes No<sup>+</sup> N/A  
(Check pH of all H<sub>2</sub>O requiring preservative (STL-PN SOP 917) except VOA vials that require zero headspace)\*
9. Is there sufficient volume for analysis requested? Yes No<sup>+</sup>
10. Were samples received within Holding Time? Yes No<sup>+</sup>  
(REFER TO STL-SOP 1040)
11. Is Headspace visible > ¼" in diameter in VOA vials? \* If any headspace is evident, comment in out-of-control Yes<sup>+</sup> No N/A
12. If sent, were matrix spike bottles returned? Yes No<sup>+</sup> N/A
13. Was Project Manager notified of problems? (initials: \_\_\_\_\_) Yes No<sup>+</sup> N/A

Airbill Number(s): 44126309 2746

Shipped By: FED EX

cooler Number(s): Thurs

Shipping Charges: n/a

Cooler Weight(s): n/a

Cooler Temp(s) (°C): 3.5°C

(LIST THERMOMETER NUMBER(S) FOR VERIFICATION)

**Out of Control Events and Inspection Comments:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(USE BACK OF PSIF FOR ADDITIONAL NOTES AND COMMENTS)

Inspected By: UBP Date: 10-14-98 Logged By: UBP Date: 10-14-98

Note all Out-of-Control and/or questionable events on Comment Section of this form.

Note who requested the splitting of samples on the Comment Section of this form.

+ All preservatives for the State of North Carolina, the State of New York, and other requested samples are to be recorded on the sheet provided to record pH results (STL-SOP 938, section 2.2.9).

\* According to EPA, ¼" of headspace is allowed in 40 ml vials requiring volatile analysis, however, STL makes it policy to record any headspace as out-of-control (STL-SOP 938, section 2.2.12).

Pinnacle Laboratories, Inc.  
 2709-D Pan American Freeway, NE  
 Albuquerque, New Mexico 87107  
 (505) 344-3777 Fax (505) 344-4413

| SAMPLE ID         | DATE  | TIME | MATRIX | LAB ID | Metals (8) RCRA | RCRA TCLP METALS | Metals-13 PP List | Metals-TAL | TOX | TOC | Gen Chemistry | Oil and Grease | Volatile Organics GC/MS (8260) | BOD | COD | PESTICIDES/PCB (608/8080) | 8270 BY GC/MS | PNA (8310) + 1 methyl & 2 methyl Naphth. | 8240 (TCLP 1311) ZHE | Herbicides (615/8150) | Base/Neutral Acid Compounds GC/MS (625/8270) | URANIUM | RADIUM 226+228 | Gross Alpha/Beta | TO-14 | NUMBER OF CONTAINERS |
|-------------------|-------|------|--------|--------|-----------------|------------------|-------------------|------------|-----|-----|---------------|----------------|--------------------------------|-----|-----|---------------------------|---------------|------------------------------------------|----------------------|-----------------------|----------------------------------------------|---------|----------------|------------------|-------|----------------------|
| 810018-22 (MW.95) | 10/12 | 1215 | Ad     |        |                 |                  |                   |            |     |     |               |                |                                |     |     |                           |               | X                                        |                      |                       |                                              |         |                |                  |       |                      |
| .03 (MW.63)       | 10/11 | 0915 |        |        |                 |                  |                   | X          |     |     |               |                |                                |     |     |                           |               |                                          |                      |                       |                                              |         |                |                  |       |                      |
| .15 (MW.71)       | 10/11 | 1710 |        |        |                 |                  |                   | X          |     |     |               |                |                                |     |     |                           |               |                                          |                      |                       |                                              |         |                |                  |       |                      |
| .18 (MW.67)       | 10/12 | 1030 |        |        |                 |                  |                   | X          |     |     |               |                |                                |     |     |                           |               |                                          |                      |                       |                                              |         |                |                  |       |                      |
| .24 (MW.97)       |       | 1410 |        |        |                 |                  |                   | X          |     |     |               |                |                                |     |     |                           |               |                                          |                      |                       |                                              |         |                |                  |       |                      |
| .27 (MW.82)       |       | 1550 |        |        |                 |                  |                   | X          |     |     |               |                |                                |     |     |                           |               |                                          |                      |                       |                                              |         |                |                  |       |                      |
| .28 (MW.68)       |       | 1630 |        |        |                 |                  |                   | X          |     |     |               |                |                                |     |     |                           |               |                                          |                      |                       |                                              |         |                |                  |       |                      |

|                       |                 |                            |       |                    |   |                  |                 |                  |          |
|-----------------------|-----------------|----------------------------|-------|--------------------|---|------------------|-----------------|------------------|----------|
| PROJECT INFORMATION   |                 | SAMPLE RECEIPT             |       | SAMPLES SENT TO:   |   | RELINQUISHED BY: |                 | RELINQUISHED BY: |          |
| PROJECT #:            | 810018          | Total Number of Containers |       | PENSACOLA - STL-FL | ✓ | Signature:       | Kim McNeill     | Time:            | 3:40     |
| PROJ. NAME:           | MOC             | Chain of Custody           | Seals | PORTLAND - ESL-OR  |   | Printed Name:    | Kim McNeill     | Date:            | 10/13/08 |
| QC LEVEL:             | 6TD IV          | Received Intact?           |       | STL - CT           |   |                  |                 |                  |          |
| QC REQUIRED:          | MS MSD BLANK    | Received Good Cond./Cold   |       | STL - NEW JERSEY   |   |                  |                 |                  |          |
| TAT:                  | STANDARD RUSHII | LAB NUMBER:                |       | N. CREEK           |   |                  |                 |                  |          |
|                       |                 |                            |       | BARRINGER          |   |                  |                 |                  |          |
| DUE DATE:             |                 | COMMENTS:                  |       | SEQUOIA            |   | Signature:       | Kim B. Phillips | Time:            | 10:08:18 |
| RUSH SURCHARGE:       |                 |                            |       |                    |   | Printed Name:    | Kim B. Phillips | Date:            | 10-14-08 |
| CLIENT DISCOUNT:      |                 |                            |       |                    |   |                  |                 |                  |          |
| SPECIAL CERTIFICATION |                 |                            |       |                    |   |                  |                 |                  |          |
| REQUIRED:             |                 |                            |       |                    |   | Company:         |                 |                  |          |

# Environmental Services Laboratory, Inc.

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Kim McNeill  
Pinnacle Laboratories  
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Albuquerque, NM 87107

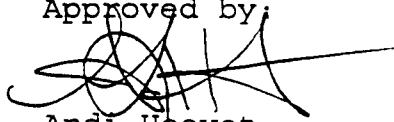
Date: 10/22/1998  
ESL Account No.: 90147  
ESL Job Number: 98.02005

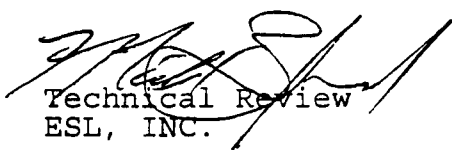
Project: 810048 / MOC  
Location: Indian Basin Remediation

Sample analysis in support of the project referenced above has been completed and results are presented on the following pages. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

| Sample Number | Sample Description | Matrix Type | Date Taken | Date Received |
|---------------|--------------------|-------------|------------|---------------|
| 106512        | 810048-03 (MW-63)  | Water       | 10/11/1998 | 10/14/1998    |
| 106513        | 810048-07 (MW-89)  | Water       | 10/11/1998 | 10/14/1998    |
| 106514        | 810048-09 (MW-66)  | Water       | 10/11/1998 | 10/14/1998    |
| 106515        | 810048-11 (MW-61A) | Water       | 10/11/1998 | 10/14/1998    |
| 106516        | 810048-15 (MW-71)  | Water       | 10/11/1998 | 10/14/1998    |
| 106517        | 810048-18 (MW-87)  | Water       | 10/12/1998 | 10/14/1998    |
| 106518        | 810048-22 (MW-95)  | Water       | 10/12/1998 | 10/14/1998    |
| 106519        | 810048-24 (MW-97)  | Water       | 10/12/1998 | 10/14/1998    |
| 106520        | 810048-27 (MW-82)  | Water       | 10/12/1998 | 10/14/1998    |
| 106521        | 810048-28 (MW-68)  | Water       | 10/12/1998 | 10/14/1998    |

Approved by:

  
Andi Hoevet  
Project Manager  
ESL, INC.

  
Technical Review  
ESL, INC.

The results from these samples relate only to the items tested. This report shall not be reproduced, except in full, without the written approval of the laboratory.

*ANALYTICAL SERVICES FOR THE ENVIRONMENT*

# ANALYTICAL REPORT

Kim McNeill  
Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

10/22/1998  
Job No.: 98.02005

Page: 2

Project Name: 810048 / MOC  
Date Received: 10/14/1998

Sample Number      Sample Description  
106512              810048-03 (MW-63)

| <u>PARAMETERS</u>           | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|-----------------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Alkalinity, Bicarb. (CaCO3) | SM 2320 B      | 330            | 5.0                 | mg/L         | 10/15/1998           |             |
| Alkalinity, Carb. (CaCO3)   | SM 2320 B      | ND             | 5.0                 | mg/L         | 10/15/1998           |             |
| Alkalinity, Total (CaCO3)   | 310.1          | 330            | 5.0                 | mg/L         | 10/15/1998           |             |
| Chloride                    | EPA 300.0      | 1.3            | 0.5                 | mg/L         | 10/16/1998           |             |
| ICP/AA Digestion - Water    | ICP            | -              |                     |              | 10/16/1998           |             |
| Calcium, ICP                | 6010           | 74             | 0.05                | mg/L         | 10/20/1998           | MD          |
| Magnesium, ICP              | 6010           | 31             | 0.05                | mg/L         | 10/20/1998           | MD          |
| Potassium, ICP              | 6010           | 2.3            | 0.2                 | mg/L         | 10/20/1998           |             |
| Sodium, ICP                 | 6010           | 6.2            | 0.2                 | mg/L         | 10/20/1998           |             |

Sample Number      Sample Description  
106513              810048-07 (MW-89)

| <u>PARAMETERS</u>    | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|----------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Cyanide Distillation |                | -              |                     |              | 10/16/1998           |             |
| Cyanide, Total       | 9010           | ND             | 0.02                | mg/L         | 10/20/1998           |             |

Sample Number      Sample Description  
106514              810048-09 (MW-66)

| <u>PARAMETERS</u>    | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|----------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Cyanide Distillation |                | -              |                     |              | 10/16/1998           |             |
| Cyanide, Total       | 9010           | ND             | 0.02                | mg/L         | 10/20/1998           |             |

Sample Number      Sample Description  
106515              810048-11 (MW-61A)

| <u>PARAMETERS</u>    | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|----------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Cyanide Distillation |                | -              |                     |              | 10/16/1998           |             |
| Cyanide, Total       | 9010           | ND             | 0.02                | mg/L         | 10/20/1998           |             |

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

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# ANALYTICAL REPORT

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Albuquerque, NM 87107

10/22/1998  
Job No.: 98.02005

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Project Name: 810048 / MOC  
Date Received: 10/14/1998

Sample Number      Sample Description  
106516              810048-15 (MW-71)

| <u>PARAMETERS</u>           | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|-----------------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Alkalinity, Bicarb. (CaCO3) | SM 2320 B      | 320            | 5.0                 | mg/L         | 10/15/1998           |             |
| Alkalinity, Carb. (CaCO3)   | SM 2320 B      | ND             | 5.0                 | mg/L         | 10/15/1998           |             |
| Alkalinity, Total (CaCO3)   | 310.1          | 320            | 5.0                 | mg/L         | 10/15/1998           |             |
| Chloride                    | EPA 300.0      | 35             | 5.0                 | mg/L         | 10/16/1998           | DIL,Q       |
| Fluoride, Total             | 340.2          | 2.0            | 0.2                 | mg/L         | 10/20/1998           |             |
| Solids, Total Dissolved     | 160.1          | 1200           | 10                  | mg/L         | 10/16/1998           |             |
| ICP/AA Digestion - Water    | ICP            | -              |                     |              | 10/16/1998           |             |
| Calcium, ICP                | 6010           | 200            | 0.05                | mg/L         | 10/20/1998           |             |
| Magnesium, ICP              | 6010           | 87             | 0.05                | mg/L         | 10/20/1998           |             |
| Potassium, ICP              | 6010           | 12             | 0.2                 | mg/L         | 10/20/1998           |             |
| Sodium, ICP                 | 6010           | 27             | 4.0                 | mg/L         | 10/20/1998           | DIL,Q       |

Sample Number      Sample Description  
106517              810048-18 (MW-87)

| <u>PARAMETERS</u>           | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|-----------------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Alkalinity, Bicarb. (CaCO3) | SM 2320 B      | 270            | 5.0                 | mg/L         | 10/15/1998           |             |
| Alkalinity, Carb. (CaCO3)   | SM 2320 B      | ND             | 5.0                 | mg/L         | 10/15/1998           |             |
| Alkalinity, Total (CaCO3)   | 310.1          | 270            | 5.0                 | mg/L         | 10/15/1998           |             |
| Chloride                    | EPA 300.0      | 1.8            | 0.5                 | mg/L         | 10/16/1998           |             |
| ICP/AA Digestion - Water    | ICP            | -              |                     |              | 10/16/1998           |             |
| Calcium, ICP                | 6010           | 130            | 0.05                | mg/L         | 10/20/1998           |             |
| Magnesium, ICP              | 6010           | 50             | 0.05                | mg/L         | 10/20/1998           |             |
| Potassium, ICP              | 6010           | 1.6            | 0.2                 | mg/L         | 10/19/1998           |             |
| Sodium, ICP                 | 6010           | 10             | 0.2                 | mg/L         | 10/20/1998           |             |

Sample Number      Sample Description  
106518              810048-22 (MW-95)

| <u>PARAMETERS</u>           | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|-----------------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Alkalinity, Bicarb. (CaCO3) | SM 2320 B      | 320            | 5.0                 | mg/L         | 10/15/1998           |             |
| Alkalinity, Carb. (CaCO3)   | SM 2320 B      | ND             | 5.0                 | mg/L         | 10/15/1998           |             |

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

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## ANALYTICAL REPORT

Kim McNeill  
Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

10/22/1998  
Job No.: 98.02005

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Project Name: 810048 / MOC  
Date Received: 10/14/1998

Sample Number      Sample Description  
106518              810048-22 (MW-95)

| <u>PARAMETERS</u>                      | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|----------------------------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Alkalinity, Total (CaCO <sub>3</sub> ) | 310.1          | 320            | 5.0                 | mg/L         | 10/15/1998           |             |
| Chloride                               | EPA 300.0      | 1.3            | 0.5                 | mg/L         | 10/16/1998           |             |
| ICP/AA Digestion - Water               | ICP            | -              |                     |              | 10/16/1998           |             |
| Calcium, ICP                           | 6010           | 79             | 0.05                | mg/L         | 10/20/1998           |             |
| Magnesium, ICP                         | 6010           | 35             | 0.05                | mg/L         | 10/20/1998           |             |
| Potassium, ICP                         | 6010           | 1.9            | 0.2                 | mg/L         | 10/19/1998           |             |
| Sodium, ICP                            | 6010           | 3.6            | 0.2                 | mg/L         | 10/20/1998           |             |

Sample Number      Sample Description  
106519              810048-24 (MW-97)

| <u>PARAMETERS</u>                        | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|------------------------------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Alkalinity, Bicarb. (CaCO <sub>3</sub> ) | SM 2320 B      | 280            | 5.0                 | mg/L         | 10/15/1998           |             |
| Alkalinity, Carb. (CaCO <sub>3</sub> )   | SM 2320 B      | ND             | 5.0                 | mg/L         | 10/15/1998           |             |
| Alkalinity, Total (CaCO <sub>3</sub> )   | 310.1          | 280            | 5.0                 | mg/L         | 10/15/1998           |             |
| Chloride                                 | EPA 300.0      | 1.0            | 0.5                 | mg/L         | 10/16/1998           |             |
| ICP/AA Digestion - Water                 | ICP            | -              |                     |              | 10/16/1998           |             |
| Calcium, ICP                             | 6010           | 110            | 0.05                | mg/L         | 10/20/1998           |             |
| Magnesium, ICP                           | 6010           | 41             | 0.05                | mg/L         | 10/20/1998           |             |
| Potassium, ICP                           | 6010           | 2.6            | 0.2                 | mg/L         | 10/19/1998           |             |
| Sodium, ICP                              | 6010           | 6.6            | 0.2                 | mg/L         | 10/20/1998           |             |

Sample Number      Sample Description  
106520              810048-27 (MW-82)

| <u>PARAMETERS</u>                        | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|------------------------------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Alkalinity, Bicarb. (CaCO <sub>3</sub> ) | SM 2320 B      | 300            | 5.0                 | mg/L         | 10/15/1998           |             |
| Alkalinity, Carb. (CaCO <sub>3</sub> )   | SM 2320 B      | ND             | 5.0                 | mg/L         | 10/15/1998           |             |
| Alkalinity, Total (CaCO <sub>3</sub> )   | 310.1          | 300            | 5.0                 | mg/L         | 10/15/1998           |             |
| Chloride                                 | EPA 300.0      | 7.0            | 0.5                 | mg/L         | 10/16/1998           |             |
| ICP/AA Digestion - Water                 | ICP            | -              |                     |              | 10/16/1998           |             |
| Calcium, ICP                             | 6010           | 120            | 0.05                | mg/L         | 10/20/1998           |             |

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

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## ANALYTICAL REPORT

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2709-D Pan American Fwy NE  
Albuquerque, NM 87107

10/22/1998  
Job No.: 98.02005

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Project Name: 810048 / MOC  
Date Received: 10/14/1998

Sample Number      Sample Description  
106520              810048-27 (MW-82)

| <u>PARAMETERS</u> | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|-------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Magnesium, ICP    | 6010           | 51             | 0.05                | mg/L         | 10/20/1998           |             |
| Potassium, ICP    | 6010           | 2.1            | 0.2                 | mg/L         | 10/19/1998           |             |
| Sodium, ICP       | 6010           | 44             | 4.0                 | mg/L         | 10/20/1998           | DIL.Q       |

Sample Number      Sample Description  
106521              810048-28 (MW-68)

| <u>PARAMETERS</u>           | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|-----------------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Alkalinity, Bicarb. (CaCO3) | SM 2320 B      | 300            | 5.0                 | mg/L         | 10/15/1998           |             |
| Alkalinity, Carb. (CaCO3)   | SM 2320 B      | ND             | 5.0                 | mg/L         | 10/15/1998           |             |
| Alkalinity, Total (CaCO3)   | 310.1          | 300            | 5.0                 | mg/L         | 10/15/1998           |             |
| Chloride                    | EPA 300.0      | 2.8            | 0.5                 | mg/L         | 10/16/1998           |             |
| ICP/AA Digestion - Water    | ICP            | -              |                     |              | 10/16/1998           |             |
| Calcium, ICP                | 6010           | 84             | 0.05                | mg/L         | 10/20/1998           |             |
| Magnesium, ICP              | 6010           | 34             | 0.05                | mg/L         | 10/20/1998           |             |
| Potassium, ICP              | 6010           | 2.3            | 0.2                 | mg/L         | 10/19/1998           |             |
| Sodium, ICP                 | 6010           | 14             | 0.2                 | mg/L         | 10/20/1998           |             |

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

Environmental Services Laboratory, Inc. (503) 670-8520 (503) 670-9243 FAX  
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## QUALITY CONTROL REPORT CONTINUING CALIBRATION VERIFICATION

Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 10/22/1998

Job Number: 98.02005

Contact: Kim McNeill  
Project: 810048 / MOC

| Analyte                                  | CCV                   | Concentration<br>Found | Percent<br>Recovery | Date<br>Analyzed |
|------------------------------------------|-----------------------|------------------------|---------------------|------------------|
|                                          | True<br>Concentration |                        |                     |                  |
| Alkalinity, Bicarb. (CaCO <sub>3</sub> ) | 201                   | 220                    | 109.5               | 10/15/1998       |
| Chloride                                 | 10.0                  | 9.5                    | 95.0                | 10/16/1998       |
| Fluoride, Total                          | 7.0                   | 7.2                    | 102.9               | 10/20/1998       |
| Calcium, ICP                             | 25.0                  | 23.5                   | 94.0                | 10/20/1998       |
| Calcium, ICP                             | 25.0                  | 23.8                   | 95.2                | 10/19/1998       |
| Magnesium, ICP                           | 25.0                  | 25.1                   | 100.4               | 10/20/1998       |
| Potassium, ICP                           | 5.00                  | 4.98                   | 99.6                | 10/20/1998       |
| Sodium, ICP                              | 5.00                  | 4.76                   | 95.2                | 10/20/1998       |

CCV - Continuing Calibration Verification

Environmental Services Laboratory, Inc. (503) 670-8520 (503) 670-9243 FAX  
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# QUALITY CONTROL REPORT LABORATORY CONTROL STANDARD

Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 10/22/1998

Job Number: 98.02005

Contact: Kim McNeill  
Project: 810048 / MOC

| Analyte                 | LCS                | Concentration Found | LCS        | Flags | Date Analyzed |
|-------------------------|--------------------|---------------------|------------|-------|---------------|
|                         | True Concentration |                     | % Recovery |       |               |
| Cyanide, Total          | 0.20               | 0.212               | 106.0      |       | 10/16/1998    |
| Cyanide, Total          | 0.20               | 0.191               | 95.5       |       | 10/20/1998    |
| Solids, Total Dissolved | 1904               | 2014                | 105.8      |       | 10/16/1998    |
| Calcium, ICP            | 5.00               | 4.58                | 91.6       |       | 10/20/1998    |
| Magnesium, ICP          | 5.00               | 4.90                | 98.0       |       | 10/20/1998    |
| Potassium, ICP          | 5.00               | 5.14                | 102.8      |       | 10/20/1998    |
| Sodium, ICP             | 5.00               | 4.58                | 91.6       |       | 10/20/1998    |

LCS - Laboratory Control Standard

Environmental Services Laboratory, Inc. (503) 670-8520 (503) 670-9243 FAX  
17400 SW Upper Boones Ferry Rd., Suite 270, Portland OR 97224

# QUALITY CONTROL REPORT MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 10/22/1998  
Job Number: 98.02005

Contact: Kim McNeill  
Project: 810048 / MOC

| Analyte         | Matrix          | Sample | Spike  | Units | Percent  | MSD    | MSD             |       | Percent  | MS/MSD | Flags |
|-----------------|-----------------|--------|--------|-------|----------|--------|-----------------|-------|----------|--------|-------|
|                 | Spike<br>Result |        | Amount |       | Recovery | Result | Spike<br>Amount | Units | Recovery | RPD    |       |
| Chloride        | 13.8            | 3.5    | 10.0   | mg/L  | 103.0    | 13.3   | 10.0            | mg/L  | 98.0     | 4.9    |       |
| Fluoride, Total | 7.0             | 2.0    | 5.0    | mg/L  | 100.0    | 7.0    | 5.0             | mg/L  | 100.0    | 0.0    |       |
| Calcium, ICP    |                 | 74     | 5.00   | mg/L  |          |        | 5.00            | mg/L  |          |        | MD    |
| Magnesium, ICP  |                 | 31     | 5.00   | mg/L  |          |        | 5.00            | mg/L  |          |        | MD    |
| Potassium, ICP  | 8.06            | 2.3    | 5.00   | mg/L  | 115.2    | 8.05   | 5.00            | mg/L  | 115.0    | 0.2    |       |
| Sodium, ICP     | 10.7            | 6.2    | 5.00   | mg/L  | 90.0     | 10.7   | 5.00            | mg/L  | 90.0     | 0.0    |       |

QC Sample:

NOTE: Matrix Spike Samples may not be samples from this job.

MS = Matrix Spike

MSD = Matrix Spike Duplicate

RPD = Relative Percent Difference

dil. = Diluted Out

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## QUALITY CONTROL REPORT SPIKE

Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 10/22/1998

Job Number: 98.02005

Contact: Kim McNeill  
Project: 810048 / MOC

| Analyte        | Original<br>Analysis | Spike<br>Analysis | Spike<br>Amount | Units | Percent<br>Recovery | Flag |
|----------------|----------------------|-------------------|-----------------|-------|---------------------|------|
| Cyanide, Total | ND                   | 0.193             | 0.20            | mg/L  | 96.5                |      |

## QUALITY CONTROL REPORT BLANKS

Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 10/22/1998

Job Number: 98.02005

Contact: Kim McNeill  
Project: 810048 / MOC  
Location: Indian Basin Remediation

| Analyte                                  | Blank<br>Analysis | Report<br>Limit | Units | Date<br>Analyzed |
|------------------------------------------|-------------------|-----------------|-------|------------------|
| Alkalinity, Bicarb. (CaCO <sub>3</sub> ) | ND                | 5.0             | mg/L  | 10/15/1998       |
| Chloride                                 | ND                | 0.5             | mg/L  | 10/16/1998       |
| Cyanide, Total                           | ND                | 0.02            | mg/L  | 10/16/1998       |
| Cyanide, Total                           | ND                | 0.02            | mg/L  | 10/20/1998       |
| Fluoride, Total                          | ND                | 0.2             | mg/L  | 10/20/1998       |
| Solids, Total Dissolved                  | ND                | 10              | mg/L  | 10/16/1998       |
| Calcium, ICP                             | ND                | 0.05            | mg/L  | 10/20/1998       |
| Magnesium, ICP                           | ND                | 0.05            | mg/L  | 10/20/1998       |
| Potassium, ICP                           | ND                | 0.2             | mg/L  | 10/20/1998       |
| Sodium, ICP                              | ND                | 0.2             | mg/L  | 10/20/1998       |

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# QUALITY CONTROL REPORT DUPLICATES

Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 10/22/1998

Job Number: 98.02005

Contact: Kim McNeill  
Project: 810048 / MOC

| Analyte                     | Original<br>Analysis | Duplicate<br>Analysis | Units | RPD | Date<br>Analyzed | Flag |
|-----------------------------|----------------------|-----------------------|-------|-----|------------------|------|
| Alkalinity, Bicarb. (CaCO3) | 320                  | 330                   | mg/L  | 3.1 | 10/15/1998       |      |
| Alkalinity, Bicarb. (CaCO3) | ND                   | ND                    | mg/L  |     | 10/15/1998       |      |
| Alkalinity, Bicarb. (CaCO3) | 320                  | 330                   | mg/L  | 3.1 | 10/15/1998       |      |
| Alkalinity, Carb. (CaCO3)   | 320                  | 330                   | mg/L  | 3.1 | 10/15/1998       |      |
| Alkalinity, Carb. (CaCO3)   | ND                   | ND                    | mg/L  |     | 10/15/1998       |      |
| Alkalinity, Carb. (CaCO3)   | 320                  | 330                   | mg/L  | 3.1 | 10/15/1998       |      |
| Alkalinity, Total (CaCO3)   | 320                  | 330                   | mg/L  | 3.1 | 10/15/1998       |      |
| Alkalinity, Total (CaCO3)   | ND                   | ND                    | mg/L  |     | 10/15/1998       |      |
| Alkalinity, Total (CaCO3)   | 320                  | 330                   | mg/L  | 3.1 | 10/15/1998       |      |
| Chloride                    | 3.5                  | 3.8                   | mg/L  | 8.2 | 10/16/1998       |      |
| Cyanide, Total              | ND                   | ND                    | mg/L  |     | 10/16/1998       |      |
| Cyanide, Total              | ND                   | ND                    | mg/L  |     | 10/20/1998       |      |
| Fluoride, Total             | 2.0                  | 2.0                   | mg/L  | 0.0 | 10/20/1998       |      |
| Solids, Total Dissolved     | 680                  | 730                   | mg/L  | 7.1 | 10/16/1998       |      |

NOTE: Duplicates may not be samples from this job.

RPD - Relative Percent Difference

# FLAG GLOSSARY

|     |                                                                                                                                                                                                       |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A   | This sample does not have a typical gasoline pattern.                                                                                                                                                 |
| B1  | This sample does not have a typical diesel pattern.                                                                                                                                                   |
| B   | Analyte found in the associated blank as well as the sample.                                                                                                                                          |
| C   | The sample contains a lighter hydrocarbon than gasoline.                                                                                                                                              |
| CN  | See case narrative                                                                                                                                                                                    |
| CS  | Outside control limits or unusual matrix; see case narrative.                                                                                                                                         |
| D   | The sample extends to a heavier hydrocarbon range than gasoline.                                                                                                                                      |
| d   | Results on a dry weight basis                                                                                                                                                                         |
| DIL | Result was calculated from dilution.                                                                                                                                                                  |
| E   | The sample extends to a lighter hydrocarbon range than diesel.                                                                                                                                        |
| F   | The sample extends to a heavier hydrocarbon range than diesel.                                                                                                                                        |
| G   | The positive result for gasoline is due to single component contamination.                                                                                                                            |
| H   | The sample extends to a lighter hydrocarbon range than oil.                                                                                                                                           |
| I   | The oil pattern for this sample is not typical.                                                                                                                                                       |
| J   | The result for this compound is an estimated concentration.                                                                                                                                           |
| L   | The LCS recovery exceeded control limits. See the LCS page of this report.                                                                                                                            |
| LM  | The LCS recovery exceeded control limits; the MS/MSD were in control validating the batch.                                                                                                            |
| M   | MS and/or MSD percent recovery exceeds control limits.                                                                                                                                                |
| MD  | Unable to calculate MS/MSD recovery due to high amount of analyte; greater than 4 times spike level.                                                                                                  |
| MR  | The MS/MSD RPD is greater than method criteria. The sample was re-extracted and re-analyzed with similar results indicating a non-homogeneous sample.                                                 |
| MM  | The Matrix Spike exceeded control limits; LCS was in control validating the batch.                                                                                                                    |
| MI  | Outside control limits due to matrix interference.                                                                                                                                                    |
| N   | Manual integration performed on sample for quantification.                                                                                                                                            |
| N/A | Not Applicable.                                                                                                                                                                                       |
| NC  | Not calculable.                                                                                                                                                                                       |
| NO  | Not Analyzed.                                                                                                                                                                                         |
| P   | A post digestion spike was analyzed, and recoveries were within control limits.                                                                                                                       |
| Q   | Detection limits elevated due to sample matrix.                                                                                                                                                       |
| Q1  | Detection limits elevated due to high levels of non-target compounds. Sample(s) run at a dilution.                                                                                                    |
| R   | The duplicate RPD was greater than 20%. The sample was re-extracted and re-analyzed with similar results. This indicates a matrix interference in the sample, likely a non-homogeneity of the sample. |
| R1  | The duplicate RPD was greater than 20%. Visual inspection showed the sample to be non-homogeneous.                                                                                                    |
| RD  | RPD not applicable for results less than five times the reporting limit.                                                                                                                              |
| RH  | The Relative Percent Difference (RPD) between two columns was greater than 40%, the higher result was reported.                                                                                       |
| RL  | The Relative Percent Difference (RPD) between two columns was greater than 40%, the lower result was reported due to obvious interference with the higher result.                                     |
| RP  | MS/MSD RPD is greater than 20%                                                                                                                                                                        |
| SR  | Surrogate recovery outside control limits. See the surrogate page of the report.                                                                                                                      |
| SD  | Unable to quantitate surrogate due to sample dilution.                                                                                                                                                |
| SC  | Sample not provided to laboratory in proper sampling container.                                                                                                                                       |
| V   | Volatile analysis was requested, sample container received with headspace.                                                                                                                            |
| X1  | The duplicate RPD was greater than 20%. Due to insufficient sample, re-analysis was not possible.                                                                                                     |
| X   | Sample was analyzed outside recommended holding times.                                                                                                                                                |
| Y   | The result for this parameter was greater than the TCLP regulatory limit.                                                                                                                             |
| Z   | The pattern seen for the parameter being analyzed is not typical.                                                                                                                                     |



# Environmental Services Laboratory, Inc.

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Kim McNeill  
Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 11/03/1998  
ESL Account No.: 90147  
ESL Job Number: 98.02114

Project: 810048 / MOC  
Location: Indian Basin

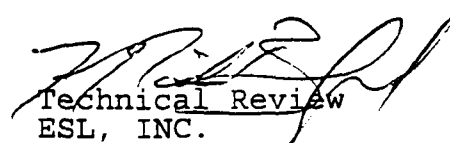
Sample analysis in support of the project referenced above has been completed and results are presented on the following pages. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

| Sample<br>Number | Sample Description | Matrix<br>Type | Date<br>Taken | Date<br>Received |
|------------------|--------------------|----------------|---------------|------------------|
| 106939           | 810048-15 (MW-71)  | Water          | 10/11/1998    | 10/14/1998       |

Approved by:



Andi Hoevet  
Project Manager  
ESL, INC.



Technical Review  
ESL, INC.

The results from these samples relate only to the items tested. This report shall not be reproduced, except in full, without the written approval of the laboratory.

*ANALYTICAL SERVICES FOR THE ENVIRONMENT*

## ANALYTICAL REPORT

Kim McNeill  
Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

11/03/1998  
Job No.: 98.02114

Page: 2

Project Name: 810048 / MOC  
Date Received: 10/14/1998

Sample Number      Sample Description  
106939              810048-15 (MW-71)

| <u>PARAMETERS</u> | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|-------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Sulfate           | 375.4          | 500            | 125                 | mg/L         | 11/03/1998           | DIL.Q       |

A sample result of ND indicates the parameter was Not Detected at the reporting limit.  
mg = ppm      ug = ppb      su = standard units

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# QUALITY CONTROL REPORT CONTINUING CALIBRATION VERIFICATION

Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 11/03/1998

Job Number: 98.02114

Contact: Kim McNeill  
Project: 810048 / MOC

| Analyte | CCV                   | Concentration<br>Found | Percent<br>Recovery | Date<br>Analyzed |
|---------|-----------------------|------------------------|---------------------|------------------|
|         | True<br>Concentration |                        |                     |                  |
| Sulfate | 13.9                  | 12.9                   | 92.8                | 11/03/1998       |

CCV - Continuing Calibration Verification

Environmental Services Laboratory, Inc. (503)670-8520 (503)670-9243 FAX  
17400 SW Upper Boones Ferry Rd., Suite 270, Portland, OR 97224

# QUALITY CONTROL REPORT

## MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 11/03/1998  
Job Number: 98.02114

Contact: Kim McNeill  
Project: 810048 / MOC

| Analyte | Matrix | Sample | Spike  | Units | Percent  | MSD    | Spike  | Units | Percent  | MS/MSD | Flags |
|---------|--------|--------|--------|-------|----------|--------|--------|-------|----------|--------|-------|
|         | Spike  |        |        |       |          | MSD    |        |       |          | MS/MSD |       |
|         | Result | Result | Amount |       | Recovery | Result | Amount |       | Recovery | RPD    |       |
| Sulfate | 18.6   | ND     | 15.0   | mg/L  | 124.0    | 17.3   | 15.0   | mg/L  | 115.3    | 7.3    |       |

QC Sample:

NOTE: Matrix Spike Samples may not be samples from this job.

MS = Matrix Spike

MSD = Matrix Spike Duplicate

RPD = Relative Percent Difference

dil.= Diluted Out

Environmental Services Laboratory, Inc. (503)670-8520 (503)670-9243 FAX  
17400 SW Upper Boones Ferry Rd., Portland, OR 97224

## QUALITY CONTROL REPORT BLANKS

Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 11/03/1998

Job Number: 98.02114

Contact: Kim McNeill  
Project: 810048 / MOC  
Location: Indian Basin

| Analyte | Blank<br>Analysis | Report<br>Limit | Units | Date<br>Analyzed |
|---------|-------------------|-----------------|-------|------------------|
| Sulfate | ND                | 5.0             | mg/L  | 11/03/1998       |

## QUALITY CONTROL REPORT DUPLICATES

Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 11/03/1998  
Job Number: 98.02114

Contact: Kim McNeill  
Project: 810048 / MOC

| Analyte | Original<br>Analysis | Duplicate<br>Analysis | Units | RPD | Date<br>Analyzed | Flag |
|---------|----------------------|-----------------------|-------|-----|------------------|------|
| Sulfate | ND                   | ND                    | mg/L  |     | 11/03/1998       |      |

NOTE: Duplicates may not be samples from this job.

RPD - Relative Percent Difference

# FLAG GLOSSARY

|     |                                                                                                                                                                                                       |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A   | This sample does not have a typical gasoline pattern.                                                                                                                                                 |
| B1  | This sample does not have a typical diesel pattern.                                                                                                                                                   |
| B   | Analyte found in the associated blank as well as the sample.                                                                                                                                          |
| C   | The sample contains a lighter hydrocarbon than gasoline.                                                                                                                                              |
| CN  | See case narrative                                                                                                                                                                                    |
| CS  | Outside control limits or unusual matrix; see case narrative.                                                                                                                                         |
| D   | The sample extends to a heavier hydrocarbon range than gasoline.                                                                                                                                      |
| d   | Results on a dry weight basis                                                                                                                                                                         |
| DIL | Result was calculated from dilution.                                                                                                                                                                  |
| E   | The sample extends to a lighter hydrocarbon range than diesel.                                                                                                                                        |
| F   | The sample extends to a heavier hydrocarbon range than diesel.                                                                                                                                        |
| G   | The positive result for gasoline is due to single component contamination.                                                                                                                            |
| H   | The sample extends to a lighter hydrocarbon range than oil.                                                                                                                                           |
| I   | The oil pattern for this sample is not typical.                                                                                                                                                       |
| J   | The result for this compound is an estimated concentration.                                                                                                                                           |
| L   | The LCS recovery exceeded control limits. See the LCS page of this report.                                                                                                                            |
| LM  | The LCS recovery exceeded control limits; the MS/MSD were in control validating the batch.                                                                                                            |
| M   | MS and/or MSD percent recovery exceeds control limits.                                                                                                                                                |
| MD  | Unable to calculate MS/MSD recovery due to high amount of analyte; greater than 4 times spike level.                                                                                                  |
| MR  | The MS/MSD RPD is greater than method criteria. The sample was re-extracted and re-analyzed with similar results indicating a non-homogeneous sample.                                                 |
| MM  | The Matrix Spike exceeded control limits; LCS was in control validating the batch.                                                                                                                    |
| MI  | Outside control limits due to matrix interference.                                                                                                                                                    |
| N   | Manual integration performed on sample for quantification.                                                                                                                                            |
| N/A | Not Applicable.                                                                                                                                                                                       |
| NC  | Not calculable.                                                                                                                                                                                       |
| NO  | Not Analyzed.                                                                                                                                                                                         |
| P   | A post digestion spike was analyzed, and recoveries were within control limits.                                                                                                                       |
| Q   | Detection limits elevated due to sample matrix.                                                                                                                                                       |
| Q1  | Detection limits elevated due to high levels of non-target compounds. Sample(s) run at a dilution.                                                                                                    |
| R   | The duplicate RPD was greater than 20%. The sample was re-extracted and re-analyzed with similar results. This indicates a matrix interference in the sample, likely a non-homogeneity of the sample. |
| R1  | The duplicate RPD was greater than 20%. Visual inspection showed the sample to be non-homogeneous.                                                                                                    |
| RD  | RPD not applicable for results less than five times the reporting limit.                                                                                                                              |
| RH  | The Relative Percent Difference (RPD) between two columns was greater than 40%, the higher result was reported.                                                                                       |
| RL  | The Relative Percent Difference (RPD) between two columns was greater than 40%, the lower result was reported due to obvious interference with the higher result.                                     |
| RP  | MS/MSD RPD is greater than 20%                                                                                                                                                                        |
| SR  | Surrogate recovery outside control limits. See the surrogate page of the report.                                                                                                                      |
| SD  | Unable to quantitate surrogate due to sample dilution.                                                                                                                                                |
| SC  | Sample not provided to laboratory in proper sampling container.                                                                                                                                       |
| V   | Volatile analysis was requested, sample container received with headspace.                                                                                                                            |
| X1  | The duplicate RPD was greater than 20%. Due to insufficient sample, re-analysis was not possible.                                                                                                     |
| X   | Sample was analyzed outside recommended holding times.                                                                                                                                                |
| Y   | The result for this parameter was greater than the TCLP regulatory limit.                                                                                                                             |
| Z   | The pattern seen for the parameter being analyzed is not typical.                                                                                                                                     |

# Marathon October 1998 Gauging/Sampling Event

## October 8-15, 1998

Note: Paul will turn have pumps turned off the day before gauging are collected. Static gauging event is needed for modelling.

| Well ID | BTEX | Cyanide | Anions/Cations | Sulfate | Fluoride | TDS | PAH | Comments                             |
|---------|------|---------|----------------|---------|----------|-----|-----|--------------------------------------|
| MW-60   | X    |         |                |         |          |     |     |                                      |
| MW-61A  | X    | X       |                |         |          |     |     |                                      |
| MW-63   |      |         | X              |         |          |     |     |                                      |
| MW-66   | X    | X       |                |         |          |     |     |                                      |
| MW-68   |      |         | X              |         |          |     |     | <del>has pump in well</del>          |
| MW-71   | X    |         | X              | X       | X        | X   |     | (has pump in well)                   |
| MW-82   |      |         | X              |         |          |     |     |                                      |
| MW-87   | X    |         | X              |         |          |     |     |                                      |
| MW-87A  | X    |         | X              | X       | X        | X   |     |                                      |
| MW-88   | X    |         |                |         |          |     |     |                                      |
| MW-89   | X    | X       |                |         |          |     |     |                                      |
| MW-95   |      |         | X              |         |          |     | X   | bottle broke during shipment in 6/98 |
| MW-96   | X    |         |                |         |          |     |     |                                      |
| MW-97   | X    |         | X              |         |          |     |     |                                      |
| MW-111  | X    |         |                |         |          |     |     |                                      |

| Analysis           | Constituents                                                                                                                                                      | Method                                      |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| BTEX               | Benzene, Toluene, Ethylbenzene, Xylene                                                                                                                            | EPA 8021 VOA's                              |
| Cyanide            | Cyanide                                                                                                                                                           | 335.2 1 Liter Poly w/ NaOH                  |
| Anions/<br>Cations | Sodium (Na), Calcium (Ca), Magnesium (Mg), Potassium (K), Bicarbonate (HCO <sub>3</sub> ), Sulfide (S <sub>2</sub> ), Chloride (Cl), Carbonate (CO <sub>3</sub> ) |                                             |
| Sulfate            | Sulfate                                                                                                                                                           | 375.4                                       |
| Fluoride           | Fluoride                                                                                                                                                          | 340.2/4506-FC                               |
| TDS                | TDS                                                                                                                                                               | 160.1 1500 mL Na <sub>2</sub> Acid          |
| PAH                | benzo(a)pyrene and 1-methylnaphthalene                                                                                                                            | EPA 8310 2 Amber Lites Na <sub>2</sub> Acid |

9/30/98 - not confirmed  
by Paul. Left voice mail for  
him. No word back. Case

## Interlab Chain of Custody

**Pinnacle Laboratories, Inc.**

1

**Network Project Manager:** Kimberly D. McNeill

**Pinnacle Laboratories, Inc.**  
2709-D Pan American Freeway, NE  
Albuquerque, New Mexico 87107  
(505) 344-3777 Fax (505) 344-4413

**ANALYSIS REQUEST:**

| SAMPLE ID         | DATE     | TIME | MATRIX | LAB ID |
|-------------------|----------|------|--------|--------|
| 81004B-03 (MW.63) | 10/11/98 | 0915 | AQ     |        |
| -07 (MW.89)       |          | 1145 |        |        |
| -09 (MW.66)       |          | 1255 |        |        |
| -11 (MW.61A)      |          | 1430 |        |        |
| -15 (MW.71)       |          | 1710 |        |        |
| -18 (MW.87)       | 10/12    | 1030 |        |        |
| -22 (MW.95)       |          | 1255 |        |        |
| -24 (MW.97)       |          | 1410 |        |        |
| -27 (MW.82)       |          | 1550 |        |        |
| -28 (MW.68)       |          | 1630 |        |        |

Pinnacle Laboratories, Inc.

2709-D Pan American Freeway, NE

Albuquerque, New Mexico 87107

(505) 344-3777 Fax (505) 344-4413

| PROJECT INFORMATION | SAMPLE RECEIPT |
|---------------------|----------------|
|---------------------|----------------|

|              |                 |                            |          |
|--------------|-----------------|----------------------------|----------|
| PROJECT #:   | 810642          | Total Number of Containers | 18       |
| PROJ. NAME:  | MOC             | Chain of Custody Seals     | 2        |
| QC LEVEL:    | 6TD IV          | Received Intact?           | 42       |
| QC REQUIRED: | MS MSD BLANK    | Received Good Cond /Cold   | 2        |
| TAT:         | STANDARD RUSH!! | LAB NUMBER:                | 98.02005 |

**COMMENTS:**

DUE DATE: 10/23  
RUSH SURCHARGE: 0  
CLIENT DISCOUNT: NA  
SPECIAL CERTIFICATION  
REQUIRED: YES (NO)

**SAMPLES SENT TO:**

|                    |   |
|--------------------|---|
| PENSACOLA - STL-FL |   |
| PORTLAND - ESL-OR  | X |
| STL - CT           |   |
| STL - NEW JERSEY   |   |
| N. CREEK           |   |
| BARRINGER          |   |
| SEQUOIA            |   |
|                    |   |
|                    |   |
|                    |   |

**RELINQUISHED BY:**

|                                                       |                       |
|-------------------------------------------------------|-----------------------|
| Signature: <i>W. Russell</i>                          | Time: <i>3:30</i>     |
| Printed Name: <i>W. Russell</i>                       | Date: <i>10/13/88</i> |
| Pinnacle Laboratories, Inc.                           |                       |
| RECEIVED BY: <i>[Signature]</i> 1: <i>[Signature]</i> |                       |
| Signature: <i>[Signature]</i>                         | Time: <i>1:00</i>     |
| Printed Name: <i>W. Russell</i>                       | Date: <i>10/14/88</i> |
| Company <i>ESL</i>                                    |                       |

**RELINQUISHED BY:**

|                     |       |
|---------------------|-------|
| Signature:          | Time: |
| Printed Name:       | Date: |
| Company             |       |
| <b>RECEIVED BY:</b> |       |
| 2                   |       |
| Signature:          | Time: |
| Printed Name:       | Date: |
| Company             |       |

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

|                                  |                                                                                                                                                                                  |                                                   |          |        |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|----------|--------|
| PROJECT MANAGER: Paul Penick     |                                                                                                                                                                                  | ANALYSIS REQUEST                                  |          |        |
| COMPANY: Marathon Oil Co         | General Chemistry:                                                                                                                                                               |                                                   |          |        |
| ADDRESS: Midland TX              | Polynuclear Aromatics (610/8310) PAH                                                                                                                                             |                                                   |          |        |
| PHONE:                           | Base/Neutral/Acid Compounds GC/MS (625/8270)                                                                                                                                     |                                                   |          |        |
| FAX:                             | Herbicides (615/8151)                                                                                                                                                            |                                                   |          |        |
| BILL TO:                         | Pesticides /PCB (608/8081)                                                                                                                                                       |                                                   |          |        |
| COMPANY:                         | 8260 (Landfill) Volatile Organics                                                                                                                                                |                                                   |          |        |
| ADDRESS: same as above           | 8260 (CUST) Volatile Organics                                                                                                                                                    |                                                   |          |        |
|                                  | 8260 (Full) Volatile Organics                                                                                                                                                    |                                                   |          |        |
|                                  | 8260 (TCL) Volatile Organics                                                                                                                                                     |                                                   |          |        |
|                                  | 504.1 EDB <input type="checkbox"/> / DBCP <input type="checkbox"/>                                                                                                               |                                                   |          |        |
|                                  | 8021 (CUST)                                                                                                                                                                      |                                                   |          |        |
|                                  | 8021 (HALO)                                                                                                                                                                      |                                                   |          |        |
|                                  | 8021 (EDX)                                                                                                                                                                       |                                                   |          |        |
|                                  | 8021 (TCL)                                                                                                                                                                       |                                                   |          |        |
|                                  | 8021 (BTEX) <input type="checkbox"/> MIB <input type="checkbox"/> TMB <input type="checkbox"/> TCE                                                                               |                                                   |          |        |
|                                  | 8021 (BTEX)/8015 (Gasoline)                                                                                                                                                      |                                                   |          |        |
|                                  | (M8015) Gas/Purge & Trap                                                                                                                                                         |                                                   |          |        |
|                                  | (MOD 8015) Diesel/Direct Inject                                                                                                                                                  |                                                   |          |        |
|                                  | Petroleum Hydrocarbons (418.1) TPH                                                                                                                                               |                                                   |          |        |
| SAMPLE ID                        | DATE                                                                                                                                                                             | TIME                                              | MATRIX   | LAB ID |
| DT-1tho                          | 10/11/98                                                                                                                                                                         | 0820                                              | Water    | 0110   |
| Jat RB                           |                                                                                                                                                                                  | 0835                                              |          | 02     |
| mw-63                            |                                                                                                                                                                                  | 0915                                              |          | 03     |
| mw-63RB                          |                                                                                                                                                                                  | 0940                                              |          | 04     |
| mw-111                           |                                                                                                                                                                                  | 1035                                              |          | 05     |
| mw-111RB                         |                                                                                                                                                                                  | 1055                                              |          | 06     |
| mw-87                            |                                                                                                                                                                                  | 1145                                              |          | 07     |
| mw-89RB                          |                                                                                                                                                                                  | 1205                                              |          | 08     |
| mw-66                            |                                                                                                                                                                                  | 1255                                              |          | 09     |
| mw-66RB                          |                                                                                                                                                                                  | 1340                                              |          | ID     |
| PROJECT INFORMATION              |                                                                                                                                                                                  | PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS |          |        |
| PROJ NO: 104332.40               | (RUSH) <input type="checkbox"/> 124hr <input type="checkbox"/> 148hr <input type="checkbox"/> 172hr <input type="checkbox"/> 1 WEEK (NORMAL) <input checked="" type="checkbox"/> |                                                   |          |        |
| PROJ NAME: Lubricant Penetration | CERTIFICATION REQUIRED: <input type="checkbox"/> INM <input type="checkbox"/> SDWA <input type="checkbox"/> OTHER                                                                |                                                   |          |        |
| P.O. NO.                         | METHANOL PRESERVATION <input type="checkbox"/>                                                                                                                                   |                                                   |          |        |
| SHIPPED VIA                      | COMMENTS: FIXED FEE <input type="checkbox"/>                                                                                                                                     |                                                   |          |        |
| SAMPLE RECEIPT                   |                                                                                                                                                                                  | RECEIVED BY: (LAB)                                |          |        |
| NO. CONTAINERS                   | 23                                                                                                                                                                               | Signature:                                        | Time:    | 2.     |
| CUSTODY SEALS                    | YIN/NA                                                                                                                                                                           | Printed Name:                                     | Date:    |        |
| RECEIVED INTACT                  | Y                                                                                                                                                                                | Signature:                                        | Time:    |        |
| BLUE IDENCE                      | 10                                                                                                                                                                               | Printed Name:                                     | Date:    |        |
|                                  |                                                                                                                                                                                  | Company:                                          | Company: |        |

Metal's Bottle has been Field Filtered

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

PROJECT MANAGER: Paul Pearce

COMPANY: Marathon Oil Co

ADDRESS: Midland TX

PHONE:

FAX:

BILL TO: Marathon

COMPANY: Marathon

ADDRESS: Spring TX

| SAMPLE ID | DATE     | TIME | MATRIX | LAB ID |
|-----------|----------|------|--------|--------|
| MW-61A    | 10/11/98 | 1430 | WATER  | 11111  |
| MW-61ARB  |          | 1455 |        | 11121  |
| MW-88     |          | 1525 |        | 11131  |
| MW-88RB   |          | 1545 |        | 11141  |
| MW-71     |          | 1710 |        | 11151  |
| MW-71RB   | 10/12/98 | 0750 |        | 11161  |
| MW-87ARB  |          | 0850 |        | 11171  |
| MW-87A    |          | 0950 |        | 11181  |
| MW-87     |          | 1030 |        | 11191  |
| MW-87RB   |          | 1100 |        | 11201  |

ANALYSIS REQUESTED:

Petroleum Hydrocarbons (418.1) TPH

(MOD.8015) Diesel/Direct Inject

(M8015) Gas/Purge & Trap

8021 (BTX)/8015 (Gasoline)

8021 (BTX) ☒ TMB ☒ PCB

8021 (TCL)

8021 (EDX)

8021 (HALO)

8021 (CUST)

504.1 EDB ☐ DBCP ☐

8260 (TCL) Volatile Organics

8260 (Full) Volatile Organics

8260 (CUST) Volatile Organics

8260 (Landfill) Volatile Organics

Pesticides /PCB (608/8081)

Herbicides (615/8151)

Base/Neutral/Acid Compounds GC/MS (625/8270)

Polynuclear Aromatics (610/8310)

General Chemistry:

TD5 / 60.1

ANIONS/CATIONS (Mg) (Ca) (K) (Na) (Cl) (SO4) (NO3) (CO3)

Priority Pollutant Metals (13)

Target Analyte List Metals (23)

RCRA Metals (8)

RCRA Metals by TCLP (Method 1311)

Metals: 5u/mk 375.4

Fluoride 340.2 / 4506 FIC

NUMBER OF CONTAINERS: 2

PROJECT INFORMATION

PROJ NO: 104332.40

PROJ NAME: Indian Basin Remediation

P.O. NO:

SHIPPED VIA:

SAMPLE RECEIPT

NO. CONTAINERS: 26

CUSTODY SEALS: YIN (NM)

RECEIVED INTACT: Y

BLUE ICE: 10

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(RUSH) ☐ (12hr) ☐ (148hr) ☐ (172hr) ☐ (1 WEEK) ☒ (NORMAL)

CERTIFICATION REQUIRED: ☐ INM ☐ SDWA ☐ OTHER

METHANOL PRESERVATION ☐

COMMENTS: Metals Bottle has been Field filled

RELINQUISHED BY: 1

Signature: Kevin Cox Date: 10/13/98

Printed Name: Kevin Cox

Company: PDG

RELINQUISHED BY: 2

Signature:  Date:

Printed Name:

Company:

RECEIVED BY: 1

Signature: Paul Pearce Date: 10/13/98

Printed Name: Paul Pearce

Company: American Environmental Network (NM), Inc

RECEIVED BY: 2

Signature: Kevin Cox Date: 10/13/98

Printed Name: Kevin Cox

Company: American Environmental Network (NM), Inc



# Chain of Custody Record

ALBUQUERQUE, NEW MEXICO 87109 810048  
(505) 345-8964  
3332 WEDGEWOOD  
EL PASO, TEXAS 79925  
(915) 593-6000

1910 N. SPRING  
MIDLAND, TEXAS 79705  
(915) 570-1116

Lab job no.: \_\_\_\_\_  
Date: 10/12/98  
Page 3 of 3

Client: MacArthur o/c  
Project Manager / Contact: Paul Penick

Address: \_\_\_\_\_  
Telephone No.: \_\_\_\_\_

City / State / Zip: Midland TX  
Fax No.: \_\_\_\_\_

Project Name / Number: \_\_\_\_\_  
Samplers: (Signature) *K. Cook*

Contract / Purchase Order / Quote: \_\_\_\_\_

MELOQUIADES ALANIS  
6411 LOCAL UNO  
CIUDAD JUAREZ, CHIHUAHUA MEXICO 32320

| Analysis Required      |   | Remarks |
|------------------------|---|---------|
| No. of Containers      |   |         |
| BTEX 80.21             | X |         |
| Cyanide 335.2          | X |         |
| TDS 160.1              | X |         |
| Phos / Amos (No. 2)    | X |         |
| CL 2. HCO350           | X |         |
| PAH 831.0              | X |         |
| Sulfate 375.4          | X |         |
| Fluoride 342.2 / 486.7 | X |         |

| AAL FRACTION NUMBER | Field Sample Number / Location | Date     | Time | Sample Type | Type / Size of Container | Preservation |          |
|---------------------|--------------------------------|----------|------|-------------|--------------------------|--------------|----------|
|                     |                                |          |      |             |                          | Temp.        | Chemical |
| 20                  | MW-60                          | 10/12/98 | 1145 | 1000        | 2                        |              |          |
| 21                  | MW-60RB                        |          | 1215 |             | 2                        |              |          |
| 22                  | MW-95                          |          | 1300 |             | 5                        |              |          |
| 23                  | MW-95RB                        |          | 1330 |             | 2                        |              |          |
| 24                  | MW-97                          |          | 1410 |             | 5                        |              |          |
| 25                  | MW-97RB                        |          | 1425 |             | 2                        |              |          |
| 26                  | MW-96                          |          | 1515 |             | 2                        |              |          |
| 27                  | MW-82                          |          | 1550 |             | 3                        |              |          |
| 28                  | MW-68                          |          | 1630 |             | 3                        |              |          |
| 29                  | TRP BLANK                      | 10/19/98 | 1720 |             | 1                        |              |          |

|                                 |                               |
|---------------------------------|-------------------------------|
| Relinquished by: <i>K. Cook</i> | Received by: <i>K. Penick</i> |
| Signature: <i>K. Cook</i>       | Signature: <i>K. Penick</i>   |
| Printed: <i>K. Cook</i>         | Printed: <i>K. Penick</i>     |
| Company: <i>FOG</i>             | Company: <i>Penick</i>        |
| Reason: _____                   | Reason: _____                 |
| Date: 10/13/98                  | Date: 10/13/98                |
| Time: 1540                      | Time: 1540                    |

|                             |                                                               |
|-----------------------------|---------------------------------------------------------------|
| Method of Shipment: _____   | After analysis, samples are to be:                            |
| Shipment No.: _____         | <input type="checkbox"/> Disposed of (additional fee)         |
| Special instructions: _____ | <input type="checkbox"/> Stored (30 days max)                 |
|                             | <input type="checkbox"/> Stored over 30 days (additional fee) |
|                             | <input type="checkbox"/> Returned to customer                 |

Laboratory Analytical Reports  
Monthly Air Stripper Monitoring,  
1998

PINNACLE  
LABORATORIES

2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

Pinnacle Lab ID number      **812099**  
January 19, 1999

MARATHON OIL COMPANY  
P.O. BOX 552  
MIDLAND, TX 79702-0552

Project Name              IB REMEDIATION  
Project Number          (none)

Attention:      PAUL PEACOCK

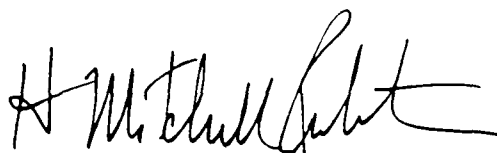
On 12/31/98 Pinnacle Laboratories, Inc. Inc., (ADHS License No. AZ0592), received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

EPA method 8021 was performed by Pinnacle Laboratories, Inc., Albuquerque, NM.

All other parameters were performed by Severn Trent (FL) Inc., Pensacola, FL.

If you have any questions or comments, please do not hesitate to contact us at (505)344-3777.

  
Kimberly D. McNeill  
Project Manager

  
H. Mitchell Rubenstein, Ph. D.  
General Manager

MR: mt

Enclosure

**MCR**

JAN 27 1999

Environmental & Safety



2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : IB REMEDIATION

PINNACLE ID : 812099  
DATE RECEIVED : 12/31/98  
REPORT DATE : 1/19/99

| AEN  |                    |         | DATE      |
|------|--------------------|---------|-----------|
| D. # | CLIENT DESCRIPTION | MATRIX  | COLLECTED |
| 1    | W. STRIPPER INLET  | AQUEOUS | 12/30/98  |
| 02   | W. STRIPPER OUTLET | AQUEOUS | 12/30/98  |
| 03   | E. STRIPPER INLET  | AQUEOUS | 12/30/98  |
| 4    | E. STRIPPER OUTLET | AQUEOUS | 12/30/98  |
| 05   | LYMON              | AQUEOUS | 12/30/98  |



2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

# GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : IB REMEDIATION

PINNACLE I.D.: 812099

| SAMPLE<br>ID. # | CLIENT I.D.        | MATRIX  | DATE<br>SAMPLED | DATE<br>EXTRACTED | DATE<br>ANALYZED | DIL.<br>FACTOR |
|-----------------|--------------------|---------|-----------------|-------------------|------------------|----------------|
| 01              | W. STRIPPER INLET  | AQUEOUS | 12/30/98        | NA                | 1/4/99           | 10             |
| 02              | W. STRIPPER OUTLET | AQUEOUS | 12/30/98        | NA                | 1/4/99           | 1              |
| 03              | E. STRIPPER INLET  | AQUEOUS | 12/30/98        | NA                | 1/4/99           | 10             |

| PARAMETER     | DET. LIMIT | UNITS | W. STRIPPER<br>INLET | W. STRIPPER<br>OUTLET | E. STRIPPER<br>INLET |
|---------------|------------|-------|----------------------|-----------------------|----------------------|
| BENZENE       | 0.5        | UG/L  | 47                   | 0.8                   | 43                   |
| TOLUENE       | 0.5        | UG/L  | 21                   | 3.7                   | 20                   |
| ETHYLBENZENE  | 0.5        | UG/L  | 70                   | 3.1                   | 66                   |
| TOTAL XYLENES | 0.5        | UG/L  | 92                   | 23                    | 97                   |

## SURROGATE:

|                               |     |       |     |
|-------------------------------|-----|-------|-----|
| BROMOFLUOROBENZENE (%)        | 108 | 135 * | 112 |
| SURROGATE LIMITS ( 80 - 120 ) |     |       |     |

## CHEMIST NOTES:

\*= HIGH SURROGATE RECOVERY DUE TO MATRIX INTERFERENCE.



2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

# GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : IB REMEDIATION

PINNACLE I.D.: 812099

| SAMPLE ID. # | CLIENT I.D.        | MATRIX  | DATE SAMPLED | DATE EXTRACTED | DATE ANALYZED | DIL. FACTOR |
|--------------|--------------------|---------|--------------|----------------|---------------|-------------|
| 04           | E. STRIPPER OUTLET | AQUEOUS | 12/30/98     | NA             | 1/4/99        | 1           |
| 05           | LYMON              | AQUEOUS | 12/30/98     | NA             | 1/4/99        | 1           |

| PARAMETER     | DET. LIMIT | UNITS | E. STRIPPER OUTLET | LYMON |
|---------------|------------|-------|--------------------|-------|
| BENZENE       | 0.5        | UG/L  | 1.4                | < 0.5 |
| TOLUENE       | 0.5        | UG/L  | 5.5                | < 0.5 |
| ETHYLBENZENE  | 0.5        | UG/L  | 3.4                | < 0.5 |
| TOTAL XYLENES | 0.5        | UG/L  | 15                 | < 0.5 |

## SURROGATE:

BROMOFLUOROBENZENE (%)

107

114

SURROGATE LIMITS ( 80 - 120 )

## CHEMIST NOTES:

N/A



2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

GAS CHROMATOGRAPHY RESULTS  
REAGENT BLANK

|              |                        |                |           |
|--------------|------------------------|----------------|-----------|
| TEST         | : EPA 8021 MODIFIED    | PINNACLE I.D.  | : 812099  |
| BLANK I. D.  | : 010499               | DATE EXTRACTED | : NA      |
| CLIENT       | : MARATHON OIL COMPANY | DATE ANALYZED  | : 1/4/99  |
| PROJECT #    | : (none)               | SAMPLE MATRIX  | : AQUEOUS |
| PROJECT NAME | : IB REMEDIATION       |                |           |

| PARAMETER              | UNITS |      |
|------------------------|-------|------|
| BENZENE                | UG/L  | <0.5 |
| TOLUENE                | UG/L  | <0.5 |
| ETHYLBENZENE           | UG/L  | <0.5 |
| TOTAL XYLENES          | UG/L  | <0.5 |
| METHYL-T-BUTYL ETHER   | UG/L  | <2.5 |
| 1,3,5-TRIMETHYLBENZENE | UG/L  | <0.5 |
| 1,3,4-TRIMETHYLBENZENE | UG/L  | <0.5 |

SURROGATE:

|                          |     |
|--------------------------|-----|
| 1-BROMOFLUOROBENZENE (%) | 112 |
|--------------------------|-----|

SURROGATE LIMITS: ( 80 - 120 )

CHEMIST NOTES:

N/A



2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

GAS CHROMATOGRAPHY QUALITY CONTROL  
MSMSD

TEST : EPA 8021 MODIFIED  
MSMSD # : 812100-02  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : IB REMEDIATION

PINNACLE I.D. : 812099  
DATE EXTRACTED : NA  
DATE ANALYZED : 1/4/99  
SAMPLE MATRIX : AQUEOUS  
UNITS : UG/L

| PARAMETER     | SAMPLE<br>RESULT | CONC<br>SPIKE | SPIKED<br>SAMPLE | %<br>REC | DUP<br>SPIKE | DUP<br>% REC | RPD | REC<br>LIMITS | RPD<br>LIMITS |
|---------------|------------------|---------------|------------------|----------|--------------|--------------|-----|---------------|---------------|
| BENZENE       | 1.1              | 10.0          | 10.9             | 98       | 10.9         | 98           | 0   | ( 80 - 120 )  | 20            |
| TOLUENE       | 0.6              | 10.0          | 10.6             | 100      | 10.7         | 101          | 1   | ( 80 - 120 )  | 20            |
| ETHYLBENZENE  | 1.7              | 10.0          | 12.5             | 108      | 12.4         | 107          | 1   | ( 80 - 120 )  | 20            |
| TOTAL XYLENES | 2.0              | 30.0          | 33.6             | 105      | 33.5         | 105          | 0   | ( 80 - 120 )  | 20            |

CHEMIST NOTES:  
N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

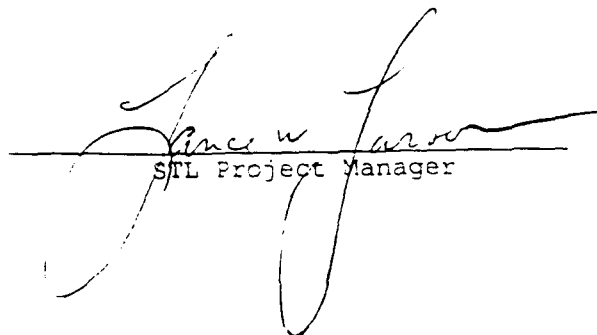


Severn Trent Laboratories  
11 East Olive Road  
Pensacola FL 32514

Tel: (850) 474-1001  
Fax: (850) 478-2671

SIGNATURE PAGE

Reviewed by:

  
STL Project Manager

Client: PINNACLE LABORATORIES  
ALBUQUERQUE, NEW MEXICO

Project Name: MOC  
Project Number: 812099  
Project Location: IB REMEDIATION  
Accession Number: 901021

Project Manager: KIMBERLY D. MCNEILL  
Sampled By: N/S

Other Laboratory Locations:

- 149 Rangeway Road, North Billerica MA 01862
- 16203 Park Row, Suite 110, Houston TX 77064
- 200 Monroe Turnpike, Monroe CT 06468
- 55 South Park Drive, Colchester VT 05446

- 315 Fullerton Avenue, Newburgh NY 12550
- Westfield Executive Park, 53 Southampton Road, Westfield MA 01085
- 628 Route 10, Whippany NY 07981
- 77 New Durham Road, Edison NJ 08817



SEVERN TRENT LABORATORIES, INC. - PENSACOLA, FLORIDA  
STATE CERTIFICATIONS

Alabama Department of Environmental Management, Laboratory ID No. 40150 (Drinking Water by Reciprocity with FL)

Arizona Department of Health Services, Lab ID No. AZ0589 (Hazardous Waste & Wastewater)

State of California, Department of Health Services, Laboratory ID No. 1-2338 (Hazardous Waste and Wastewater)

State of Connecticut, Department of Health Services, Connecticut Lab Approval No. PH-0697 (Drinking Water, Hazardous Waste and Wastewater)

Delaware Health & Social Services, Division of Public Health, Laboratory ID No. FL094 (Drinking Water by Reciprocity with FL)

Florida DOH Laboratory ID No. 81142 (Drinking Water), Laboratory ID No. E81010 (Hazardous Waste and Wastewater)

Florida, Radioactive Materials License No. G0733-1

Foreign Soil Permit, Permit No. S-37599

Kansas Department of Health & Environment, Laboratory ID No. E10253 (Wastewater and Hazardous Waste)

Commonwealth of Kentucky, Natural Resources and Environmental Protection Cabinet, Laboratory ID No. 90043 (Drinking Water)

State of Louisiana, DHH, Office of Public Health Division of Laboratories, Laboratory ID No. 98-25 (Drinking Water)

State of Maryland, DH&MH Laboratory ID No. 233 (Drinking Water by Reciprocity with Florida)

Commonwealth of Massachusetts, DEP, Laboratory ID No. M-FL094 (Hazardous Waste and Wastewater)

State of Michigan, Bureau of E&OcH (No Laboratory ID No. assigned by state) (Drinking Water by Reciprocity with Florida)

New Hampshire DES, Laboratory ID No. 250598-A (Wastewater)

State of New Jersey, Department of Environmental Protection & Energy, Laboratory ID No. 49006 (Wastewater)

New York State, Department of Health, Laboratory ID No. 11503 (Wastewater and Solids/Hazardous Waste)

North Carolina Department of Environment, Health, & Natural Resources, Laboratory ID No. 314 (Hazardous Waste and Wastewater)

North Dakota DH&Consol Labs, Laboratory ID No. R-108 (Hazardous Waste and Wastewater by Reciprocity with California)

State of Oklahoma, Oklahoma Department of Environmental Quality, Laboratory ID No. 9810 (Hazardous Waste and Wastewater)

Commonwealth of Pennsylvania, Department of Environmental Resources, Laboratory ID No. 68-467 (Drinking Water)

South Carolina DH&EC, Laboratory ID No. 96026 (Wastewater by Reciprocity with FL and Solids/Hazardous Waste by Reciprocity with CA)

Tennessee Department of Health & Environment, Laboratory ID No. 02907 (Drinking Water)

Tennessee Division of Underground Storage Tanks Approved Laboratory

Virginia Department of General Services, Laboratory ID No. 00008 (Drinking Water by Reciprocity with FL)

State of Washington, Department of Ecology, Laboratory ID No. C282 (Hazardous Waste and Wastewater)

West Virginia Division of Environmental Protection, Office of Water Resources, Laboratory ID No. 136 (Hazardous Waste and Wastewater by Reciprocity with FL)

American Industrial Hygiene Association (AIHA) Accredited Laboratory, Laboratory ID No. 9133

Analysis Report

Analysis: Group of Single Wetchem

|                   |                       |
|-------------------|-----------------------|
| Accession:        | 901021                |
| Client:           | PINNACLE LABORATORIES |
| Project Number:   | 812099                |
| Project Name:     | MOC                   |
| Project Location: | IB REMEDIATION        |
| Department:       | WET CHEM              |

[0] Page 1  
Date 13-Jan-99

## "FINAL REPORT FORMAT - SINGLE"

Accession: 901021  
Client: PINNACLE LABORATORIES  
Project Number: 812099  
Project Name: MOC  
Project Location: IB REMEDIATION  
Test: Group of Single Wetchem  
Matrix: WATER  
QC Level: II

Lab ID: 001  
Client Sample Id: 812099-05 (LYMON)

Sample Date/Time: 30-DEC-98 0955  
Received Date: 05-JAN-99

| Parameters:          | Units: | Results: | Rpt Lmts: | Q: | Batch: | Analyst: |
|----------------------|--------|----------|-----------|----|--------|----------|
| CHLORIDE (4500-CL E) | MG/L   | 12       | 2         |    | CKW02A | WH       |

Comments:

[0] Page 2  
Date 13-Jan-99

## "Method Report Summary"

Accession Number: 301021  
Client: PINNACLE LABORATORIES  
Project Number: 812099  
Project Name: MOC  
Project Location: IB REMEDIATION  
Test: Group of Single Wetchem

---

| Client Sample Id: | Parameter:           | Unit: | Result: |
|-------------------|----------------------|-------|---------|
| 812099-05 (LYMON) | CHLORIDE (4500-CL E) | MG/L  | 12      |

## Data Qualifiers for Final Report

STL-Pensacola Inorganic/Organic and AFCEE Projects (under QAPP)

|                       |                                                                                                              |                                                                                                                                  |
|-----------------------|--------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| J4                    | (For positive results)                                                                                       | Temperature limits exceeded ( $\leq 2^{\circ}\text{C}$ or $\geq 6^{\circ}\text{C}$ )                                             |
| J5                    | (TICs)                                                                                                       | The reported value is quantitated as a TIC; therefore, it is estimated                                                           |
| J6                    | (For positive results)                                                                                       | LCS or Surrogate %R is $>$ upper control limit (UCL) or $<$ lower control limit (LCL)                                            |
| J7                    | (For positive results)                                                                                       | The reported value is $>$ the laboratory MDL and $<$ lowest calibration standards; therefore, the quantitation is an estimation. |
| J (AFCEE description) | The analyte was positively identified, the quantitation is an estimation                                     |                                                                                                                                  |
| R1                    | (For nondetects)                                                                                             | Temperature limits exceeded ( $\leq 2^{\circ}\text{C}$ or $\geq 6^{\circ}\text{C}$ )                                             |
| R2                    | Improper preservation, no preservative present in sample upon receipt                                        |                                                                                                                                  |
| R3                    | Improper preservation, incorrect preservative present in sample upon receipt                                 |                                                                                                                                  |
| R4                    | Holding time exceeded                                                                                        |                                                                                                                                  |
| R5                    | Collection requirements not met, improper container used for sample                                          |                                                                                                                                  |
| R6                    | LCS or surrogate %R is $<$ LCL and analyte is not detected or surrogate %R is $<$ 10% for detects/nondetects |                                                                                                                                  |
| R7                    | Internal standard area outside -50% to +100% of initial calibration midpoint standard.                       |                                                                                                                                  |
| R8                    | Second source calibration verification exceeds acceptance criteria.                                          |                                                                                                                                  |
| R (AFCEE description) | The data are unusable due to deficiencies in the ability to analyze the sample and meet QC criteria          |                                                                                                                                  |
| F                     | $<$ laboratory or AFCEE RL and $>$ laboratory MDL                                                            |                                                                                                                                  |
| F (AFCEE description) | The analyte was positively identified but the associated numerical value is below the AFCEE or lab RL        |                                                                                                                                  |
| U2                    | $<$ Laboratory MDL (value for result will be the MDL, never below the MDL)                                   |                                                                                                                                  |
| U (AFCEE description) | The analyte was analyzed for but not detected. The associated numerical value is at or below the MDL         |                                                                                                                                  |
| B (AFCEE description) | The analyte was found in the associated blank, as well as in the sample                                      |                                                                                                                                  |
| (2)                   | Adjusted reporting limit due to sample matrix (dilution prior to digestion and/or analysis)                  |                                                                                                                                  |
| *                     | Elevated reporting limit due to dilution into calibration range                                              |                                                                                                                                  |
| .                     | Elevated reporting limit due to matrix interference (dilution prior to digestion and/or analysis)            |                                                                                                                                  |
| #                     | Elevated reporting limit due to insufficient sample size                                                     |                                                                                                                                  |
| D                     | Diluted out                                                                                                  |                                                                                                                                  |
| M                     | A matrix effect was present (sample was analyzed twice to confirm or chromatogram had interfering peaks)     |                                                                                                                                  |
| S                     | Incorrect sample amount was submitted to the laboratory for analysis                                         |                                                                                                                                  |

ND = Not Detected at or above the STL-Pensacola reporting limit (RL)

N/S = Not Submitted

N/A = Not Applicable

DL = Laboratory Instrument Detection Limit

MDL = Laboratory Method Detection Limit

RL = Reporting Limit (AFCEE RLs are listed in the AFCEE QAPP)

**Any time** a sample arrives at the laboratory improperly preserved (at improper pH or temperature) or after holding time has expired or prepared or analyzed after holding time, client must be notified in writing (i.e. case narrative)

Florida Projects Inorganic/Organic

|                    |                                                                                                             |
|--------------------|-------------------------------------------------------------------------------------------------------------|
| Y1                 | Improper preservation, no preservative present in sample upon receipt                                       |
| Y2                 | Improper preservation, incorrect preservative present in sample upon receipt                                |
| Y3                 | Improper preservation, sample temperature exceeded EPA temperature limits of 2-6°C upon receipt             |
| Y (FL description) | The analysis was from an unpreserved or improperly preserved sample. Data may not be accurate               |
| Q                  | Sample held beyond the accepted holding time                                                                |
| I                  | The reported value is $<$ Laboratory RL and $>$ laboratory MDL                                              |
| U1                 | The reported value is $\leq$ Laboratory MDL (value for sample result is reported as the MDL)                |
| U (FL description) | Indicates the compound was analyzed for but not detected                                                    |
| T                  | The reported value is $<$ Laboratory MDL (value shall not be used for statistical analysis)                 |
| V                  | The analyte was detected in both the sample and the associated method blank                                 |
| J1                 | Surrogate recovery limits have been exceeded                                                                |
| J2                 | The sample matrix interfered with the ability to make any accurate determinations                           |
| J3                 | The reported value failed to meet the established quality control criteria for either precision or accuracy |
| J (FL description) | Estimated value; not accurate                                                                               |

ICR Projects Inorganic/Organic

A1 Acceptable

R6

Rejected

Examples: ICR Flags

R6 = Laboratory extracted the sample but the refrigerator malfunctioned so the extract became warm and client was notified

R6 = Sample arrived in laboratory in good condition; however, the laboratory did not analyze it within EPA's established holding time limit

CLP and CLP-like Projects: Refer to referenced CLP Statement of Work (SOW) for explanation of data qualifiers

Quality Control Report

Analysis: Group of Single Wetchem

|                   |                       |
|-------------------|-----------------------|
| Accession:        | 901021                |
| Client:           | PINNACLE LABORATORIES |
| Project Number:   | 812099                |
| Project Name:     | MOC                   |
| Project Location: | IB REMEDIATION        |
| Department:       | WET CHEM              |

[0] Page 1  
Date 13-Jan-99

## "WetChem Quality Control Report"

|                |           |
|----------------|-----------|
| Parameter:     | CHLORIDE  |
| Batch Id:      | CKW02A    |
| Blank Result:  | <2        |
| Anal. Method:  | 4500-CL E |
| Prep. Method:  | N/A       |
| Analysis Date: | 13-JAN-99 |
| Prep. Date:    | 12-JAN-99 |

## Sample Duplication

|             |          |
|-------------|----------|
| Sample Dup: | 901038-1 |
| Rept Limit: | <2       |

|                |      |
|----------------|------|
| Sample Result: | 11.8 |
| Dup Result:    | 11.0 |
| Sample RPD:    | 7    |
| Max RPD:       | 20   |
| Dry Weight%    | N/A  |

## Matrix Spike

|                |          |
|----------------|----------|
| Sample Spiked: | 901038-1 |
| Rept Limit:    | <2       |

|                |        |
|----------------|--------|
| Sample Result: | 11.8   |
| Spiked Result: | 34.5   |
| Spike Added:   | 25.0   |
| % Recovery:    | 91     |
| % Rec Limits:  | 75-125 |
| Dry Weight%    | N/A    |

## ICV

|               |        |
|---------------|--------|
| ICV Result:   | 50.1   |
| True Result:  | 50.0   |
| % Recovery:   | 100    |
| % Rec Limits: | 90-110 |

## LCS

|               |  |
|---------------|--|
| LCS Result:   |  |
| True Result:  |  |
| % Recovery:   |  |
| % Rec Limits: |  |

## ----- Common Footnotes WetChem -----

N/A = NOT APPLICABLE.  
N/S = NOT SUBMITTED.  
N/C = SAMPLE AND DUPLICATE RESULTS ARE AT OR BELOW STL REPORTING LIMIT;  
THEREFORE, THE RPD IS "NOT CALCULABLE" AND NO CONTROL LIMITS APPLY.  
N/D = NOT DETECTED AT OR ABOVE THE STL-PENSACOLA REPORTING LIMIT (RL).  
R = REACTIVE  
T = TOTAL  
G = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X STL REPORTING LIMIT AND  
THE ABSOLUTE DIFFERENCE BETWEEN THE SAMPLE AND DUPLICATE RESULT IS AT  
OR BELOW STL REPORTING LIMIT; THEREFORE, THE RESULTS ARE "IN CONTROL".  
Q = THE ANALYTICAL (POST-DISTILLATION) SPIKE IS REPORTED DUE TO PERCENT RECOVERY  
BEING OUTSIDE ACCEPTANCE LIMITS ON THE MATRIX (PRE-DISTILLATION) SPIKE.  
# = ELEVATED REPORTING LIMIT DUE TO INSUFFICIENT SAMPLE.  
+ = ELEVATED REPORTING LIMIT DUE TO DILUTION INTO CALIBRATION RANGE.  
\* = ELEVATED REPORTING LIMIT DUE TO MATRIX INTERFERENCE (DILUTION PRIOR DIGESTION  
AND/OR ANALYSIS).  
@ = ADJUSTED REPORTING LIMIT DUE TO SAMPLE MATRIX (DILUTION PRIOR TO DIGESTION  
AND/OR ANALYSIS).  
P = ANALYTICAL (POST DIGESTION) SPIKE.  
I = DUPLICATE INJECTION.  
& = AUTOMATED  
F = SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.  
N/C+ = NOT CALCULABLE  
H = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X STL REPORTING LIMIT AND THE  
ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE STL REPORTING  
LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".  
A = SAMPLE AND DUPLICATE RESULTS ARE "OUT OF CONTROL".  
Z = THE SAMPLE RESULT FOR THE SPIKE IS BELOW THE REPORTING LIMIT. HOWEVER,  
THIS RESULT IS REPORTED FOR ACCURATE QC CALCULATIONS.  
NH = SAMPLE AND / OR DUPLICATE RESULT IS BELOW 5 X STL REPORTING LIMIT  
AND THE ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE STL  
REPORTING LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".  
SAMPLE IS NON-HOMOGENEOUS.  
(\*) = REPORTING LIMITS RAISED DUE TO CLP METHOD NOT REQUIRING A CONCENTRATION STEP FOR CN.  
(CA) = SEE CORRECTIVE ACTIONS FORM.  
\*\* = MATRIX INTERFERENCE  
SW-846, 3rd Edition, latest EPA-approved edition.  
EPA 600/4-79-020, Revised March 1983.  
STANDARD METHODS, For the Examination of Water and Wastewater, latest EPA-approved edition.  
NIOSH Manual of Analytical Methods, 4th Edition.  
ANNUAL BOOK OF ASTM STANDARDS, VOLUMES 11.01 and 11.02, latest EPA-approved edition.  
METHODS FOR THE DETERMINATION OF INORGANIC SUBSTANCES IN ENVIRONMENTAL SAMPLES,  
EPA600/R-93/100, AUGUST 1993  
METHODS FOR SOIL ANALYSIS, PART 2, CHEMICAL AND MICROBIOLOGICAL PROPERTIES, 2ND EDITION.  
STL-PN USES THE MOST CURRENT PROMULGATED METHODS FROM THE REFERENCES LISTED ABOVE.

1. COLIFORM. COLIFORM PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN  
THE LOGARITHM OF COLONIES PER 100 MLS OF SAMPLE ON DUPLICATE PLATES.
2. PH. PH PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN THE  
SAMPLE AND DUPLICATE ANALYSIS.
3. FLASHPOINT. FLASHPOINT PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN  
THE SAMPLE AND DUPLICATE ANALYSIS.

RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION).  
RPD LMTS = REPORTING LIMITS BASED ON METHOD DETECTION LIMIT STUDIES.

DPH = DOLLY P. HWANG      RB = REBECCA BROWN      WH = WENDY HAGGARD  
ED = ESTHER DANTIN      CR = CYNTHIA ROBERTS      AB = AMY BRADLEY  
BE = BETTY EVERTON      PLD = PAULA L. DOUGHTY      JTZ = JONATHAN T. ZIENTARSKI  
RH = RICKY HAGENDORFER      LT = LISA TORRES

**Severn Trent Laboratories of Florida**  
**PROJECT SAMPLE INSPECTION FORM**

Lab Accession #: 901021

Date Received: 05 Jan 99

1. Was there a Chain of Custody? ☒ Yes ☐ No\*
2. Was Chain of Custody properly filled out and relinquished? ☒ Yes ☐ No\*
3. Were samples received cold? ☒ Yes ☐ No\* N/A  
(Criteria: 2° - 6°C: STL-SOP 1055)
4. Were all samples properly labeled and identified? ☒ Yes ☐ No\*
5. Did samples require splitting? Yes\* ☒ No  
Req By: PM Client Other\*
6. Were samples received in proper containers for analysis requested? ☒ Yes ☐ No\*
7. Were all sample containers received intact? ☒ Yes ☐ No\*

8. Were samples checked for preservative? ☒ Yes ☐ No\* N/A  
*(Check pH of all H<sub>2</sub>O requiring preservative (STL-PN SOP 917) except VOA vials that require zero headspace)\**
9. Is there sufficient volume for analysis requested? ☒ Yes ☐ No\* N/A  
(Can)
10. Were samples received within Holding Time? ☒ Yes ☐ No\*
11. Is Headspace visible > 1/4" in diameter in VOA vials? Yes\* ☐ No ☒ N/A  
If any headspace is evident, comment in out-of-control section.
12. If sent, were matrix spike bottles returned? Yes ☐ No\* ☒ N/A
13. Was Project Manager notified of problems? (initials:           ) Yes ☐ No\* ☒ N/A

Airbill Number(s): 4412 6310 0563

Shipped By: FED EX

Cooler Number(s): THEIRS

Shipping Charges: N/A

Cooler Weight(s): 33

Cooler Temp(s) (°C): 3.5° C  
CCK2  
(LIST THERMOMETER NUMBER(S) FOR VERIFICATION)

**Out of Control Events and Inspection Comments:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(USE BACK OF PSIF FOR ADDITIONAL NOTES AND COMMENTS) 

Inspected By: [Signature] Date: 05 Jan 99 Logged By: [Signature] Date: 05 Jan - 99

- + Note all Out-of-Control and/or questionable events on Comment Section of this form.  
Note who requested the splitting of samples on the Comment Section of this form.  
All preservatives for the State of North Carolina, the State of New York, and other requested samples are to be recorded on the sheet provided to record pH results (STL-SOP 938).
- \* According to EPA, 1/4" of headspace is allowed in 40 ml vials requiring volatile analysis, however, STL makes it policy to record any headspace as out-of-control (STL-SOP 938).

### ANALYSIS REQUEST

90621

|                                                                                                                                      |       |      |        |        |                                                              |                                              |  |                  |
|--------------------------------------------------------------------------------------------------------------------------------------|-------|------|--------|--------|--------------------------------------------------------------|----------------------------------------------|--|------------------|
| Pinnacle Laboratories, Inc.<br>2709-D Pan American Freeway, NE<br>Albuquerque, New Mexico 87107<br>(505) 344-3777 Fax (505) 344-4413 |       |      |        |        |                                                              | Network Project Manager: Kimberly D. McNeill |  | ANALYSIS REQUEST |
| SAMPLE ID                                                                                                                            | DATE  | TIME | MATRIX | LAB ID |                                                              |                                              |  |                  |
| 812099 - 05 (Lymon)                                                                                                                  | 12/30 | 0635 | AQ     |        |                                                              |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | Metals (8) RCRA                                              |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | RCRA TCLP METALS                                             |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | Metals-13 PP List                                            |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | Metals-TAL                                                   |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | TOX                                                          |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | TOC                                                          |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | <input checked="" type="checkbox"/> Gen Chemistry : Chloride |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | Oil and Grease                                               |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | Volatile Organics GC/MS (8260)                               |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | BOD                                                          |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | COD                                                          |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | PESTICIDES/PCB (608/8080)                                    |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | 8270 BY GC/MS                                                |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | PNA (8310)                                                   |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | 8240 (TCLP 1311) ZHE                                         |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | Herbicides (615/8150)                                        |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | Base/Neutral Acid Compounds GC/MS (625/8270)                 |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | URANIUM                                                      |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | RADIUM 226+228                                               |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | Gross Alpha/Beta                                             |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | TO-14                                                        |                                              |  |                  |
|                                                                                                                                      |       |      |        |        | NUMBER OF CONTAINERS                                         |                                              |  |                  |

| PROJECT INFORMATION |               | SAMPLE RECEIPT             |  | SAMPLES SENT TO:   |                                     | RELINQUISHED BY:        |        | RELINQUISHED BY: |      |
|---------------------|---------------|----------------------------|--|--------------------|-------------------------------------|-------------------------|--------|------------------|------|
| PROJECT #           | 8/2099        | Total Number of Containers |  | PENSACOLA - STL-FL | <input checked="" type="checkbox"/> | Signature               | Time   | Signature        | Time |
| PROJ NAME:          | MOC           | Chain of Custody Seals     |  | PORTLAND - ESL-OR  |                                     | <i>Francine Toranzo</i> | 1700   |                  |      |
| OC LEVEL:           | STD IV        | Received Intact?           |  | STL - CT           |                                     | Printed Name            | Date   | Printed Name     | Date |
| OC REQUIRED         | MS MSD BLANK  | Received Good Cond / Cold  |  | STL - NEW JERSEY   |                                     | <i>Francine Toranzo</i> | 1/4/99 |                  |      |
| TEST                | STANDARD RUSH | LAB NUMBER:                |  | N CREEK            |                                     | Company                 |        | Company          |      |
| DUE DATE            | 1/14          | COMMENTS                   |  | BARRINGER          |                                     | RECEIVED BY:            | 1.     | RECEIVED BY:     | 2.   |
| RUSH SURCHARGE      | —             |                            |  | SEQUOIA            |                                     | Signature               | Time   | Signature        | Time |
| CLIENT DISCOUNT     | —             |                            |  |                    |                                     | <i>Francine Toranzo</i> | 1013   |                  |      |
| SPECIAL CERE        |               |                            |  |                    |                                     | Printed Name            | Date   | Printed Name     | Date |
| REQUIRED            |               |                            |  |                    |                                     | <i>Francine Toranzo</i> | 1/5/99 |                  |      |

PLEASE FILL THIS FORM IN COMPLETELY.

SHADED AREAS ARE FOR LAB USE ONLY.

Pinnacle Laboratories

Pinnacle Laboratories Inc.

CHAIN OF CUSTODY

DATE: 12-30-98

PAGE: 1 OF 1

PLI Accession #:

812099

PROJECT MANAGER: Paul Peacock

COMPANY: Marathon Oil Co

ADDRESS: P.O. Box 552

Midland TX 79702

PHONE: 915 687-8312

FAX: 915 687-8305

BILL TO:

Same As Above

COMPANY ADDRESS:

| SAMPLE ID         | DATE     | TIME    | MATRIX | LAB I.D. | ANALYSIS REQUEST                                                                                    |
|-------------------|----------|---------|--------|----------|-----------------------------------------------------------------------------------------------------|
| U. Stripped Inlet | 12-30-98 | 9:20 AM | Water  | 01       | Petroleum Hydrocarbons (418.1) TRPH                                                                 |
| U. Stripped Inlet | "        | 9:24 AM | "      | 02       | (MOD.8015) Diesel/Direct Inject                                                                     |
| U. Stripped Inlet | "        | 9:28 AM | "      | 03       | (M8015) Gas/Purge & Trap                                                                            |
| U. Stripped Inlet | "        | 9:32 AM | "      | 04       | 8021 (BTEX)/8015 (Gasoline) MTBE                                                                    |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | 8021 (BTEX) <input type="checkbox"/> MTBE <input type="checkbox"/> TMB <input type="checkbox"/> PCE |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | 8021 (TCL)                                                                                          |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | 8021 (EDX)                                                                                          |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | 8021 (HALO)                                                                                         |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | 8021 (CUST)                                                                                         |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | 504.1 EDB <input type="checkbox"/> / DBCP <input type="checkbox"/>                                  |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | BTEX (8020)                                                                                         |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | 8260 (TCL) Volatile Organics                                                                        |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | 8260 (Full) Volatile Organics                                                                       |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | 8260 (CUST) Volatile Organics                                                                       |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | 8260 (Landfill) Volatile Organics                                                                   |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | Pesticides /PCB (608/8081/8082)                                                                     |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | Herbicides (615/8151)                                                                               |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | Base/Neutral/Acid Compounds GC/MS (625/8270)                                                        |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | Polynuclear Aromatics (610/8310/8270-SIMS)                                                          |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | General Chemistry:                                                                                  |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | Chloride                                                                                            |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | Priority Pollutant Metals (13)                                                                      |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | Target Analyte List Metals (23)                                                                     |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | RCRA Metals (8)                                                                                     |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | RCRA Metals by TCLP (Method 1311)                                                                   |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | Metals:                                                                                             |
| U. Stripped Inlet | "        | 9:35 AM | "      | 05       | NUMBER OF CONTAINERS                                                                                |

ANALYSIS REQUEST

## PROJECT INFORMATION

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

RELINQUISHED BY: 1.

RELINQUISHED BY: 2.

PROJ NO

(RUSH) 124hr 148hr 172hr 11 WEEK (NORMAL) ✓

PROJ NAME: Remediation

CERTIFICATION REQUIRED: [ ] NM [ ] SDWA [ ] OTHER

PO NO

METHANOL PRESERVATION [ ]

SHIPPED VIA

COMMENTS FIXED FEE [ ]

## SAMPLE RECEIPT

NO CONTAINERS

11

CUSTODY SEALS

(Y) N / NA

RECEIVED INTACT

YES

BLUE INK

YES

Signature: [Signature]  
 Printed Name: [Name]  
 Date: 12-30-98

Signature: [Signature]  
 Printed Name: [Name]  
 Date: 12-30-98

RECEIVED BY: 1.

RECEIVED BY: (LAB) 2.

Signature: [Signature]

Signature: [Signature]

Printed Name: [Name]

Printed Name: [Name]

Date: [Date]

Date: [Date]

Company: [Company]

Company: [Company]

Pinnacle Laboratories Inc.

Pinnacle Laboratories Inc.

PINNACLE  
LABORATORIES

2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

Pinnacle Lab ID number      **811073**  
November 30, 1998

MARATHON OIL COMPANY  
P.O. BOX 552  
MIDLAND, TX 79702-0552

Project Name              IB REMEDIATION  
Project Number          (none)

Attention:      PAUL PEACOCK

On 11/20/98 Pinnacle Laboratories, Inc. Inc., (ADHS License No. AZ0592), received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

EPA method 8021 was performed by Pinnacle Laboratories, Inc., Albuquerque, NM.

All other parameters were performed by Severn Trent (FL) Inc., Pensacola, FL.

If you have any questions or comments, please do not hesitate to contact us at (505)344-3777.



Kimberly D. McNeill  
Project Manager



H. Mitchell Rubenstein, Ph. D.  
General Manager

MR: mt

Enclosure

**MCR**

DEC 7 1998

Environmental & San.

PINNACLE  
LABORATORIES

2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : IB REMEDIATION

PINNACLE ID : 811073  
DATE RECEIVED : 11/20/98  
REPORT DATE : 11/30/98

| AEN   |                    |         |                |
|-------|--------------------|---------|----------------|
| ID. # | CLIENT DESCRIPTION | MATRIX  | DATE COLLECTED |
| 01    | W.STRIPPER INLET   | AQUEOUS | 11/19/98       |
| 02    | W.STRIPPER OUTLET  | AQUEOUS | 11/19/98       |
| 03    | E.STRIPPER INLET   | AQUEOUS | 11/19/98       |
| 04    | E.STRIPPER OUTLET  | AQUEOUS | 11/19/98       |
| 05    | LYMON              | AQUEOUS | 11/19/98       |

**GAS CHROMATOGRAPHY RESULTS**

TEST : EPA 8021 MODIFIED  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : IB REMEDIATION

PINNACLE I.D.: 811073

| TABLE 1. ANALYTICAL DATA FOR 11/19/98 |                   |         |          |           |          |        |
|---------------------------------------|-------------------|---------|----------|-----------|----------|--------|
| SAMPLE                                | DATE              | DATE    | DATE     | DIL.      |          |        |
| ID. #                                 | CLIENT I.D.       | MATRIX  | SAMPLED  | EXTRACTED | ANALYZED | FACTOR |
| 01                                    | W.STRIPPER INLET  | AQUEOUS | 11/19/98 | NA        | 11/20/98 | 5      |
| 02                                    | W.STRIPPER OUTLET | AQUEOUS | 11/19/98 | NA        | 11/20/98 | 1      |
| 03                                    | E.STRIPPER INLET  | AQUEOUS | 11/19/98 | NA        | 11/20/98 | 20     |
| PARAMETER                             | DET. LIMIT        | UNITS   | 01       | 02        | 03       |        |
| BENZENE                               | 0.5               | UG/L    | 48       | < 0.5     | 59       |        |
| TOLUENE                               | 0.5               | UG/L    | 21       | 4.1       | 34       |        |
| ETHYLBENZENE                          | 0.5               | UG/L    | 42       | 2.7       | 44       |        |
| TOTAL XYLENES                         | 0.5               | UG/L    | 91       | 16        | 140      |        |

**SURROGATE:**

BROMOFLUOROBENZENE (%)

120

117

80

SURROGATE LIMITS ( 80 - 120 )

**CHEMIST NOTES:**

N/A

**GAS CHROMATOGRAPHY RESULTS**

TEST : EPA 8021 MODIFIED  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : IB REMEDIATION

PINNACLE I.D.: 811073

| SAMPLE |                   |         | DATE     | DATE      | DATE     | DIL.   |
|--------|-------------------|---------|----------|-----------|----------|--------|
| ID. #  | CLIENT I.D.       | MATRIX  | SAMPLED  | EXTRACTED | ANALYZED | FACTOR |
| 04     | E.STRIPPER OUTLET | AQUEOUS | 11/19/98 | NA        | 11/20/98 | 1      |
| 05     | LYMON             | AQUEOUS | 11/19/98 | NA        | 11/20/98 | 1      |

| PARAMETER     | DET. LIMIT | UNITS | 04  | 05    |
|---------------|------------|-------|-----|-------|
| BENZENE       | 0.5        | UG/L  | 2.1 | < 0.5 |
| TOLUENE       | 0.5        | UG/L  | 4.9 | < 0.5 |
| ETHYLBENZENE  | 0.5        | UG/L  | 3.9 | < 0.5 |
| TOTAL XYLENES | 0.5        | UG/L  | 19  | < 0.5 |

**SURROGATE:**

BROMOFLUOROBENZENE (%)

112

116

SURROGATE LIMITS ( 80 - 120 )

**CHEMIST NOTES:**

N/A

GAS CHROMATOGRAPHY RESULTS  
REAGENT BLANK

|              |                        |                |            |
|--------------|------------------------|----------------|------------|
| TEST         | : EPA 8021 MODIFIED    | PINNACLE I.D.  | : 811073   |
| BLANK I. D.  | : 112098B              | DATE EXTRACTED | : 11/20/98 |
| CLIENT       | : MARATHON OIL COMPANY | DATE ANALYZED  | : 11/20/98 |
| PROJECT #    | : (none)               | SAMPLE MATRIX  | : AQUEOUS  |
| PROJECT NAME | : IB REMEDIATION       |                |            |

| PARAMETER     | UNITS |      |
|---------------|-------|------|
| BENZENE       | UG/L  | <0.5 |
| TOLUENE       | UG/L  | <0.5 |
| ETHYLBENZENE  | UG/L  | <0.5 |
| TOTAL XYLENES | UG/L  | <0.5 |

SURROGATE:

BROMOFLUOROBENZENE (%)

98

SURROGATE LIMITS: ( 80 - 120 )

CHEMIST NOTES:

N/A

2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

PINNACLE  
LABORATORIES

GAS CHROMATOGRAPHY QUALITY CONTROL  
MSMSD

TEST : EPA 8021 MODIFIED  
MSMSD # : 811051-04  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : IB REMEDIATION

PINNACLE I.D. : 811073  
DATE EXTRACTED : NA  
DATE ANALYZED : 11/20/98  
SAMPLE MATRIX : AQUEOUS  
UNITS : UG/L

| PARAMETER     | SAMPLE<br>RESULT | CONC<br>SPIKE | SPIKED<br>SAMPLE | %<br>REC | DUP<br>SPIKE | DUP<br>% REC | RPD | REC<br>LIMITS | RPD<br>LIMITS |
|---------------|------------------|---------------|------------------|----------|--------------|--------------|-----|---------------|---------------|
| BENZENE       | <0.5             | 10.0          | 8.2              | 82       | 8.7          | 87           | 6   | ( 80 - 120 )  | 20            |
| TOLUENE       | <0.5             | 10.0          | 9.4              | 94       | 9.9          | 99           | 5   | ( 80 - 120 )  | 20            |
| ETHYLBENZENE  | <0.5             | 10.0          | 9.6              | 96       | 10.1         | 101          | 5   | ( 80 - 120 )  | 20            |
| TOTAL XYLENES | <0.5             | 30.0          | 27.3             | 91       | 28.5         | 95           | 4   | ( 80 - 120 )  | 20            |

CHEMIST NOTES:  
N/A

% Recovery =  $\frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$

RPD (Relative Percent Difference) =  $\frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$



Severn Trent Laboratories  
11 East Olive Road  
Pensacola FL 32514

Tel: (850) 474-1001  
Fax: (850) 474-4789

SIGNATURE PAGE

Reviewed by:

  
STL Project Manager

Client: PINNACLE LABORATORIES  
ALBUQUERQUE, NEW MEXICO

Project Name: MOC  
Project Number: 811073  
Project Location: IB REMEDIATION  
Accession Number: 811399

Project Manager: KIM MCNEILL  
Sampled By: N/S

Other Laboratory Locations:

- 149 Rangeway Road, North Billerica MA 01862
- 16203 Park Row, Suite 110, Houston TX 77084
- 200 Monroe Turnpike, Monroe CT 06468

- 120 Southcenter Court, Suite 300, Morrisville NC 27560
- 315 Fullerton Avenue, Newburgh NY 12550
- Westfield Executive Park, 53 Southampton Road, Westfield MA 01085
- 628 Route 10, Whippany NJ 07981

a part of

SEVERN TRENT SERVICES LTD

Analysis Report

Analysis: Group of Single Wetchem

|                   |                       |
|-------------------|-----------------------|
| Accession:        | 811399                |
| Client:           | PINNACLE LABORATORIES |
| Project Number:   | 811073                |
| Project Name:     | MOC                   |
| Project Location: | IB REMEDIATION        |
| Department:       | WET CHEM              |

[0] Page 1  
Date 25-Nov-98

## "FINAL REPORT FORMAT - SINGLE"

Accession: 811399  
Client: PINNACLE LABORATORIES  
Project Number: 811073  
Project Name: MOC  
Project Location: IB REMEDIATION  
Test: Group of Single Wetchem  
Matrix: WATER  
QC Level: II

Lab ID: 001  
Client Sample Id: 811073-05 (LYMON)

Sample Date/Time: 19-NOV-98 0902  
Received Date: 21-NOV-98

| Parameters:          | Units: | Results: | Rpt Lmts: | Q: | Batch: | Analyst: |
|----------------------|--------|----------|-----------|----|--------|----------|
| CHLORIDE (4500-CL E) | MG/L   | 15       | 2         |    | CKW08A | WH       |

Comments:

## "Method Report Summary"

Accession Number: 811399  
Client: PINNACLE LABORATORIES  
Project Number: 811073  
Project Name: MOC  
Project Location: IB REMEDIATION  
Test: Group of Single Wetchem

---

| Client Sample Id: | Parameter:           | Unit: | Result: |
|-------------------|----------------------|-------|---------|
| 811073-05 (LYMON) | CHLORIDE (4500-CL E) | MG/L  | 15      |

## Data Qualifiers for Final Report

STL-Pensacola Inorganic/Organic and AFCEE Projects (under QAPP)

|                       |                        |                                                                                                                                  |
|-----------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| J4                    | (For positive results) | Temperature limits exceeded ( $\leq 2^{\circ}\text{C}$ or $\geq 6^{\circ}\text{C}$ )                                             |
| J5                    | (TICs)                 | The reported value is quantitated as a TIC; therefore, it is estimated                                                           |
| J6                    | (For positive results) | Surrogate %R is $>$ upper control limit (UCL) or $<$ lower control limit (LCL)                                                   |
| J7                    | (For positive results) | The reported value is $>$ the laboratory MDL and $<$ lowest calibration standards; therefore, the quantitation is an estimation. |
| J (AFCEE description) |                        | The analyte was positively identified, the quantitation is an estimation                                                         |
| R1                    | (For nondetects)       | Temperature limits exceeded ( $\leq 2^{\circ}\text{C}$ or $\geq 6^{\circ}\text{C}$ )                                             |
| R2                    |                        | Improper preservation, no preservative present in sample upon receipt                                                            |
| R3                    |                        | Improper preservation, incorrect preservative present in sample upon receipt                                                     |
| R4                    |                        | Holding time exceeded                                                                                                            |
| R5                    |                        | Collection requirements not met, improper container used for sample                                                              |
| R6                    |                        | Surrogate %R is $<$ LCL and analyte is not detected or surrogate %R is $<$ 10% for detects and nondetects                        |
| R7                    |                        | Internal standard area outside -50% to +100% of initial calibration midpoint standard.                                           |
| R (AFCEE description) |                        | The data are unusable due to deficiencies in the ability to analyze the sample and meet QC criteria                              |
| F                     |                        | $<$ laboratory or AFCEE RL and $>$ laboratory MDL                                                                                |
| F (AFCEE description) |                        | The analyte was positively identified but the associated numerical value is below the AFCEE or lab RL                            |
| U2                    |                        | $<$ Laboratory MDL (value for result will be the MDL, never below the MDL)                                                       |
| U (AFCEE description) |                        | The analyte was analyzed for but not detected. The associated numerical value is at or below the MDL                             |
| B (AFCEE description) |                        | The analyte was found in the associated blank, as well as in the sample                                                          |
| @                     |                        | Adjusted reporting limit due to sample matrix (dilution prior to digestion and/or analysis)                                      |
| +                     |                        | Elevated reporting limit due to dilution into calibration range                                                                  |
| *                     |                        | Elevated reporting limit due to matrix interference (dilution prior to digestion and/or analysis)                                |
| #                     |                        | Elevated reporting limit due to insufficient sample size                                                                         |
| D                     |                        | Diluted out                                                                                                                      |
| A2                    |                        | Surrogate %R is $>$ UCL (upper control limit) and analyte is not detected. No corrective action required                         |
| M                     |                        | A matrix effect was present (sample was analyzed twice to confirm or chromatogram had interfering peaks)                         |
| S                     |                        | Incorrect sample amount was submitted to the laboratory for analysis                                                             |

ND = Not Detected at or above the STL-Pensacola reporting limit (RL)

N/S = Not Submitted

N/A = Not Applicable

IDL = Laboratory Instrument Detection Limit

MDL = Laboratory Method Detection Limit

RL = Reporting Limit (AFCEE RLs are listed in the AFCEE QAPP)

**Any time** a sample arrives at the laboratory improperly preserved (at improper pH or temperature) or after holding time has expired or prepared or analyzed after holding time, client must be notified in writing (i.e. case narrative)

Florida Projects Inorganic/Organic

|                    |                                                                                                                 |
|--------------------|-----------------------------------------------------------------------------------------------------------------|
| Y1                 | Improper preservation, no preservative present in sample upon receipt                                           |
| Y2                 | Improper preservation, incorrect preservative present in sample upon receipt                                    |
| Y3                 | Improper preservation, sample temperature exceeded EPA temperature limits of $2-6^{\circ}\text{C}$ upon receipt |
| Y (FL description) | The analysis was from an unpreserved or improperly preserved sample. Data may not be accurate                   |
| Q                  | Sample held beyond the accepted holding time                                                                    |
| I                  | The reported value is $<$ Laboratory RL and $>$ laboratory MDL                                                  |
| U1                 | The reported value is $<$ Laboratory MDL (value for sample result is reported as the MDL)                       |
| U (FL description) | Indicates the compound was analyzed for but not detected                                                        |
| T                  | The reported value is $<$ Laboratory MDL (value shall not be used for statistical analysis)                     |
| V                  | The analyte was detected in both the sample and the associated method blank                                     |
| J1                 | Surrogate recovery limits have been exceeded                                                                    |
| J2                 | The sample matrix interfered with the ability to make any accurate determinations                               |
| J3                 | The reported value failed to meet the established quality control criteria for either precision or accuracy     |
| J (FL description) | Estimated value; not accurate                                                                                   |

ICR Projects Inorganic/Organic

A1 Acceptable

R6

Rejected

Examples: ICR Flags

R6 = Laboratory extracted the sample but the refrigerator malfunctioned so the extract became warm and client was notified

R6 = Sample arrived in laboratory in good condition; however, the laboratory did not analyze it within EPA's established holding time limit

CLP and CLP-like Projects: Refer to referenced CLP Statement of Work (SOW) for explanation of data qualifiers

Quality Control Report

Analysis: Group of Single Wetchem

|                   |                       |
|-------------------|-----------------------|
| Accession:        | 811399                |
| Client:           | PINNACLE LABORATORIES |
| Project Number:   | 811073                |
| Project Name:     | MOC                   |
| Project Location: | IB REMEDIATION        |
| Department:       | WET CHEM              |

[0] Page 1  
Date 25-Nov-98

## "WetChem Quality Control Report"

|                |           |
|----------------|-----------|
| Parameter:     | CHLORIDE  |
| Batch Id:      | CKW08A    |
| Plank Result:  | <2        |
| Anal. Method:  | 4500-CL E |
| Prep. Method:  | N/A       |
| Analysis Date: | 23-NOV-98 |
| Prep. Date:    | 21-NOV-98 |

## Sample Duplication

|             |          |
|-------------|----------|
| Sample Dup: | 811351-1 |
| Rept Limit: | <2       |

|                |     |
|----------------|-----|
| Sample Result: | 3.4 |
| Dup Result:    | 3.4 |
| Sample RPD:    | 0 G |
| Max RPD:       | 2   |
| Dry Weight%    | N/A |

## Matrix Spike

|                |          |
|----------------|----------|
| Sample Spiked: | 811351-1 |
| Rept Limit:    | <2       |

|                |        |
|----------------|--------|
| Sample Result: | 3.4    |
| Spiked Result: | 30.8   |
| Spike Added:   | 25.0   |
| % Recovery:    | 110    |
| % Rec Limits:  | 75-125 |
| Dry Weight%    | N/A    |

## ICV

|               |        |
|---------------|--------|
| ICV Result:   | 52.0   |
| True Result:  | 50.0   |
| % Recovery:   | 104    |
| % Rec Limits: | 90-110 |

## LCS

|               |  |
|---------------|--|
| LCS Result:   |  |
| True Result:  |  |
| % Recovery:   |  |
| % Rec Limits: |  |

[0] Page 2  
Date 25-Nov-98

----- Common Footnotes WetChem -----

N/A = NOT APPLICABLE.  
N/S = NOT SUBMITTED.  
N/C = SAMPLE AND DUPLICATE RESULTS ARE AT OR BELOW STL REPORTING LIMIT;  
THEREFORE, THE RPD IS "NOT CALCULABLE" AND NO CONTROL LIMITS APPLY.  
N/D = NOT DETECTED AT OR ABOVE THE STL-PENSACOLA REPORTING LIMIT (RL).  
R = REACTIVE  
T = TOTAL  
G = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X STL REPORTING LIMIT AND  
THE ABSOLUTE DIFFERENCE BETWEEN THE SAMPLE AND DUPLICATE RESULT IS AT  
OR BELOW STL REPORTING LIMIT; THEREFORE, THE RESULTS ARE "IN CONTROL".  
Q = THE ANALYTICAL (POST-DISTILLATION) SPIKE IS REPORTED DUE TO PERCENT RECOVERY  
BEING OUTSIDE ACCEPTANCE LIMITS ON THE MATRIX (PRE-DISTILLATION) SPIKE.  
# = ELEVATED REPORTING LIMIT DUE TO INSUFFICIENT SAMPLE.  
+ = ELEVATED REPORTING LIMIT DUE TO DILUTION INTO CALIBRATION RANGE.  
\* = ELEVATED REPORTING LIMIT DUE TO MATRIX INTERFERENCE (DILUTION PRIOR DIGESTION  
AND/OR ANALYSIS).  
@ = ADJUSTED REPORTING LIMIT DUE TO SAMPLE MATRIX (DILUTION PRIOR TO DIGESTION  
AND/OR ANALYSIS).  
P = ANALYTICAL (POST DIGESTION) SPIKE.  
I = DUPLICATE INJECTION.  
& = AUTOMATED  
F = SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.  
N/C+ = NOT CALCULABLE  
H = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X STL REPORTING LIMIT AND THE  
ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE STL REPORTING  
LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".  
A = SAMPLE AND DUPLICATE RESULTS ARE "OUT OF CONTROL".  
Z = THE SAMPLE RESULT FOR THE SPIKE IS BELOW THE REPORTING LIMIT. HOWEVER,  
THIS RESULT IS REPORTED FOR ACCURATE QC CALCULATIONS.  
NH = SAMPLE AND / OR DUPLICATE RESULT IS BELOW 5 X STL REPORTING LIMIT  
AND THE ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE STL  
REPORTING LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".  
SAMPLE IS NON-HOMOGENEOUS.  
(\*) = REPORTING LIMITS RAISED DUE TO CLP METHOD NOT REQUIRING A CONCENTRATION STEP FOR CN.  
(CA) = SEE CORRECTIVE ACTIONS FORM.  
\*\* = MATRIX INTERFERENCE  
SW-846, 3rd Edition, latest EPA-approved edition.  
EPA 600/4-79-020, Revised March 1983.  
STANDARD METHODS, For the Examination of Water and Wastewater, latest EPA-approved edition.  
NIOH Manual of Analytical Methods, 4th Edition.  
ANNUAL BOOK OF ASTM STANDARDS, VOLUMES 11.01 and 11.02, latest EPA-approved edition.  
METHODS FOR THE DETERMINATION OF INORGANIC SUBSTANCES IN ENVIRONMENTAL SAMPLES,  
EPA600/R-93/100, AUGUST 1993  
METHODS FOR SOIL ANALYSIS, PART 2, CHEMICAL AND MICROBIOLOGICAL PROPERTIES, 2ND EDITION.  
STL-PN USES THE MOST CURRENT PROMULGATED METHODS FROM THE REFERENCES LISTED ABOVE.

1. COLIFORM. COLIFORM PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN  
THE LOGARITHM OF COLONIES PER 100 MLS OF SAMPLE ON DUPLICATE PLATES.
2. PH. PH PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN THE  
SAMPLE AND DUPLICATE ANALYSIS.
3. FLASHPOINT. FLASHPOINT PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN  
THE SAMPLE AND DUPLICATE ANALYSIS.

RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION).  
RPD LMTS = REPORTING LIMITS BASED ON METHOD DETECTION LIMIT STUDIES.

DPH = DOLLY P. HWANG      RB = REBECCA BROWN      WH = WENDY HAGGARD  
ED = ESTHER DANTIN      CR = CYNTHIA ROBERTS      AB = AMY BRADLEY  
BE = BETTY EVERTON      PLD = PAULA L. DOUGHTY      JTZ = JONATHAN T. ZIENTARSKI  
RH = RICKY HAGENDORFER      LT = LISA TORRES

Severn Trent Laboratories of Florida  
PROJECT SAMPLE INSPECTION FORM

Lab Accession #:

811399

Date Received:

21 NOV 98

1. Was there a Chain of Custody? ☒ Yes ☐ No\*

2. Was Chain of Custody properly filled out and relinquished? ☒ Yes ☐ No\*

3. Were samples received cold? ☒ Yes ☐ No\* N/A  
(Criteria: 2° - 6°C: STL-SOP 1055)

4. Were all samples properly labeled and identified? ☒ Yes ☐ No\*

5. Did samples require splitting? ☐ Yes\* ☒ No  
Req By: PM Client Other\*

6. Were samples received in proper containers for analysis requested? ☒ Yes ☐ No\*

7. Were all sample containers received intact? ☒ Yes ☐ No\*

8. Were samples checked for preservative? (Check pH of all H<sub>2</sub>O requiring preservative (STL-PN SOP 917) except VOA vials that require zero headspace)\* ☐ Yes ☐ No\* ☒ N/A

9. Is there sufficient volume for analysis requested? ☒ Yes ☐ No\*

10. Were samples received within Holding Time? (REFER TO STL-SOP 1040) ☒ Yes ☐ No\*

11. Is Headspace visible > ¼" in diameter in VOA vials?\* If any headspace is evident, comment in out-of-control ☐ Yes\* ☐ No ☒ N/A

12. If sent, were matrix spike bottles returned? ☐ Yes ☐ No ☒ N/A

13. Was Project Manager notified of problems? (initials: \_\_\_\_\_) ☐ Yes ☐ No ☒ N/A

Airbill Number(s):

441263099978

Shipped By:

FED EX

Cooler Number(s):

Thurs

Shipping Charges:

n/a

Cooler Weight(s):

n/a

Cooler Temp(s) (°C):

2.0°C

(LIST THERMOMETER NUMBER(S) FOR VERIFICATION)

Out of Control Events and Inspection Comments:

(USE BACK OF PSIF FOR ADDITIONAL NOTES AND COMMENTS)

Inspected By:

WBP

Date:

21 NOV 98

Logged By:

WBP

Date:

21 NOV 98

\* Note all Out-of-Control and/or questionable events on Comment Section of this form.

\* Note who requested the splitting of samples on the Comment Section of this form.

\* All preservatives for the State of North Carolina, the State of New York, and other requested samples are to be recorded on the sheet provided to record pH results (STL-SOP 938, section 2.2.9).

\* According to EPA, ¼" of headspace is allowed in 40 ml vials requiring volatile analysis, however, STL makes it policy to record any headspace as out-of-control (STL-SOP 938, section 2.2.12).

**Network Project Manager:** Kimberly D. McNeill

811399

[illegible]

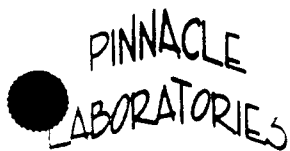
| PROJECT INFORMATION   |                 | SAMPLE RECEIPT             |  | SAMPLES SENT TO:   |   | RELINQUISHED BY: 1. |        | RELINQUISHED BY: 2. |      |
|-----------------------|-----------------|----------------------------|--|--------------------|---|---------------------|--------|---------------------|------|
| PROJECT #             | 811073          | Total Number of Containers |  | PENSACOLA - STL-FL | X | Signature           | - Time | Signature           | Time |
| PROJ. NAME            | MOE             | Chain of Custody Seals     |  | PORTLAND - EST-OR  |   | Signature           | Time   | Signature           | Time |
| QC LEVEL              | STD IV          | Received Intact?           |  | STL - CT           |   | Printed Name        | Date   | Printed Name        | Date |
| QC REQUIRED           | MS MSD BLANK    | Received Good Cond /Cold   |  | STL - NEW JERSEY   |   | Signature           | Time   | Signature           | Time |
| TAI                   | STANDARD RUSH!! | LAB NUMBER:                |  | N CREEK            |   | Printed Name        | Date   | Printed Name        | Date |
|                       |                 |                            |  | BARRINGER          |   | Signature           | Time   | Signature           | Time |
| DUE DATE              | 12/4            | COMMENTS                   |  | SEQUOIA            |   | Signature           | Time   | Signature           | Time |
| RUSH SURCHARGE        | -               |                            |  |                    |   | Signature           | Time   | Signature           | Time |
| CLIENT DISCOUNT       | -               |                            |  |                    |   | Signature           | Time   | Signature           | Time |
| SPECIAL CERTIFICATION |                 |                            |  |                    |   | Signature           | Time   | Signature           | Time |
| REQUIRED YES          |                 |                            |  |                    |   | Signature           | Time   | Signature           | Time |

AEN(NM) Accession # S11073

PLEASE FILL THIS FORM IN COMPLETELY.

**DISTRIBUTION:** White Canary - Original

**DISTRIBUTION:** White - Canary - Originator



2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

Pinnacle Lab ID number 810113  
November 17, 1998

MARATHON OIL COMPANY  
P.O. BOX 552  
MIDLAND, TX 79702-0552

Project Name IB REMEDIATION  
Project Number (none)

Attention: PAUL PEACOCK

On 10/30/98 Pinnacle Laboratories, Inc. Inc., (ADHS License No. AZ0592), received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

EPA method 8021 was performed by Pinnacle Laboratories, Inc., Albuquerque, NM.

All other parameters were performed by ESL (OR) Inc., Portland, OR.

If you have any questions or comments, please do not hesitate to contact us at (505)344-3777.

A handwritten signature in black ink, appearing to read "Kim McNeill".

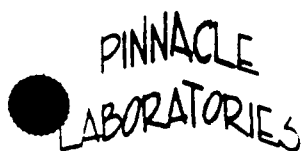
Kimberly D. McNeill  
Project Manager

A handwritten signature in black ink, appearing to read "H. Mitchell Rubenstein".

H. Mitchell Rubenstein, Ph. D.  
General Manager

MR: mt

Enclosure



2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

|              |                      |               |          |
|--------------|----------------------|---------------|----------|
| CLIENT       | MARATHON OIL COMPANY | PINNACLE ID   | 810113   |
| PROJECT #    | (none)               | DATE RECEIVED | 10/30/98 |
| PROJECT NAME | IB REMEDIATION       | REPORT DATE   | 11/17/98 |

| AEN   |                    |         | DATE      |
|-------|--------------------|---------|-----------|
| ID. # | CLIENT DESCRIPTION | MATRIX  | COLLECTED |
| 01    | E.STRIPPER INLET   | AQUEOUS | 10/29/98  |
| 02    | E.STRIPPER OUTLET  | AQUEOUS | 10/29/98  |
| 03    | W.STRIPPER INLET   | AQUEOUS | 10/29/98  |
| 04    | W.STRIPPER OUTLET  | AQUEOUS | 10/29/98  |
| 05    | LYMON              | AQUEOUS | 10/29/98  |



2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

# GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : IB REMEDIATION

PINNACLE I.D.: 810113

| PROJECT NAME: T-10 REMEDIATION |                   |            |          |           |          |        |
|--------------------------------|-------------------|------------|----------|-----------|----------|--------|
| SAMPLE                         |                   |            | DATE     | DATE      | DATE     | DIL.   |
| ID. #                          | CLIENT I.D.       | MATRIX     | SAMPLED  | EXTRACTED | ANALYZED | FACTOR |
| 01                             | E.STRIPPER INLET  | AQUEOUS    | 10/29/98 | NA        | 11/6/98  | 10     |
| 02                             | E.STRIPPER OUTLET | AQUEOUS    | 10/29/98 | NA        | 11/6/98  | 1      |
| 03                             | W.STRIPPER INLET  | AQUEOUS    | 10/29/98 | NA        | 11/6/98  | 5      |
| PARAMETER                      |                   | DET. LIMIT | UNITS    | 01        | 02       | 03     |
| BENZENE                        |                   | 0.5        | UG/L     | 68        | 0.8      | 74     |
| TOLUENE                        |                   | 0.5        | UG/L     | 17        | 4.6      | 30     |
| ETHYLBENZENE                   |                   | 0.5        | UG/L     | 49        | 3.4      | 62     |
| TOTAL XYLENES                  |                   | 0.5        | UG/L     | 78        | 16       | 130    |

## SURROGATE:

BROMOFLUOROBENZENE (%)

108

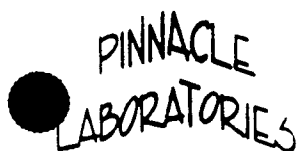
114

120

SURROGATE LIMITS ( 80 - 120 )

## CHEMIST NOTES:

N/A



2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
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# GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : IB REMEDIATION

PINNACLE I.D.: 810113

| SAMPLE                 |                   | MATRIX     | DATE     | DATE         | DATE     | DIL.   |
|------------------------|-------------------|------------|----------|--------------|----------|--------|
| ID. #                  | CLIENT I.D.       |            | SAMPLED  | EXTRACTED    | ANALYZED | FACTOR |
| 04                     | W.STRIPPER OUTLET | AQUEOUS    | 10/29/98 | NA           | 10/6/98  | 1      |
| 05                     | LYMON             | AQUEOUS    | 10/29/98 | NA           | 10/6/98  | 1      |
| PARAMETER              |                   | DET. LIMIT | UNITS    | 04           | 05       |        |
| BENZENE                |                   | 0.5        | UG/L     | 0.6          | < 0.5    |        |
| TOLUENE                |                   | 0.5        | UG/L     | 2.5          | < 0.5    |        |
| ETHYLBENZENE           |                   | 0.5        | UG/L     | 1.3          | < 0.5    |        |
| TOTAL XYLENES          |                   | 0.5        | UG/L     | 8.7          | < 0.5    |        |
| SURROGATE:             |                   |            |          |              |          |        |
| BROMOFLUOROBENZENE (%) |                   |            |          | 107          | 110      |        |
| SURROGATE LIMITS       |                   |            |          | ( 80 - 120 ) |          |        |

CHEMIST NOTES:  
N/A

GAS CHROMATOGRAPHY RESULTS  
REAGENT BLANK

|              |                      |                |         |
|--------------|----------------------|----------------|---------|
| TEST         | EPA 8021 MODIFIED    | PINNACLE I.D.  | 810113  |
| BLANK I.D.   | 110698               | DATE EXTRACTED | NA      |
| CLIENT       | MARATHON OIL COMPANY | DATE ANALYZED  | 11/6/98 |
| PROJECT #    | (none)               | SAMPLE MATRIX  | AQUEOUS |
| PROJECT NAME | IB REMEDIATION       |                |         |

| PARAMETER     | UNITS |      |
|---------------|-------|------|
| BENZENE       | UG/L  | <0.5 |
| TOLUENE       | UG/L  | <0.5 |
| ETHYLBENZENE  | UG/L  | <0.5 |
| TOTAL XYLENES | UG/L  | <0.5 |

SURROGATE

BROMOFLUOROBENZENE (%)

107

SURROGATE LIMITS

( 80 - 120 )

CHEMIST NOTES

N/A

GAS CHROMATOGRAPHY QUALITY CONTROL  
MSMSD

|              |                      |                |         |
|--------------|----------------------|----------------|---------|
| TEST         | EPA 8021 MODIFIED    | PINNACLE I.D.  | 810113  |
| MSMSD #      | 110698               | DATE EXTRACTED | NA      |
| CLIENT       | MARATHON OIL COMPANY | DATE ANALYZED  | 11/6/98 |
| PROJECT #    | (none)               | SAMPLE MATRIX  | AQUEOUS |
| PROJECT NAME | IB REMEDIATION       | UNITS          | UG/L    |

| PARAMETER     | SAMPLE<br>RESULT | CONC<br>SPIKE | SPIKED<br>SAMPLE | %<br>REC | DUP<br>SPIKE | DUP<br>% REC | RPD | REC<br>LIMITS | RPD<br>LIMITS |
|---------------|------------------|---------------|------------------|----------|--------------|--------------|-----|---------------|---------------|
| BENZENE       | <0.5             | 10.0          | 9.2              | 92       | 8.5          | 85           | 8   | ( 80 - 120 )  | 20            |
| TOLUENE       | <0.5             | 10.0          | 10.1             | 101      | 9.5          | 95           | 6   | ( 80 - 120 )  | 20            |
| ETHYLBENZENE  | <0.5             | 10.0          | 10.4             | 104      | 9.5          | 95           | 9   | ( 80 - 120 )  | 20            |
| TOTAL XYLENES | <0.5             | 30.0          | 30.0             | 100      | 27.8         | 93           | 8   | ( 70 - 133 )  | 20            |

EMIST NOTES.  
N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

# Environmental Services Laboratory, Inc. E S L

17400 SW Upper Boones Ferry Road • Suite 270 • Portland, OR 97224 • (503) 670-8520

Kim McNeill  
Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 11/12/1998  
ESL Account No.: 90147  
ESL Job Number: 98.02128

Project: 810113 / MOC  
Location: IB Remediation

Sample analysis in support of the project referenced above has been completed and results are presented on the following pages. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

| Sample<br>Number | Sample Description | Matrix<br>Type | Date<br>Taken | Date<br>Received |
|------------------|--------------------|----------------|---------------|------------------|
| 137504           | 810113-05          | Water          | 10/29/1998    | 11/03/1998       |

Approved by:

  
Andi Hoevet  
Project Manager  
ESL, INC.

  
Technical Review  
ESL, INC.

The results from these samples relate only to the items tested. This report shall not be reproduced, except in full, without the written approval of the laboratory.

ANALYTICAL SERVICES FOR THE ENVIRONMENT

## ANALYTICAL REPORT

Kim McNeill  
Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

11/12/1998  
Job No.: 98.02128

Page: 2

Project Name: 810113 / MOC  
Date Received: 11/03/1998

Sample Number      Sample Description  
107104              810113-05

| <u>PARAMETERS</u> | <u>METHOD</u> | <u>RESULT</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYSED</u> | <u>FLAG</u> |
|-------------------|---------------|---------------|---------------------|--------------|----------------------|-------------|
| Chloride          | EPA 800.0     | 12            | 15                  | mg/L         | 11/11/1998           |             |

A sample result of ND indicates the parameter was Not Detected at the reporting limit.  
mg = ppm      ug = ppb      su = standard units

Environmental Services Laboratory, Inc. (503) 670-8520      (503) 670-9243 FAX  
17400 NW Upper Boones Ferry Rd., Suite 270, Portland, OR 97224

# QUALITY CONTROL REPORT CONTINUING CALIBRATION VERIFICATION

Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 11/12/1998

Job Number: 98.02128

Contact: Kim McNeill  
Project: 810113 / MOC

| Analyte  | CCV<br>True<br>Concentration | Concentration<br>Found | Percent<br>Recovery | Date<br>Analyzed |
|----------|------------------------------|------------------------|---------------------|------------------|
| Chloride | 100.0                        | 11                     | 110.0               | 11/11/1998       |
| Chloride | 100.0                        | 103.0                  | 103.0               | 11/11/1998       |

CCV - Continuing Calibration Verification

Environmental Services Laboratory, Inc. (503)670-8520 (503)670-9243 FAX  
17400 SW Upper Boones Ferry Rd., Suite 270, Portland, OR 97224

# QUALITY CONTROL REPORT BLANKS

Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 11/12/1998

Job Number: 98.02128

Contact: Kim McNeill  
Project: 810113 / MOC  
Location: IB Remediation

| Analyte  | Blank<br>Analysis | Report<br>Limit | Units | Date<br>Analyzed |
|----------|-------------------|-----------------|-------|------------------|
| Chloride | ND                | 0.1             | mg/L  | 11/11/1998       |

Enviro-Mental Services Laboratory, Inc. 10000 SW 10th St. Suite 100  
17400 SW Upper Lonesome Ferry Rd., Portland, OR 97224 (503) 671-1411 FAX

# FLAG GLOSSARY

|     |                                                                                                                                                                                                       |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A   | This sample does not have a typical gasoline pattern.                                                                                                                                                 |
| BI  | This sample does not have a typical diesel pattern.                                                                                                                                                   |
| B   | Analyte found in the associated blank as well as the sample.                                                                                                                                          |
| C   | The sample contains a lighter hydrocarbon than gasoline.                                                                                                                                              |
| CN  | See case narrative.                                                                                                                                                                                   |
| CS  | Outside control limits or unusual matrix; See case narrative.                                                                                                                                         |
| D   | The sample extends to a heavier hydrocarbon range than gasoline.                                                                                                                                      |
| E   | Results on a dry weight basis.                                                                                                                                                                        |
| DIL | Result was calculated from dilution.                                                                                                                                                                  |
| E   | The sample extends to a lighter hydrocarbon range than diesel.                                                                                                                                        |
| F   | The sample extends to a heavier hydrocarbon range than diesel.                                                                                                                                        |
| G   | The positive result for gasoline is due to single component contamination.                                                                                                                            |
| H   | The sample extends to a lighter hydrocarbon range than oil.                                                                                                                                           |
| I   | The oil pattern for this sample is not typical.                                                                                                                                                       |
| J   | The result for this compound is an estimated concentration.                                                                                                                                           |
| L   | The LCS recovery exceeded control limits. See the LCS page of this report.                                                                                                                            |
| LM  | The LCS recovery exceeded control limits; the MS/MSD were in control validating the batch.                                                                                                            |
| M   | MS and/or MSD percent recovery exceeds control limits.                                                                                                                                                |
| MD  | Unable to calculate MS/MSD recovery due to high amount of analyte; greater than 4 times spike level.                                                                                                  |
| MR  | The MS/MSD RPD is greater than method criteria. The sample was re-extracted and re-analyzed with similar results indicating a non-homogeneous sample.                                                 |
| MM  | The Matrix Spike exceeded control limits; LCS was in control validating the batch.                                                                                                                    |
| MI  | Outside control limits due to matrix interference.                                                                                                                                                    |
| N   | Manual integration performed on sample for quantification.                                                                                                                                            |
| N/A | Not Applicable.                                                                                                                                                                                       |
| NC  | Not calculable.                                                                                                                                                                                       |
| NO  | Not Analyzed.                                                                                                                                                                                         |
| P   | A post digestion spike was analyzed, and recoveries were within control limits.                                                                                                                       |
| Q   | Detection limits elevated due to sample matrix.                                                                                                                                                       |
| Q1  | Detection limits elevated due to high levels of non-target compounds. Sample(s) run at a dilution.                                                                                                    |
| R   | The duplicate RPD was greater than 20%. The sample was re-extracted and re-analyzed with similar results. This indicates a matrix interference in the sample, likely a non-homogeneity of the sample. |
| R1  | The duplicate RPD was greater than 20%. Visual inspection showed the sample to be non-homogeneous.                                                                                                    |
| RD  | RPD not applicable for results less than five times the reporting limit.                                                                                                                              |
| RH  | The Relative Percent Difference (RPD) between two columns was greater than 40%, the higher result was reported.                                                                                       |
| RL  | The Relative Percent Difference (RPD) between two columns was greater than 40%, the lower result was reported due to obvious interference with the higher result.                                     |
| RP  | MS/MSD RPD is greater than 20%                                                                                                                                                                        |
| SR  | Surrogate recovery outside control limits. See the surrogate page of the report.                                                                                                                      |
| D   | Unable to quantitate surrogate due to sample dilution.                                                                                                                                                |
| T   | Sample not provided to laboratory in proper sampling container.                                                                                                                                       |
| T   | Final analysis was requested, sample container received with headspace.                                                                                                                               |
| X1  | The duplicate RPD was greater than 20%. Due to insufficient sample, re-analysis was not possible.                                                                                                     |
| X   | Sample was analyzed outside recommended holding times.                                                                                                                                                |
| Y   | The result for this parameter was greater than the TCLP regulatory limit.                                                                                                                             |
| Z   | The pattern seen for the parameter being analyzed is not typical.                                                                                                                                     |

Date: 11/2 Page: 1 of 1

### ANALYSIS OF RESULTS

(505) 344-3777 Fax (505) 344-4413

| <p> <b>Network Project Manager:</b> Kimberly D. McNeill<br/> <b>Pinnacle Laboratories, Inc.</b><br/> <b>2709-D Pan American Freeway, NE</b><br/> <b>Albuquerque, New Mexico 87107</b><br/> <b>(505) 344-3777 Fax (505) 344-4413</b> </p> |       |      |        |        | ANALYSIS REQUEST                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|--------|--------|----------------------------------------------|
| SAMPLE ID                                                                                                                                                                                                                                | DATE  | TIME | MATRIX | LAB ID |                                              |
| 810113-05                                                                                                                                                                                                                                | 10/29 | 0931 | AL     |        | Metals (8) RCRA                              |
|                                                                                                                                                                                                                                          |       |      |        |        | RCRA TCLP METALS                             |
|                                                                                                                                                                                                                                          |       |      |        |        | Metals-13 PP List                            |
|                                                                                                                                                                                                                                          |       |      |        |        | Metals-TAL                                   |
|                                                                                                                                                                                                                                          |       |      |        | X      | Chloride                                     |
|                                                                                                                                                                                                                                          |       |      |        |        | TOX                                          |
|                                                                                                                                                                                                                                          |       |      |        |        | TOC                                          |
|                                                                                                                                                                                                                                          |       |      |        |        | Gen Chemistry                                |
|                                                                                                                                                                                                                                          |       |      |        |        |                                              |
|                                                                                                                                                                                                                                          |       |      |        |        | Oil and Grease                               |
|                                                                                                                                                                                                                                          |       |      |        |        | Volatile Organics GC/MS (8260)               |
|                                                                                                                                                                                                                                          |       |      |        |        | BOD                                          |
|                                                                                                                                                                                                                                          |       |      |        |        | COD                                          |
|                                                                                                                                                                                                                                          |       |      |        |        | PESTICIDES/PCB (608/8080)                    |
|                                                                                                                                                                                                                                          |       |      |        |        | 8270 BY GC/MS                                |
|                                                                                                                                                                                                                                          |       |      |        |        | PNA (8310)                                   |
|                                                                                                                                                                                                                                          |       |      |        |        | 8240 (TCLP 1311) ZHE                         |
|                                                                                                                                                                                                                                          |       |      |        |        | Herbicides (615/8150)                        |
|                                                                                                                                                                                                                                          |       |      |        |        | Base/Neutral Acid Compounds GC/MS (625/8270) |
|                                                                                                                                                                                                                                          |       |      |        |        | URANIUM                                      |
|                                                                                                                                                                                                                                          |       |      |        |        | RADIUM 226+228                               |
|                                                                                                                                                                                                                                          |       |      |        |        | Gross Alpha/Beta                             |
|                                                                                                                                                                                                                                          |       |      |        |        | TO-14                                        |
|                                                                                                                                                                                                                                          |       |      |        |        | NUMBER OF CONTAINERS                         |

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

| PROJECT MANAGER: <u>Paul Peacock</u>       |                |                        |              | COMPANY: <u>Marathon Oil Co</u>                   |                                     |                                 |                          | ADDRESS: <u>P.O. Box 552</u><br><u>Midland TX 79702</u> |                                                                                                     |            |            | PHONE: <u>915-687-8312</u> |             |                                                                  |                              | FAX: <u>915-687-8305</u>      |                               |                                   |                            | BILL TO: <u>Same AS Above</u> |                                              |                                  |                    | COMPANY ADDRESS: <u>Same AS Above</u> |                                 |                 |                                   |         |                      |  |  |  |  |  |  |  |  |
|--------------------------------------------|----------------|------------------------|--------------|---------------------------------------------------|-------------------------------------|---------------------------------|--------------------------|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------|------------|------------|----------------------------|-------------|------------------------------------------------------------------|------------------------------|-------------------------------|-------------------------------|-----------------------------------|----------------------------|-------------------------------|----------------------------------------------|----------------------------------|--------------------|---------------------------------------|---------------------------------|-----------------|-----------------------------------|---------|----------------------|--|--|--|--|--|--|--|--|
| SAMPLE ID                                  | DATE           | TIME                   | MATRIX       | LAB ID                                            | Petroleum Hydrocarbons (418.1) TRPH | (MOD.8015) Diesel/Direct Inject | (M8015) Gas/Purge & Trap | 8021 (BTEX)/8015 (Gasoline)                             | 8021 (BTEX) <input type="checkbox"/> MTBE <input type="checkbox"/> TMB <input type="checkbox"/> PCE | 8021 (TCL) | 8021 (EDX) | 8021 (HALO)                | 8021 (CUST) | 504.1 EDB <input type="checkbox"/> DBCP <input type="checkbox"/> | 8260 (TCL) Volatile Organics | 8260 (Full) Volatile Organics | 8260 (CUST) Volatile Organics | 8260 (Landfill) Volatile Organics | Pesticides /PCB (608/8081) | Herbicides (615/8151)         | Base/Neutral/Acid Compounds GC/MS (625/8270) | Polynuclear Aromatics (610/8310) | General Chemistry: | Priority Pollutant Metals (13)        | Target Analyte List Metals (23) | RCRA Metals (8) | RCRA Metals by TCLP (Method 1311) | Metals: | NUMBER OF CONTAINERS |  |  |  |  |  |  |  |  |
| E. Stripper inlet                          | 10-29-98       | 9:01 AM                | Water        | -01                                               |                                     |                                 |                          |                                                         | <input checked="" type="checkbox"/>                                                                 |            |            |                            |             |                                                                  |                              |                               |                               |                                   |                            |                               |                                              |                                  |                    |                                       |                                 |                 |                                   |         |                      |  |  |  |  |  |  |  |  |
| E. Stripper outlet                         | "              | 9:08 AM                | "            | -02                                               |                                     |                                 |                          |                                                         | <input checked="" type="checkbox"/>                                                                 |            |            |                            |             |                                                                  |                              |                               |                               |                                   |                            |                               |                                              |                                  |                    |                                       |                                 |                 |                                   |         |                      |  |  |  |  |  |  |  |  |
| W. Stripper inlet                          | "              | 9:13 AM                | "            | -03                                               |                                     |                                 |                          |                                                         | <input checked="" type="checkbox"/>                                                                 |            |            |                            |             |                                                                  |                              |                               |                               |                                   |                            |                               |                                              |                                  |                    |                                       |                                 |                 |                                   |         |                      |  |  |  |  |  |  |  |  |
| W. Stripper outlet                         | "              | 9:18 PM                | "            | -04                                               |                                     |                                 |                          |                                                         | <input checked="" type="checkbox"/>                                                                 |            |            |                            |             |                                                                  |                              |                               |                               |                                   |                            |                               |                                              |                                  |                    |                                       |                                 |                 |                                   |         |                      |  |  |  |  |  |  |  |  |
| Bymen                                      | "              | 9:31 AM                | "            | -05                                               |                                     |                                 |                          |                                                         | <input checked="" type="checkbox"/>                                                                 |            |            |                            |             |                                                                  |                              |                               |                               |                                   |                            |                               |                                              |                                  |                    |                                       |                                 |                 |                                   |         |                      |  |  |  |  |  |  |  |  |
| PROJECT INFORMATION                        |                |                        |              | PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS |                                     |                                 |                          | RELINQUISHED BY: 1.                                     |                                                                                                     |            |            | RELINQUISHED BY: 2.        |             |                                                                  |                              |                               |                               |                                   |                            |                               |                                              |                                  |                    |                                       |                                 |                 |                                   |         |                      |  |  |  |  |  |  |  |  |
| PROJ NO                                    | PROJ NAME      | CERTIFICATION REQUIRED | TIME         | WEEK                                              | MOVED                               |                                 |                          |                                                         |                                                                                                     |            |            |                            |             |                                                                  |                              |                               |                               |                                   |                            |                               |                                              |                                  |                    |                                       |                                 |                 |                                   |         |                      |  |  |  |  |  |  |  |  |
|                                            | 18 Remediation |                        |              |                                                   | X                                   |                                 |                          |                                                         |                                                                                                     |            |            |                            |             |                                                                  |                              |                               |                               |                                   |                            |                               |                                              |                                  |                    |                                       |                                 |                 |                                   |         |                      |  |  |  |  |  |  |  |  |
| NO CONTAINERS                              | CUSTODY SEALS  | RECEIVED INTACT        | BLUE ICE/ICE |                                                   |                                     |                                 |                          |                                                         |                                                                                                     |            |            |                            |             |                                                                  |                              |                               |                               |                                   |                            |                               |                                              |                                  |                    |                                       |                                 |                 |                                   |         |                      |  |  |  |  |  |  |  |  |
| 11                                         | Y/N/NA         | Y                      | 100          |                                                   |                                     |                                 |                          |                                                         |                                                                                                     |            |            |                            |             |                                                                  |                              |                               |                               |                                   |                            |                               |                                              |                                  |                    |                                       |                                 |                 |                                   |         |                      |  |  |  |  |  |  |  |  |
| SAMPLE RECEIPT                             |                |                        |              | COMMENTS                                          |                                     |                                 |                          | FIXTURE                                                 |                                                                                                     |            |            |                            |             |                                                                  |                              |                               |                               |                                   |                            |                               |                                              |                                  |                    |                                       |                                 |                 |                                   |         |                      |  |  |  |  |  |  |  |  |
| RECEIVED BY: 1.                            |                |                        |              | RECEIVED BY: (LAB) 2.                             |                                     |                                 |                          |                                                         |                                                                                                     |            |            |                            |             |                                                                  |                              |                               |                               |                                   |                            |                               |                                              |                                  |                    |                                       |                                 |                 |                                   |         |                      |  |  |  |  |  |  |  |  |
| Signature                                  |                |                        |              | Signature                                         |                                     |                                 |                          |                                                         |                                                                                                     |            |            |                            |             |                                                                  |                              |                               |                               |                                   |                            |                               |                                              |                                  |                    |                                       |                                 |                 |                                   |         |                      |  |  |  |  |  |  |  |  |
| Printed Name                               |                |                        |              | Printed Name                                      |                                     |                                 |                          |                                                         |                                                                                                     |            |            |                            |             |                                                                  |                              |                               |                               |                                   |                            |                               |                                              |                                  |                    |                                       |                                 |                 |                                   |         |                      |  |  |  |  |  |  |  |  |
| Date                                       |                |                        |              | Date                                              |                                     |                                 |                          |                                                         |                                                                                                     |            |            |                            |             |                                                                  |                              |                               |                               |                                   |                            |                               |                                              |                                  |                    |                                       |                                 |                 |                                   |         |                      |  |  |  |  |  |  |  |  |
| 10/29/98                                   |                |                        |              | 11/15/98                                          |                                     |                                 |                          |                                                         |                                                                                                     |            |            |                            |             |                                                                  |                              |                               |                               |                                   |                            |                               |                                              |                                  |                    |                                       |                                 |                 |                                   |         |                      |  |  |  |  |  |  |  |  |
| American Environmental Network (AEN), Inc. |                |                        |              | American Environmental Network (AEN), Inc.        |                                     |                                 |                          |                                                         |                                                                                                     |            |            |                            |             |                                                                  |                              |                               |                               |                                   |                            |                               |                                              |                                  |                    |                                       |                                 |                 |                                   |         |                      |  |  |  |  |  |  |  |  |

PINNACLE  
LABORATORIES

1703-D Pan American Freeway, NE  
Albuquerque, New Mexico 87107  
Phone: 505-344-3777, Fax: 505-344-4413

Pinnacle Lab ID number      **808080**  
September 11, 1998

MARATHON OIL COMPANY  
P.O. BOX 552  
MIDLAND, TX 79702-0552

Project Name      IB REMEDIATION  
Project Number      (none)

Attention: PAUL PEACOCK

On 8/27/98 Pinnacle Laboratories, Inc., formerly American Environmental Network (NM), Inc., (ADHS License No. AZ0592), received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

EPA method 8021 was performed by Pinnacle Laboratories, Inc., Albuquerque, NM.

All other parameters were performed by Severn Trent (FL) Inc., Pensacola, FL.

If you have any questions or comments, please do not hesitate to contact us at (505)344-3777.



Kimberly D. McNeill  
Project Manager



H. Mitchell Rubenstein, Ph. D.  
General Manager

MR: mt

Enclosure

|              |                      |               |         |
|--------------|----------------------|---------------|---------|
| CLIENT       | MARATHON OIL COMPANY | PINNACLE ID   | 808080  |
| PROJECT #    | (none)               | DATE RECEIVED | 8/27/98 |
| PROJECT NAME | IB REMEDIATION       | REPORT DATE   | 9/11/98 |

---

| AEN   |                    |         | DATE      |
|-------|--------------------|---------|-----------|
| ID. # | CLIENT DESCRIPTION | MATRIX  | COLLECTED |
| 01    | W.STRIPPER INLET   | AQUEOUS | 8/26/98   |
| 02    | W.STRIPPER OUTLET  | AQUEOUS | 8/26/98   |
| 03    | E.STRIPPER INLET   | AQUEOUS | 8/26/98   |
| 04    | E.STRIPPER OUTLET  | AQUEOUS | 8/26/98   |
| 05    | LYMON              | AQUEOUS | 8/26/98   |

**GAS CHROMATOGRAPHY RESULTS**

TEST : EPA 8021 MODIFIED  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : IB REMEDIATION

PINNACLE I.D.: 808080

| SAMPLE        |                   |            | DATE    | DATE      | DATE     | DIL.   |
|---------------|-------------------|------------|---------|-----------|----------|--------|
| ID. #         | CLIENT I.D.       | MATRIX     | SAMPLED | EXTRACTED | ANALYZED | FACTOR |
| 01            | W.STRIPPER INLET  | AQUEOUS    | 8/26/98 | NA        | 8/28/98  | 5      |
| 02            | W.STRIPPER OUTLET | AQUEOUS    | 8/26/98 | NA        | 8/31/98  | 5      |
| 03            | E.STRIPPER INLET  | AQUEOUS    | 8/26/98 | NA        | 8/28/98  | 5      |
| PARAMETER     |                   | DET. LIMIT | UNITS   | 01        | 02       | 03     |
| BENZENE       |                   | 0.5        | UG/L    | 47        | 3.9      | 45     |
| TOLUENE       |                   | 0.5        | UG/L    | 19        | 8.4      | 18     |
| ETHYLBENZENE  |                   | 0.5        | UG/L    | 91        | 3.4      | 94     |
| TOTAL XYLENES |                   | 0.5        | UG/L    | 140       | 20       | 140    |

SURROGATE:  
BROMOFLUOROBENZENE (%) 92 87 89  
SURROGATE LIMITS ( 80 - 120 )

CHEMIST NOTES:  
N/A

# GAS CHROMATOGRAPHY RESULTS

TEST : EPA 8021 MODIFIED  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : IB REMEDIATION

PINNACLE I.D.: 808080

| SAMPLE        |                   |            | DATE    | DATE      | DATE     | DIL.   |
|---------------|-------------------|------------|---------|-----------|----------|--------|
| ID. #         | CLIENT I.D.       | MATRIX     | SAMPLED | EXTRACTED | ANALYZED | FACTOR |
| 04            | E.STRIPPER OUTLET | AQUEOUS    | 8/26/98 | NA        | 8/28/98  | 1      |
| 05            | LYMON             | AQUEOUS    | 8/26/98 | NA        | 8/28/98  | 1      |
| PARAMETER     |                   | DET. LIMIT | UNITS   | 04        | 05       |        |
| BENZENE       |                   | 0.5        | UG/L    | 1.6       | < 0.5    |        |
| TOLUENE       |                   | 0.5        | UG/L    | 7.7       | < 0.5    |        |
| ETHYLBENZENE  |                   | 0.5        | UG/L    | 6.3       | < 0.5    |        |
| TOTAL XYLENES |                   | 0.5        | UG/L    | 34        | < 0.5    |        |

SURROGATE:  
BROMOFLUOROBENZENE (%) 116 93  
SURROGATE LIMITS ( 80 - 120 )

CHEMIST NOTES:  
N/A

GAS CHROMATOGRAPHY RESULTS  
REAGENT BLANK

|              |                      |                |         |
|--------------|----------------------|----------------|---------|
| TEST         | EPA 8021 MODIFIED    | PINNACLE I.D.  | 808080  |
| BLANK I. D.  | 082898               | DATE EXTRACTED | N/A     |
| CLIENT       | MARATHON OIL COMPANY | DATE ANALYZED  | 8/28/98 |
| PROJECT #    | (none)               | SAMPLE MATRIX  | AQUEOUS |
| PROJECT NAME | IB REMEDIATION       |                |         |

| PARAMETER              | UNITS |      |
|------------------------|-------|------|
| BENZENE                | UG/L  | <0.5 |
| TOLUENE                | UG/L  | <0.5 |
| ETHYLBENZENE           | UG/L  | <0.5 |
| TOTAL XYLENES          | UG/L  | <0.5 |
| METHYL-t-BUTYL ETHER   | UG/L  | <2.5 |
| 1,3,5-TRIMETHYLBENZENE | UG/L  | <0.5 |
| 1,2,4-TRIMETHYLBENZENE | UG/L  | <0.5 |

SURROGATE:  
BROMOFLUOROBENZENE (%) 100  
SURROGATE LIMITS: ( 80 - 120 )  
CHEMIST NOTES:  
N/A

GAS CHROMATOGRAPHY RESULTS  
REAGENT BLANK

|              |                        |                |           |
|--------------|------------------------|----------------|-----------|
| TEST         | : EPA 8021 MODIFIED    | PINNACLE I.D.  | : 808080  |
| BLANK I. D.  | : 083198               | DATE EXTRACTED | : N/A     |
| CLIENT       | : MARATHON OIL COMPANY | DATE ANALYZED  | : 8/31/98 |
| PROJECT #    | : (none)               | SAMPLE MATRIX  | : AQUEOUS |
| PROJECT NAME | : IB REMEDIATION       |                |           |

| PARAMETER              | UNITS |      |
|------------------------|-------|------|
| BENZENE                | UG/L  | <0.5 |
| TOLUENE                | UG/L  | <0.5 |
| ETHYLBENZENE           | UG/L  | <0.5 |
| TOTAL XYLENES          | UG/L  | <0.5 |
| METHYL-t-BUTYL ETHER   | UG/L  | <2.5 |
| 1,3,5-TRIMETHYLBENZENE | UG/L  | <0.5 |
| 1,2,4-TRIMETHYLBENZENE | UG/L  | <0.5 |

SURROGATE:  
BROMOFLUOROBENZENE (%) 99  
SURROGATE LIMITS: ( 80 - 120 )  
CHEMIST NOTES:  
N/A

GAS CHROMATOGRAPHY QUALITY CONTROL  
MSMSD

|              |                      |                |         |
|--------------|----------------------|----------------|---------|
| TEST         | EPA 8021 MODIFIED    | PINNACLE I.D.  | 808080  |
| MSMSD #      | 808080-05            | DATE EXTRACTED | N/A     |
| CLIENT       | MARATHON OIL COMPANY | DATE ANALYZED  | 8/28/98 |
| PROJECT #    | (none)               | SAMPLE MATRIX  | AQUEOUS |
| PROJECT NAME | IB REMEDIATION       | UNITS          | UG/L    |

| PARAMETER            | SAMPLE<br>RESULT | CONC<br>SPIKE | SPIKED<br>SAMPLE | %<br>REC | DUP<br>SPIKE | DUP<br>% REC | RPD | REC<br>LIMITS | RPD<br>LIMITS |
|----------------------|------------------|---------------|------------------|----------|--------------|--------------|-----|---------------|---------------|
| BENZENE              | <0.5             | 10.0          | 9.8              | 98       | 9.5          | 95           | 3   | ( 80 - 120 )  | 20            |
| TOLUENE              | <0.5             | 10.0          | 9.2              | 92       | 9.0          | 90           | 2   | ( 80 - 120 )  | 20            |
| ETHYLBENZENE         | <0.5             | 10.0          | 9.4              | 94       | 9.5          | 95           | 1   | ( 80 - 120 )  | 20            |
| TOTAL XYLENES        | <0.5             | 30.0          | 30.5             | 102      | 29.9         | 100          | 2   | ( 80 - 120 )  | 20            |
| METHYL-t-BUTYL ETHER | <2.5             | 20.0          | 20.5             | 103      | 21.9         | 110          | 7   | ( 70 - 133 )  | 20            |

CHEMIST NOTES:  
N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



# Environmental Services Laboratory, Inc. E S L

17400 SW Upper Boones Ferry Road • Suite 270 • Portland, OR 97224 • (503) 670-8520

Kim McNeill  
Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

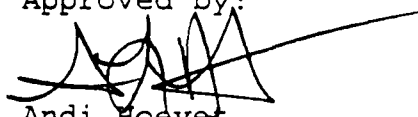
Date: 09/04/1998  
ESL Account No.: 90147  
ESL Job Number: 98.01740

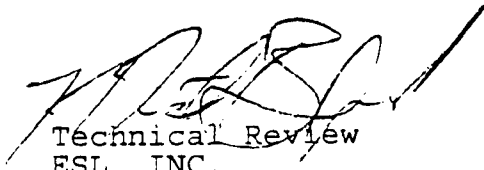
Project: 808080-05 Marathon oil  
Location: 808080-05

Sample analysis in support of the project referenced above has been completed and results are presented on the following pages. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

| Sample<br>Number | Sample Description | Matrix<br>Type | Date<br>Taken | Date<br>Received |
|------------------|--------------------|----------------|---------------|------------------|
| 105537           | 808080-05          | Water          | 08/26/1998    | 08/31/1998       |

Approved by:

  
Andi Hoevet  
Project Manager  
ESL, INC.

  
Technical Review  
ESL, INC.

The results from these samples relate only to the items tested. This report shall not be reproduced, except in full, without the written approval of the laboratory.

**ANALYTICAL SERVICES FOR THE ENVIRONMENT**

## ANALYTICAL REPORT

Kim McNeill  
Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

09/04/1998  
Job No.: 98.01740

Page: 2

Project Name: 808080-05 Marathon oil  
Date Received: 08/31/1998

Sample Number      Sample Description  
105537              808080-05

| <u>PARAMETERS</u> | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|-------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Chloride          | EPA 800.0      | 1.3            | 0.5                 | mg/L         | 09/03/1998           |             |

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

Environmental Services Laboratory, Inc. (503) 670-8520 (503) 670-9243 FAX  
17400 SW Upper Boones Ferry Rd., Suite 270, Portland, OR 97224

# QUALITY CONTROL REPORT CONTINUING CALIBRATION VERIFICATION

Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 09/04/1998

Job Number: 98.01740

Contact: Kim McNeill  
Project: 808080-05 Marathon oil

| Analyte  | CCV                   | Concentration<br>Found | Percent<br>Recovery | Date<br>Analyzed |
|----------|-----------------------|------------------------|---------------------|------------------|
|          | True<br>Concentration |                        |                     |                  |
| Chloride | 10.0                  | 9.75                   | 97.5                | 09/03/1998       |

CCV - Continuing Calibration Verification

Environmental Services Laboratory, Inc. (503)670-8520 (503)670-9243 FAX  
17400 SW Upper Boones Ferry Rd., Suite 270, Portland, OR 97224

# QUALITY CONTROL REPORT MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 09/04/1998  
Job Number: 98.01740

Contact: Kim McNeill  
Project: 808080-05 Marathon oil

| Analyte  | Matrix | Sample | Spike  | Units | Percent  | MSD    | Spike  | Units | Percent  | MS/MSD | Flags  |
|----------|--------|--------|--------|-------|----------|--------|--------|-------|----------|--------|--------|
|          | Spike  |        |        |       |          | MSD    |        |       |          |        |        |
|          | Result | Result | Amount |       | Recovery | Result | Amount |       | Recovery | RPD    |        |
| Chloride | 1400   | 350    | 1000   | mg/L  | 105.0    | 1500   | 1000   | mg/L  | 115.0    | 9.1    | DIL, Q |

QC Sample:

NOTE: Matrix Spike Samples may not be samples from this job.

MS = Matrix Spike

MSD = Matrix Spike Duplicate

RPD = Relative Percent Difference

dil. = Diluted Out

Environmental Services Laboratory, Inc. (503) 670-8520 (503) 670-9243 FAX  
17400 SW Upper Boones Ferry Rd., Portland, OR 97224

## QUALITY CONTROL REPORT BLANKS

Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 09/04/1998

Job Number: 98.01740

Contact: Kim McNeill  
Project: 808080-05 Marathon oil  
Location: 808080-05

| Analyte  | Blank<br>Analysis | Report<br>Limit | Units | Date<br>Analyzed |
|----------|-------------------|-----------------|-------|------------------|
| Chloride | ND                | 0.5             | mg/L  | 09/03/1998       |

Environmental Services Laboratory, Inc. (503) 670-8520 (503) 670-9243 FAX  
17400 SW Upper Boones Ferry Rd., Portland, OR 97224

## QUALITY CONTROL REPORT DUPLICATES

Pinnacle Laboratories  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 09/04/1998

Job Number: 98.01740

Contact: Kim McNeill  
Project: 808080-05 Marathon oil

| Analyte  | Original<br>Analysis | Duplicate<br>Analysis | Units | RPD | Date<br>Analyzed | Flag |
|----------|----------------------|-----------------------|-------|-----|------------------|------|
| Chloride | 350                  | 380                   | mg/L  | 8.2 | 09/03/1998       | DILQ |

NOTE: Duplicates may not be samples from this job.

RPD - Relative Percent Difference

# FLAG GLOSSARY

|     |                                                                                                                                                                                                       |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A   | This sample does not have a typical gasoline pattern.                                                                                                                                                 |
| B1  | This sample does not have a typical diesel pattern.                                                                                                                                                   |
| B   | Analyte found in the associated blank as well as the sample.                                                                                                                                          |
| C   | The sample contains a lighter hydrocarbon than gasoline.                                                                                                                                              |
| CN  | See case narrative                                                                                                                                                                                    |
| CS  | Outside control limits or unusual matrix; see case narrative.                                                                                                                                         |
| D   | The sample extends to a heavier hydrocarbon range than gasoline.                                                                                                                                      |
| i   | Results on a dry weight basis                                                                                                                                                                         |
| DIL | Result was calculated from dilution.                                                                                                                                                                  |
| E   | The sample extends to a lighter hydrocarbon range than diesel.                                                                                                                                        |
| F   | The sample extends to a heavier hydrocarbon range than diesel.                                                                                                                                        |
| G   | The positive result for gasoline is due to single component contamination.                                                                                                                            |
| I   | The oil pattern for this sample is not typical.                                                                                                                                                       |
| J   | The result for this compound is an estimated concentration.                                                                                                                                           |
| L   | The LCS recovery exceeded control limits. See the LCS page of this report.                                                                                                                            |
| LM  | The LCS recovery exceeded control limits; the MS/MSD were in control validating the batch.                                                                                                            |
| M   | MS and/or MSD percent recovery exceeds control limits.                                                                                                                                                |
| MD  | Unable to calculate MS/MSD recovery due to high amount of analyte; greater than 4 times spike level.                                                                                                  |
| MR  | The MS/MSD RPD is greater than method criteria. The sample was re-extracted and re-analyzed with similar results indicating a non-homogeneous sample.                                                 |
| MM  | The Matrix Spike exceeded control limits; LCS was in control validating the batch.                                                                                                                    |
| MI  | Outside control limits due to matrix interference.                                                                                                                                                    |
| N   | Manual integration performed on sample for quantification.                                                                                                                                            |
| N/A | Not Applicable.                                                                                                                                                                                       |
| NC  | Not calculable.                                                                                                                                                                                       |
| NO  | Not Analyzed.                                                                                                                                                                                         |
| P   | A post digestion spike was analyzed, and recoveries were within control limits.                                                                                                                       |
| Q   | Detection limits elevated due to sample matrix.                                                                                                                                                       |
| Q1  | Detection limits elevated due to high levels of non-target compounds. Sample(s) run at a dilution.                                                                                                    |
| R   | The duplicate RPD was greater than 20%. The sample was re-extracted and re-analyzed with similar results. This indicates a matrix interference in the sample, likely a non-homogeneity of the sample. |
| R1  | The duplicate RPD was greater than 20%. Visual inspection showed the sample to be non-homogeneous.                                                                                                    |
| RD  | RPD not applicable for results less than five times the reporting limit.                                                                                                                              |
| RH  | The Relative Percent Difference (RPD) between two columns was greater than 40%, the higher result was reported.                                                                                       |
| RL  | The Relative Percent Difference (RPD) between two columns was greater than 40%, the lower result was reported due to obvious interference with the higher result.                                     |
| RP  | MS/MSD RPD is greater than 20%                                                                                                                                                                        |
| SR  | Surrogate recovery outside control limits. See the surrogate page of the report.                                                                                                                      |
| SD  | Unable to quantitate surrogate due to sample dilution.                                                                                                                                                |
| SC  | Sample not provided to laboratory in proper sampling container.                                                                                                                                       |
| V   | Volatile analysis was requested, sample container received with headspace.                                                                                                                            |
| X1  | The duplicate RPD was greater than 20%. Due to insufficient sample, re-analysis was not possible.                                                                                                     |
| X   | Sample was analyzed outside recommended holding times.                                                                                                                                                |
| Y   | The result for this parameter was greater than the TCLP regulatory limit.                                                                                                                             |
| Z   | The pattern seen for the parameter being analyzed is not typical.                                                                                                                                     |



AMERICAN ENVIRONMENTAL NETWORK  
Albuquerque, New Mexico

# Interlab Chain of Custody

DATE: 8/27/98 PAGE: 1 OF 1

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL

COMPANY: AMERICAN ENVIRONMENTAL NETWORK

ADDRESS: 2709-D Pan American Freeway, NE  
Albuquerque, NM 87107

CLIENT PROJECT MANAGER:

Kim McNeill

SAMPLE ID DATE TIME MATRIX LAB ID

808080-05 8/26 0915 AG

Metals - TAL  
Metals - PP List  
Metals - RCRA  
RCRA Metals by TCLP (1311)

TOX  
TOC  
Gen Chemistry: Chloride

Oil and Grease  
BOD  
COD  
Pesticides/PCB (608/8080)  
Herbicides (615/8150)  
Base/Neutral Acid Compounds GC/MS (625/8270)  
Volatile Organics GC/MS (624/8240)  
Polynuclear Aromatics (610/8310)  
8240 (TCLP 1311) ZHE  
8270 (TCLP 1311)

TO-14  
Gross Alpha/Beta

NUMBER OF CONTAINERS

## PROJECT INFORMATION

## SAMPLE RECEIPT

## SAMPLES SENT TO:

## RELINQUISHED BY:

## RELINQUISHED BY:

PROJECT NUMBER:

808080

TOTAL NUMBER OF CONTAINERS

PROJECT NAME:

MOE

CHAIN OF CUSTODY SEALS

QC LEVEL:

STD IV

INTACT?

QC REQUIRED:

MS MSD BLANK

RECEIVED GOOD COND/COLD

TAI:

STANDARD RUSHI

LAB NUMBER

98.01740

DUE DATE:

9/8

RUSH SURCHARGE:

CLIENT DISCOUNT

SPECIAL CERTIFICATION REQUIRED:

☐ YES

☐ NO

Signature: *Kimberly D. McNeill* Time: 1:00

Printed Name: Kimberly D. McNeill Date: 8/27/98

Abbuquerque

RECEIVED BY:

1.

Signature: *[Signature]* Time: 1:00

Printed Name: *[Name]* Date: 8/27/98

Company: EAL

Signature: Time:

Printed Name: Date:

Company:

RECEIVED BY: (LAB)

2.

Signature: Time:

Printed Name: Date:

Company:

SHADED AREAS ARE FOR EYE USE

**DISTRIBUTION:** White - ~~Am~~ Canary - Originator

PINNACLE  
LABORATORIES

AEN I.D. 808008

August 25, 1998

MARATHON OIL COMPANY  
P.O. BOX 552  
MIDLAND, TX 79702-0552

Project Name (none)  
Project Number INDIAN BASIN REMED.

Attention: PAUL PEACOCK

On 8/5/98 Pinnacle Laboratories, Inc., formerly American Environmental Network (NM), Inc., (ADHS License No. AZ0592), received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

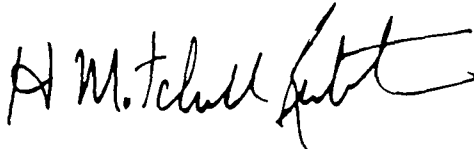
EPA method 8021 was performed by Pinnacle Laboratories Inc., Albuquerque, NM

All other parameters were performed by ESL, Portland, OR.

If you have any questions or comments, please do not hesitate to contact us at (505)344-3777.



Kimberly D. McNeill  
Project Manager



H. Mitchell Rubenstein, Ph. D.  
General Manager

MR: mt

Enclosure

MCR

SEP 8 1998

Environmental & Safety

|              |                        |               |           |
|--------------|------------------------|---------------|-----------|
| CLIENT       | : MARATHON OIL COMPANY | AEN I D       | : 808008  |
| PROJECT #    | : INDIAN BASIN REMED.  | DATE RECEIVED | : 8/5/98  |
| PROJECT NAME | : (none)               | REPORT DATE   | : 8/25/98 |

| AEN<br>ID. # | CLIENT DESCRIPTION | MATRIX  | DATE<br>COLLECTED |
|--------------|--------------------|---------|-------------------|
| 01           | LYMON              | AQUEOUS | 8/4/98            |
| 02           | W. STRIPPER INLET  | AQUEOUS | 8/4/98            |
| 03           | W. STRIPPER OUTLET | AQUEOUS | 8/4/98            |
| 04           | E. STRIPPER INLET  | AQUEOUS | 8/4/98            |
| 05           | E. STRIPPER OUTLET | AQUEOUS | 8/4/98            |

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8021)  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : INDIAN BASIN REMED.  
PROJECT NAME : (none)

AEN I.D.: 808008

| SAMPLE ID. #  | CLIENT I.D.        | MATRIX  | DATE SAMPLED | DATE EXTRACTED | DATE ANALYZED | DIL. FACTOR |
|---------------|--------------------|---------|--------------|----------------|---------------|-------------|
| 01            | LYMON              | AQUEOUS | 8/4/98       | NA             | 8/7/98        | 1           |
| 02            | W. STRIPPER INLET  | AQUEOUS | 8/4/98       | NA             | 8/7/98        | 5           |
| 03            | W. STRIPPER OUTLET | AQUEOUS | 8/4/98       | NA             | 8/10/98       | 5           |
| PARAMETER     | DET. LIMIT         | UNITS   | 01           | 02             | 03            |             |
| BENZENE       | 0.5                | UG/L    | < 0.5        | 22             | < 2.5         |             |
| TOLUENE       | 0.5                | UG/L    | < 0.5        | 17             | 8.0           |             |
| ETHYLBENZENE  | 0.5                | UG/L    | < 0.5        | 48             | 5.1           |             |
| TOTAL XYLENES | 0.5                | UG/L    | < 0.5        | 150            | 26            |             |

SURROGATE:

BROMOFLUOROBENZENE (%)

SURROGATE LIMITS ( 80 - 120 )

88

83

90

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8021)  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : INDIAN BASIN REMED.  
PROJECT NAME : (none)

AEN I.D.: 808008

| SAMPLE ID. #  | CLIENT I.D.        | MATRIX  | DATE SAMPLED | DATE EXTRACTED | DATE ANALYZED | DIL. FACTOR |
|---------------|--------------------|---------|--------------|----------------|---------------|-------------|
| 04            | E. STRIPPER INLET  | AQUEOUS | 8/4/98       | NA             | 8/7/98        | 5           |
| 05            | E. STRIPPER OUTLET | AQUEOUS | 8/4/98       | NA             | 8/7/98        | 1           |
| PARAMETER     | DET. LIMIT         | UNITS   | 04           | 05             |               |             |
| BENZENE       | 0.5                | UG/L    | 22           | 1.2            |               |             |
| TOLUENE       | 0.5                | UG/L    | 19           | 5.5            |               |             |
| ETHYLBENZENE  | 0.5                | UG/L    | 49           | 3.3            |               |             |
| TOTAL XYLENES | 0.5                | UG/L    | 170          | 21             |               |             |

SURROGATE:  
BROMOFLUOROBENZENE (%) 84 92  
SURROGATE LIMITS ( 80 - 120 )

CHEMIST NOTES:  
N/A

GAS CHROMATOGRAPHY RESULTS  
REAGENT BLANK

|              |                        |                |           |
|--------------|------------------------|----------------|-----------|
| TEST         | : BTEX (EPA 8021)      | AEN I.D.       | : 808008  |
| BLANK I. D.  | : 080798               | DATE EXTRACTED | : N/A     |
| CLIENT       | : MARATHON OIL COMPANY | DATE ANALYZED  | : 8/7/98  |
| PROJECT #    | : INDIAN BASIN REMED.  | SAMPLE MATRIX  | : AQUEOUS |
| PROJECT NAME | : (none)               |                |           |

| PARAMETER     | UNITS |      |
|---------------|-------|------|
| BENZENE       | UG/L  | <0.5 |
| TOLUENE       | UG/L  | <0.5 |
| ETHYLBENZENE  | UG/L  | <0.5 |
| TOTAL XYLENES | UG/L  | <0.5 |

SURROGATE:  
BROMOFLUOROBENZENE (%) 85  
SURROGATE LIMITS: ( 80 - 120 )

CHEMIST NOTES:  
N/A

GAS CHROMATOGRAPHY RESULTS  
REAGENT BLANK

|              |                        |                |           |
|--------------|------------------------|----------------|-----------|
| TEST         | : BTEX (EPA 8021)      | AEN I.D.       | : 808008  |
| BLANK I. D.  | : 081098               | DATE EXTRACTED | : N/A     |
| CLIENT       | : MARATHON OIL COMPANY | DATE ANALYZED  | : 8/10/98 |
| PROJECT #    | : INDIAN BASIN REMED.  | SAMPLE MATRIX  | : AQUEOUS |
| PROJECT NAME | : (none)               |                |           |

| PARAMETER     | UNITS |      |
|---------------|-------|------|
| BENZENE       | UG/L  | <0.5 |
| TOLUENE       | UG/L  | <0.5 |
| ETHYLBENZENE  | UG/L  | <0.5 |
| TOTAL XYLENES | UG/L  | <0.5 |

SURROGATE:  
BROMOFLUOROBENZENE (%) 92  
SURROGATE LIMITS: ( 80 - 120 )  
CHEMIST NOTES:  
N/A

GAS CHROMATOGRAPHY QUALITY CONTROL  
MSMSD

|              |                        |                |         |
|--------------|------------------------|----------------|---------|
| TEST         | : BTEX (EPA 8021)      | AEN I.D.       | 808008  |
| MSMSD #      | : 808008-01            | DATE EXTRACTED | N/A     |
| CLIENT       | : MARATHON OIL COMPANY | DATE ANALYZED  | 8/7/98  |
| PROJECT #    | : INDIAN BASIN REMED   | SAMPLE MATRIX  | AQUEOUS |
| PROJECT NAME | : (none)               | UNITS          | UG/L    |

| PARAMETER     | SAMPLE<br>RESULT | CONC<br>SPIKE | SPIKED<br>SAMPLE | %<br>REC | DUP<br>SPIKE | DUP<br>% REC | RPD | REC<br>LIMITS | RPD<br>LIMITS |
|---------------|------------------|---------------|------------------|----------|--------------|--------------|-----|---------------|---------------|
| BENZENE       | <0.5             | 10.0          | 9.0              | 90       | 9.4          | 94           | 4   | ( 80 - 120 )  | 20            |
| TOLUENE       | <0.5             | 10.0          | 9.0              | 90       | 9.3          | 93           | 3   | ( 80 - 120 )  | 20            |
| ETHYLBENZENE  | <0.5             | 10.0          | 9.5              | 95       | 10.0         | 100          | 5   | ( 80 - 120 )  | 20            |
| TOTAL XYLENES | <0.5             | 30.0          | 29.6             | 99       | 30.6         | 102          | 3   | ( 80 - 120 )  | 20            |

CHEMIST NOTES.  
N/A

% Recovery =  $\frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$

RPD (Relative Percent Difference) =  $\frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$



# Environmental Services Laboratory, Inc.

17400 SW Upper Boones Ferry Road • Suite 270 • Portland, OR 97224 • (503) 670-8520

Kim McNeill  
AEN - Albuquerque  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 08/18/1998  
AEN Account No.: 90147  
AEN Job Number: 98.01623

Project: 808008 Indian Basin Remed.  
Location: Indian basin Remed.

Sample analysis in support of the project referenced above has been completed and results are presented on the following pages. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

| Sample<br>Number | Sample Description | Matrix<br>Type | Date<br>Taken | Date<br>Received |
|------------------|--------------------|----------------|---------------|------------------|
| 105052           | 808008-01          | Water          | 08/04/1998    | 08/06/1998       |

Approved by:

  
Andi Hoovet  
Project Manager  
ESL, INC.

  
Technical Review  
ESL, INC.

The results from these samples relate only to the items tested. This report shall not be reproduced, except in full, without the written approval of the laboratory.

*ANALYTICAL SERVICES FOR THE ENVIRONMENT*

## ANALYTICAL REPORT

Kim McNeill  
AEN - Albuquerque  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

08/18/1998  
Job No.: 98.01623

Page: 2

Project Name: 808008 Indian Basin Remed.  
Date Received: 08/06/1998

Sample Number      Sample Description  
105052              808008-01

| <u>PARAMETERS</u> | <u>METHODS</u> | <u>RESULTS</u> | <u>REPORT LIMIT</u> | <u>UNITS</u> | <u>DATE ANALYZED</u> | <u>FLAG</u> |
|-------------------|----------------|----------------|---------------------|--------------|----------------------|-------------|
| Chloride          | EPA 300.0      | 0.63           | 0.5                 | mg/L         | 08/14/1998           |             |

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

Environmental Services Laboratory, Inc. (503) 670-8520 (503) 670-9243 FAX  
17400 SW Upper Boones Ferry Rd., Suite 270, Portland, OR 97224

# QUALITY CONTROL REPORT CONTINUING CALIBRATION VERIFICATION

AEN - Albuquerque  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 08/18/1998

Job Number: 98.01623

Contact: Kim McNeill  
Project: 808008 Indian Basin Remed.

| Analyte  | CCV                   |                        | Percent<br>Recovery | Date<br>Analyzed |
|----------|-----------------------|------------------------|---------------------|------------------|
|          | True<br>Concentration | Concentration<br>Found |                     |                  |
| Chloride | 10.0                  | 8.63                   | 86.3                | 08/14/1998       |

CCV - Continuing Calibration Verification

Environmental Services Laboratory, Inc. (503)684-0447 (503)620-0393 FAX  
17400 SW Upper Boones Ferry Rd., Suite 270, Portland, OR 97224

# QUALITY CONTROL REPORT MATRIX SPIKE/MATRIX SPIKE DUPLICATE

AEN - Albuquerque  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 08/18/1998

Job Number: 98.01623

Contact: Kim McNeill  
Project: 808008 Indian Basin Remed.

| Analyte  | Matrix          | Sample<br>Result | Spike<br>Amount | Spike<br>Units | Percent<br>Recovery | MSD<br>Result | MSD             | Percent<br>Recovery | MS/MSD<br>RPD | Flags |                |
|----------|-----------------|------------------|-----------------|----------------|---------------------|---------------|-----------------|---------------------|---------------|-------|----------------|
|          | Spike<br>Result |                  |                 |                |                     |               | Spike<br>Amount |                     |               |       | Spike<br>Units |
| Chloride | 19.4            | 7.6              | 10.0            | mg/L           | 118.0               | 18.6          | 10.0            | mg/L                | 110.0         | 7.0   |                |

QC Sample:

NOTE: Matrix Spike Samples may not be samples from this job.

MS = Matrix Spike

MSD = Matrix Spike Duplicate

RPD = Relative Percent Difference

dil. = Diluted Out

Environmental Services Laboratory, Inc. (503) 670-8520 (503) 670-9243 FAX  
17400 SW Upper Boones Ferry Rd., Portland, OR 97224

## QUALITY CONTROL REPORT BLANKS

AEN - Albuquerque  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 08/18/1998

Job Number: 98.01623

Contact: Kim McNeill  
Project: 808008 Indian Basin Remed.  
Location: Indian basin Remed.

| Analyte  | Blank<br>Analysis | Report<br>Limit | Units | Date<br>Analyzed |
|----------|-------------------|-----------------|-------|------------------|
| Chloride | ND                | 0.5             | mg/L  | 08/14/1998       |

## QUALITY CONTROL REPORT DUPLICATES

AEN - Albuquerque  
2709-D Pan American Fwy NE  
Albuquerque, NM 87107

Date: 08/18/1998

Job Number: 98.01623

Contact: Kim McNeill  
Project: 808008 Indian Basin Remed.

| Analyte  | Original<br>Analysis | Duplicate<br>Analysis | Units | RPD | Date<br>Analyzed | Flag |
|----------|----------------------|-----------------------|-------|-----|------------------|------|
| Chloride | 7.6                  | 7.4                   | mg/L  | 2.7 | 08/14/1998       |      |

NOTE: Duplicates may not be samples from this job.

RPD - Relative Percent Difference

# FLAG GLOSSARY

|     |                                                                                                                                                                                                       |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A   | This sample does not have a typical gasoline pattern.                                                                                                                                                 |
| B1  | This sample does not have a typical diesel pattern.                                                                                                                                                   |
| B   | Analyte found in the associated blank as well as the sample.                                                                                                                                          |
| C   | The sample contains a lighter hydrocarbon than gasoline.                                                                                                                                              |
| CN  | See case narrative                                                                                                                                                                                    |
| CS  | Outside control limits or unusual matrix; see case narrative.                                                                                                                                         |
| D   | The sample extends to a heavier hydrocarbon range than gasoline.                                                                                                                                      |
| d   | Results on a dry weight basis                                                                                                                                                                         |
| DIL | Result was calculated from dilution.                                                                                                                                                                  |
| E   | The sample extends to a lighter hydrocarbon range than diesel.                                                                                                                                        |
| F   | The sample extends to a heavier hydrocarbon range than diesel.                                                                                                                                        |
| G   | The positive result for gasoline is due to single component contamination.                                                                                                                            |
| I   | The oil pattern for this sample is not typical.                                                                                                                                                       |
| J   | The result for this compound is an estimated concentration.                                                                                                                                           |
| L   | The LCS recovery exceeded control limits. See the LCS page of this report.                                                                                                                            |
| LM  | The LCS recovery exceeded control limits; the MS/MSD were in control validating the batch.                                                                                                            |
| M   | MS and/or MSD percent recovery exceeds control limits.                                                                                                                                                |
| MD  | Unable to calculate MS/MSD recovery due to high amount of analyte; greater than 4 times spike level.                                                                                                  |
| MR  | The MS/MSD RPD is greater than method criteria. The sample was re-extracted and re-analyzed with similar results indicating a non-homogeneous sample.                                                 |
| MM  | The Matrix Spike exceeded control limits; LCS was in control validating the batch.                                                                                                                    |
| MI  | Outside control limits due to matrix interference.                                                                                                                                                    |
| N   | Manual integration performed on sample for quantification.                                                                                                                                            |
| N/A | Not Applicable.                                                                                                                                                                                       |
| NC  | Not calculable.                                                                                                                                                                                       |
| NO  | Not Analyzed.                                                                                                                                                                                         |
| P   | A post digestion spike was analyzed, and recoveries were within control limits.                                                                                                                       |
| Q   | Detection limits elevated due to sample matrix.                                                                                                                                                       |
| Q1  | Detection limits elevated due to high levels of non-target compounds. Sample(s) run at a dilution.                                                                                                    |
| R   | The duplicate RPD was greater than 20%. The sample was re-extracted and re-analyzed with similar results. This indicates a matrix interference in the sample, likely a non-homogeneity of the sample. |
| R1  | The duplicate RPD was greater than 20%. Visual inspection showed the sample to be non-homogeneous.                                                                                                    |
| RD  | RPD not applicable for results less than five times the reporting limit.                                                                                                                              |
| RH  | The Relative Percent Difference (RPD) between two columns was greater than 40%, the higher result was reported.                                                                                       |
| RL  | The Relative Percent Difference (RPD) between two columns was greater than 40%, the lower result was reported due to obvious interference with the higher result.                                     |
| RP  | MS/MSD RPD is greater than 20%                                                                                                                                                                        |
| SR  | Surrogate recovery outside control limits. See the surrogate page of the report.                                                                                                                      |
| SD  | Unable to quantitate surrogate due to sample dilution.                                                                                                                                                |
| SC  | Sample not provided to laboratory in proper sampling container.                                                                                                                                       |
| V   | Volatile analysis was requested, sample container received with headspace.                                                                                                                            |
| X1  | The duplicate RPD was greater than 20%. Due to insufficient sample, re-analysis was not possible.                                                                                                     |
| X   | Sample was analyzed outside recommended holding times.                                                                                                                                                |
| Y   | The result for this parameter was greater than the TCLP regulatory limit.                                                                                                                             |
| Z   | The pattern seen for the parameter being analyzed is not typical.                                                                                                                                     |

# Interlab Chain of Custody

DATE: 8/5/98 PAGE: 1 OF 1

|                                                                                                                                                                                              |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |  |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| <b>NETWORK PROJECT MANAGER: KIMBERLY D. McNEILL</b><br><br><b>COMPANY: AMERICAN ENVIRONMENTAL NETWORK</b><br><b>ADDRESS: 2709-D Pan American Freeway, NE</b><br><b>Albuquerque, NM 87107</b> |  |  |  | <b>ANALYSIS REQUEST</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |  |  |
| <b>CLIENT PROJECT MANAGER:</b><br><div style="text-align: center;">Kim McNeill</div>                                                                                                         |  |  |  | Metals - TAL<br>Metals - PP List<br>Metals - RCRA<br>RCRA Metals by TCLP (1311)<br>TOX<br>TOC<br>Gen Chemistry : Chloride<br>Oil and Grease<br>BOD<br>COD<br>Pesticides/PCB (608/8080)<br>Herbicides (615/8150)<br>Base/Neutral Acid Compounds GC/MS (625/8270)<br>Volatile Organics GC/MS (624/8240)<br>Polynuclear Aromatics (610/8310)<br>8240 (TCLP 1311) ZHE<br>8270 (TCLP 1311)<br>TO-14<br>Gross Alpha/Beta                                                                                                                   |  |  |  |
| <b>SAMPLE ID</b> <b>DATE</b> <b>TIME</b> <b>MATRIX</b> <b>LAB ID</b><br>808008-01      8/4      9:40 AM      AQ                                                                              |  |  |  | <b>NUMBER OF CONTAINERS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |
| <b>PROJECT INFORMATION</b><br><b>PROJECT NUMBER:</b> 808008<br><b>PROJECT NAME:</b> MOC<br><b>OC LEVEL:</b> STD IV<br><b>OC REQUIRED:</b> MS MSD BLANK<br><b>LAB:</b> STANDARD RUSHI         |  |  |  | <b>SAMPLE RECEIPT</b><br><b>TOTAL NUMBER OF CONTAINERS</b><br><b>CHAIN OF CUSTODY SEALS</b><br><b>INTACT?</b><br><b>RECEIVED GOOD COND/COLD</b><br><b>LAB NUMBER</b>                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |
| <b>SAMPLES SENT TO:</b><br>CONNECTICUT<br>ILLINOIS<br>MASSACHUSETTS<br>PENNSACOLA<br>PORTLAND<br>PHOENIX<br>N CAROLINA                                                                       |  |  |  | <b>RELINQUISHED BY:</b><br><div style="display: flex; justify-content: space-between;"> <div> <b>Signature:</b> <i>Kim McNeill</i><br/> <b>Printed Name:</b> Kim McNeill<br/> <b>Date:</b> 8/5/98                         </div> <div> <b>Time:</b> 1710<br/> <b>1.</b> </div> </div> <div style="display: flex; justify-content: space-between;"> <div> <b>Signature:</b> <i>Tracy</i><br/> <b>Printed Name:</b> Tracy<br/> <b>Date:</b> 8/5/98                         </div> <div> <b>Time:</b> 1010<br/> <b>2.</b> </div> </div> |  |  |  |
| <b>Abuquerque</b><br><b>RECEIVED BY:</b> 1.<br><b>Signature:</b> _____<br><b>Printed Name:</b> _____<br><b>Date:</b> _____<br><b>Company:</b> _____                                          |  |  |  | <b>Abuquerque</b><br><b>RECEIVED BY: (LAB)</b> 2.<br><b>Signature:</b> _____<br><b>Printed Name:</b> _____<br><b>Date:</b> _____<br><b>Company:</b> _____                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |
| <b>DUE DATE:</b> 8/17<br><b>RUSH SURCHARGE:</b> _____<br><b>CLIENT DISCOUNT:</b> _____<br><b>SPECIAL CERTIFICATION REQUIRED:</b> <input type="checkbox"/> YES <input type="checkbox"/> NO    |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |  |  |

SHADE AREAS ARE FORMERLY USED ONLY

NUMBER OF CONTAINERS:

|                            |                            |                                                                                                                                  |                     |                     |                    |                    |               |
|----------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------|--------------------|--------------------|---------------|
| <b>PROJECT INFORMATION</b> |                            | <b>FIELD ANALYTICAL INFORMATION REQUIRED FOR RUSH PROJECTS</b>                                                                   |                     | <b>DELIVERED BY</b> |                    | <b>RECEIVED BY</b> |               |
| PROJ NO                    | <i>7-1 India B'n Kenya</i> | (RUSH) <input type="checkbox"/> 24hr <input type="checkbox"/> 48hr <input type="checkbox"/> 72hr <input type="checkbox"/> 1 WEEK | (NORMAL) <i>K</i>   | Signature           | <i>B. A. Ayala</i> | Time               | <i>10:45</i>  |
| PROJ NAME                  |                            | CERTIFICATION REQUIRED <input type="checkbox"/> NM <input type="checkbox"/> SDWA <input type="checkbox"/> OTHER                  |                     | Print Name          | <i>B. A. Ayala</i> | Date               | <i>8-4-98</i> |
| P.O. NO.                   |                            | METHANOL PRESERVATION <input type="checkbox"/>                                                                                   |                     | Company             | <i>AQC</i>         |                    |               |
| SHIPPED VIA                |                            | COMMENTS                                                                                                                         | <i>FIXED FEE !!</i> | RECEIVED BY         | <i>[Signature]</i> | Date               | <i>8-4-98</i> |
| SAMPLE RECEIPT             |                            |                                                                                                                                  |                     | Signature           | <i>[Signature]</i> | Time               | <i>10:45</i>  |
| NO. CONTAINERS             |                            |                                                                                                                                  |                     | Printed Name        |                    | Date               |               |
| CONTAINER SEALS            | <i>(DUM)</i>               |                                                                                                                                  |                     |                     |                    |                    |               |
| RECEIVED IN LAB            |                            |                                                                                                                                  |                     |                     |                    |                    |               |
| DATE RECEIVED              | <i>8/5/98</i>              |                                                                                                                                  |                     |                     |                    |                    |               |
| LABORATORY USE ONLY        |                            |                                                                                                                                  |                     |                     |                    |                    |               |

# *American Environmental Network, Inc.*

AEN I.D. 807305

July 31, 1998

MARATHON OIL COMPANY  
P.O. BOX 552  
MIDLAND, TX 79702-0552

Project Name INDIAN BASIN REMED  
Project Number (none)

Attention: PAUL PEACOCK

On 7/2/98 American Environmental Network (NM), Inc. (ADHS License No. AZ0015), received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

EPA method 8021 was performed by American Environmental Network (NM) Inc., Albuquerque, NM.

All other parameters were performed by STL, Pensacola, FL.

If you have any questions or comments, please do not hesitate to contact us at (505)344-3777.



Kimberly D. McNeill  
Project Manager



H. Mitchell Rubenstein, Ph. D.  
General Manager

MR: mt

Enclosure

**MCR**

**AUG 6 1998**

**Environmental & Safety**

|              |                        |               |           |
|--------------|------------------------|---------------|-----------|
| CLIENT       | : MARATHON OIL COMPANY | AEN I.D.      | : 807305  |
| PROJECT #    | : (none)               | DATE RECEIVED | : 7/2/98  |
| PROJECT NAME | : INDIAN BASIN REMED   | REPORT DATE   | : 7/31/98 |

| AEN<br>ID. # | CLIENT DESCRIPTION | MATRIX  | DATE<br>COLLECTED |
|--------------|--------------------|---------|-------------------|
| 01           | LYMON              | AQUEOUS | 7/1/98            |
| 02           | W.STRIPPER INLET   | AQUEOUS | 7/1/98            |
| 03           | W. STRIPPER OUTLET | AQUEOUS | 7/1/98            |
| 04           | E. STRIPPER INLET  | AQUEOUS | 7/1/98            |
| 05           | E. STRIPPER OUTLET | AQUEOUS | 7/1/98            |

## GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8021)  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : INDIAN BASIN REMED

AEN I.D.: 807305

| SAMPLE        |                    |            | DATE    | DATE      | DATE       | DIL.       |
|---------------|--------------------|------------|---------|-----------|------------|------------|
| ID. #         | CLIENT I.D.        | MATRIX     | SAMPLED | EXTRACTED | ANALYZED   | FACTOR     |
| 01            | LYMON              | AQUEOUS    | 7/1/98  | NA        | 7/2/98     | 1          |
| 02            | W.STRIPPER INLET   | AQUEOUS    | 7/1/98  | NA        | 7/2/98     | 5          |
| 03            | W. STRIPPER OUTLET | AQUEOUS    | 7/1/98  | NA        | 7/2/98     | 1          |
| PARAMETER     |                    | DET. LIMIT | UNITS   | 01        | 02         | 03         |
| BENZENE       |                    | 0.5        | UG/L    | < 0.5     | <b>43</b>  | <b>0.6</b> |
| TOLUENE       |                    | 0.5        | UG/L    | < 0.5     | <b>18</b>  | <b>2.5</b> |
| ETHYLBENZENE  |                    | 0.5        | UG/L    | < 0.5     | <b>58</b>  | <b>2.2</b> |
| TOTAL XYLENES |                    | 0.5        | UG/L    | < 0.5     | <b>310</b> | <b>17</b>  |

## SURROGATE:

BROMOFLUOROBENZENE (%)

87

89

97

SURROGATE LIMITS ( 80 - 120 )

## CHEMIST NOTES:

N/A

## GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8021)  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : INDIAN BASIN REMED

AEN I.D.: 807305

| SAMPLE ID. #  | CLIENT I.D.        | MATRIX  | DATE SAMPLED | DATE EXTRACTED | DATE ANALYZED | DIL. FACTOR |
|---------------|--------------------|---------|--------------|----------------|---------------|-------------|
| 04            | E. STRIPPER INLET  | AQUEOUS | 7/1/98       | NA             | 7/2/98        | 5           |
| 05            | E. STRIPPER OUTLET | AQUEOUS | 7/1/98       | NA             | 7/2/98        | 1           |
| PARAMETER     | DET. LIMIT         |         | UNITS        | 04             | 05            |             |
| BENZENE       | 0.5                |         | UG/L         | 60             | 0.5           |             |
| TOLUENE       | 0.5                |         | UG/L         | 24             | 2.2           |             |
| ETHYLBENZENE  | 0.5                |         | UG/L         | 86             | 1.9           |             |
| TOTAL XYLENES | 0.5                |         | UG/L         | 430            | 15            |             |

## SURROGATE:

BROMOFLUOROBENZENE (%)

89

99

SURROGATE LIMITS ( 80 - 120 )

## CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS  
REAGENT BLANK

|              |                        |                |           |
|--------------|------------------------|----------------|-----------|
| TEST         | : BTEX (EPA 8021)      | AEN I.D.       | : 807305  |
| BLANK I. D.  | : 070298               | DATE EXTRACTED | : N/A     |
| CLIENT       | : MARATHON OIL COMPANY | DATE ANALYZED  | : 7/2/98  |
| PROJECT #    | : (none)               | SAMPLE MATRIX  | : AQUEOUS |
| PROJECT NAME | : INDIAN BASIN REMED   |                |           |

| PARAMETER     | UNITS |      |
|---------------|-------|------|
| BENZENE       | UG/L  | <0.5 |
| TOLUENE       | UG/L  | <0.5 |
| ETHYLBENZENE  | UG/L  | <0.5 |
| TOTAL XYLENES | UG/L  | <0.5 |

SURROGATE:

BROMOFLUOROBENZENE (%)

86

SURROGATE LIMITS: ( 80 - 120 )

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY QUALITY CONTROL  
MSMSD

|              |                        |                |           |
|--------------|------------------------|----------------|-----------|
| TEST         | : BTEX (EPA 8021)      | AEN I.D.       | : 807305  |
| MSMSD #      | : 807303-01            | DATE EXTRACTED | : N/A     |
| CLIENT       | : MARATHON OIL COMPANY | DATE ANALYZED  | : 7/2/98  |
| PROJECT #    | : (none)               | SAMPLE MATRIX  | : AQUEOUS |
| PROJECT NAME | : INDIAN BASIN REMED   | UNITS          | : UG/L    |

| PARAMETER     | SAMPLE<br>RESULT | CONC<br>SPIKE | SPIKED<br>SAMPLE | %<br>REC | DUP<br>SPIKE | DUP<br>% REC | RPD | REC<br>LIMITS | RPD<br>LIMITS |
|---------------|------------------|---------------|------------------|----------|--------------|--------------|-----|---------------|---------------|
| BENZENE       | <0.5             | 10.0          | 10.2             | 102      | 9.5          | 95           | 7   | ( 80 - 120 )  | 20            |
| TOLUENE       | <0.5             | 10.0          | 9.6              | 96       | 9.2          | 92           | 4   | ( 80 - 120 )  | 20            |
| ETHYLBENZENE  | <0.5             | 10.0          | 10.2             | 102      | 9.8          | 98           | 4   | ( 80 - 120 )  | 20            |
| TOTAL XYLENES | <0.5             | 30.0          | 31.6             | 105      | 30.0         | 100          | 5   | ( 80 - 120 )  | 20            |

CHEMIST NOTES:  
N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



SIGNATURE PAGE

Severn Trent Laboratories  
11 East Olive Road  
Pensacola FL 32514  
Tel: (850) 474-1001  
Fax: (850) 474-4789

Reviewed by:

*M. Patrick*

STL Project Manager

Client:

AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.  
ALBUQUERQUE, NEW MEXICO

Project Name: MARATHON OIL  
Project Number: 807305  
Project Location: INDIAN BASIN REMED.  
Accession Number: 807095

Project Manager: KIMBERLY D. MCNEILL  
Sampled By: N/S

Other Laboratory Locations:

- 149 Rangeway Road, North Billerica MA 01862
- 16203 Park Row, Suite 110, Houston TX 77084
- 200 Monroe Turnpike, Monroe CT 06468

- 120 Southcenter Court, Suite 300, Morrisville NC 27560
- 315 Fullerton Avenue, Newburgh NY 12550
- Westfield Executive Park, 53 Schuttamunton Road, Westfield MA 01085
- 628 Route 10, Wicquahy NJ 07391

a part of

Severn Trent Services Ltd.

Analysis Report

Analysis: Group of Single Wetchem

|                   |                                                  |
|-------------------|--------------------------------------------------|
| Accession:        | 807095                                           |
| Client:           | AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC. |
| Project Number:   | 807305                                           |
| Project Name:     | MARATHON OIL                                     |
| Project Location: | INDIAN BASIN REMED.                              |
| Department:       | WET CHEM                                         |

[0] Page 1  
Date 29-Jul-98

## "FINAL REPORT FORMAT - SINGLE"

Accession: 807095  
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.  
Project Number: 807305  
Project Name: MARATHON OIL  
Project Location: INDIAN BASIN REMED.  
Test: Group of Single Wetchem  
Matrix: WATER  
QC Level: II

Lab ID: 001  
Client Sample Id: 807305-01

Sample Date/Time: 01-JUL-98 0955  
Received Date: 03-JUL-98

| Parameters:          | Units: | Results: | Rpt Lmts: | Q: | Batch: | Analyst: |
|----------------------|--------|----------|-----------|----|--------|----------|
| CHLORIDE (4500-CL B) | MG/L   | 14       | 1         |    | CIW076 | RB       |

Comments:

(0) Page 2  
Date 29-Jul-98

## "Method Report Summary"

Accession Number: 807095  
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.  
Project Number: 807305  
Project Name: MARATHON OIL  
Project Location: INDIAN BASIN REMED.  
Test: Group of Single Wetchem

---

| Client Sample Id: | Parameter:           | Unit: | Result: |
|-------------------|----------------------|-------|---------|
| 807305-01         | CHLORIDE (4500-CL B) | MG/L  | 14      |

## Data Qualifiers for Final Report

STL-Pensacola Inorganic/Organic and AFCEE Projects (under QAPP)

|                       |                                                                                                             |
|-----------------------|-------------------------------------------------------------------------------------------------------------|
| J4                    | (For positive results) Temperature limits exceeded ( $\leq 2^{\circ}\text{C}$ or $\geq 6^{\circ}\text{C}$ ) |
| J6                    | (For positive results) Surrogate %R is > upper control limit (UCL) or < lower control limit (LCL)           |
| J (AFCEE description) | The analyte was positively identified, the quantitation is an estimation                                    |
| R1                    | (For nondetects) Temperature limits exceeded ( $\leq 2^{\circ}\text{C}$ or $\geq 6^{\circ}\text{C}$ )       |
| R2                    | Improper preservation, no preservative present in sample upon receipt                                       |
| R3                    | Improper preservation, incorrect preservative present in sample upon receipt                                |
| R4                    | Holding time exceeded                                                                                       |
| R5                    | Collection requirements not met, improper container used for sample                                         |
| R6                    | Surrogate %R is < LCL and analyte is not detected or surrogate %R is < 10% for detects and nondetects       |
| R (AFCEE description) | The data are unusable due to deficiencies in the ability to analyze the sample and meet QC criteria         |
| F                     | < laboratory or AFCEE RL and > laboratory MDL                                                               |
| F (AFCEE description) | The analyte was positively identified but the associated numerical value is below the AFCEE or lab RL       |
| U2                    | $\leq$ Laboratory MDL (value for result will be the MDL, never below the MDL)                               |
| U (AFCEE description) | The analyte was analyzed for but not detected. The associated numerical value is at or below the MDL        |
| B (AFCEE description) | The analyte was found in the associated blank, as well as in the sample                                     |
| @                     | Adjusted reporting limit due to sample matrix (dilution prior to digestion and/or analysis)                 |
| +                     | Elevated reporting limit due to dilution into calibration range                                             |
| .                     | Elevated reporting limit due to matrix interference (dilution prior to digestion and/or analysis)           |
| #                     | Elevated reporting limit due to insufficient sample size                                                    |
| D                     | Diluted out                                                                                                 |
| J5                    | The reported value is quantitated as a TIC; therefore, it is estimated                                      |
| A2                    | Surrogate %R is > UCL (upper control limit) and analyte is not detected. No corrective action required      |
| M                     | A matrix effect was present (sample was analyzed twice to confirm or chromatogram had interfering peaks)    |
| S                     | Incorrect sample amount was submitted to the laboratory for analysis                                        |

ND = Not Detected

N/S = Not Submitted

N/A = Not Applicable

IDL = Laboratory Instrument Detection Limit

MDL = Laboratory Method Detection Limit

RL = Reporting Limit (AFCEE RLs are listed in the AFCEE QAPP)

STL-Pensacola uses the most current promulgated methods contained in the reference manuals

**Any time** a sample arrives at the laboratory improperly preserved (at improper pH or temperature) or after holding time has expired or prepared or analyzed after holding time, client must be notified in writing (i.e. case narrative)

Florida Projects Inorganic/Organic

|                    |                                                                                                                 |
|--------------------|-----------------------------------------------------------------------------------------------------------------|
| Y1                 | Improper preservation, no preservative present in sample upon receipt                                           |
| Y2                 | Improper preservation, incorrect preservative present in sample upon receipt                                    |
| Y3                 | Improper preservation, sample temperature exceeded EPA temperature limits of $2-6^{\circ}\text{C}$ upon receipt |
| Y (FL description) | The laboratory analysis was from an unpreserved or improperly preserved sample. The data may not be accurate    |
| Q                  | Sample held beyond the accepted holding time                                                                    |
| I                  | The reported value is < Laboratory RL and > laboratory MDL                                                      |
| U1                 | The reported value is $\leq$ Laboratory MDL (value for sample result is reported as the MDL)                    |
| U (FL description) | Indicates the compound was analyzed for but not detected                                                        |
| T                  | The reported value is < Laboratory MDL (value shall not be used for statistical analysis)                       |
| V                  | The analyte was detected in both the sample and the associated method blank                                     |
| J1                 | Surrogate recovery limits have been exceeded                                                                    |
| J2                 | The sample matrix interfered with the ability to make any accurate determinations                               |
| J3                 | The reported value failed to meet the established quality control criteria for either precision or accuracy     |
| J (FL description) | Estimated value; not accurate                                                                                   |

ICR Projects Inorganic/Organic

|    |            |
|----|------------|
| A1 | Acceptable |
| R6 | Rejected   |

Examples: ICR Flags

R6 = Laboratory extracted the sample but the refrigerator malfunctioned so the extract became warm and client was notified

R6 = Sample arrived in laboratory in good condition; however, the laboratory did not analyze it within EPA's established holding time limit

CLP and CLP-like Projects: Refer to referenced CLP Statement of Work (SOW) for explanation of data qualifiers

Quality Control Report

Analysis: Group of Single Wetchem

|                   |                                                  |
|-------------------|--------------------------------------------------|
| Accession:        | 807095                                           |
| Client:           | AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC. |
| Project Number:   | 807305                                           |
| Project Name:     | MARATHON OIL                                     |
| Project Location: | INDIAN BASIN REMED.                              |
| Department:       | WET CHEM                                         |

(0) Page 1  
Date 29-Jul-98

## "WetChem Quality Control Report"

|                |           |
|----------------|-----------|
| Parameter:     | CHLORIDE  |
| Batch Id:      | CIW076    |
| Blank Result:  | <1        |
| Anal. Method:  | 4500-CL B |
| Prep. Method:  | NA        |
| Analysis Date: | 06-JUL-98 |
| Prep. Date:    | 06-JUL-98 |

## Sample Duplication

|             |          |
|-------------|----------|
| Sample Dup: | 807097-4 |
| Rept Limit: | <1       |

|                |      |
|----------------|------|
| Sample Result: | 34.8 |
| Dup Result:    | 34.9 |
| Sample RPD:    | 0    |
| Max RPD:       | 5    |
| Dry Weight%    | N/A  |

## Matrix Spike

|                |          |
|----------------|----------|
| Sample Spiked: | 807097-4 |
| Rept Limit:    | <1       |

|                |        |
|----------------|--------|
| Sample Result: | 34.8   |
| Spiked Result: | 89.5   |
| Spike Added:   | 55.0   |
| % Recovery:    | 99     |
| % Rec Limits:  | 90-111 |
| Dry Weight%    | N/A    |

## ICV

|               |        |
|---------------|--------|
| ICV Result:   | 98.7   |
| True Result:  | 100.0  |
| % Recovery:   | 99     |
| % Rec Limits: | 90-110 |

## LCS

|               |  |
|---------------|--|
| LCS Result:   |  |
| True Result:  |  |
| % Recovery:   |  |
| % Rec Limits: |  |

## ----- Common Footnotes WetChem -----

N/A = NOT APPLICABLE.

N/S = NOT SUBMITTED.

N/C = SAMPLE AND DUPLICATE RESULTS ARE AT OR BELOW AEN REPORTING LIMIT;  
THEREFORE, THE RPD IS "NOT CALCULABLE" AND NO CONTROL LIMITS APPLY.

N/D = NOT DETECTED.

R = REACTIVE

T = TOTAL

G = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X AEN REPORTING LIMIT AND  
THE ABSOLUTE DIFFERENCE BETWEEN THE SAMPLE AND DUPLICATE RESULT IS AT  
OR BELOW AEN REPORTING LIMIT; THEREFORE, THE RESULTS ARE "IN CONTROL".Q = THE ANALYTICAL (POST-DISTILLATION) SPIKE IS REPORTED DUE TO PERCENT RECOVERY  
BEING OUTSIDE ACCEPTANCE LIMITS ON THE MATRIX (PRE-DISTILLATION) SPIKE.

# = ELEVATED REPORTING LIMIT DUE TO INSUFFICIENT SAMPLE.

+ = ELEVATED REPORTING LIMIT DUE TO DILUTION INTO CALIBRATION RANGE.

\* = ELEVATED REPORTING LIMIT DUE TO MATRIX INTERFERENCE (DILUTION PRIOR DIGESTION  
AND/OR ANALYSIS).@ = ADJUSTED REPORTING LIMIT DUE TO SAMPLE MATRIX (DILUTION PRIOR TO DIGESTION  
AND/OR ANALYSIS).

P = ANALYTICAL (POST DIGESTION) SPIKE.

I = DUPLICATE INJECTION.

&amp; = AUTOMATED

F = SAMPLE SPIKED &gt; 4 X SPIKE CONCENTRATION.

N/C+ = NOT CALCULABLE

H = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X AEN REPORTING LIMIT AND THE  
ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE AEN REPORTING  
LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".

A = SAMPLE AND DUPLICATE RESULTS ARE "OUT OF CONTROL".

Z = THE SAMPLE RESULT FOR THE SPIKE IS BELOW THE REPORTING LIMIT. HOWEVER,  
THIS RESULT IS REPORTED FOR ACCURATE QC CALCULATIONS.NH= SAMPLE AND / OR DUPLICATE RESULT IS BELOW 5 X AEN REPORTING LIMIT  
AND THE ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE AEN  
REPORTING LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".  
SAMPLE IS NON-HOMOGENEOUS.

(\*) = REPORTING LIMITS RAISED DUE TO CLP METHOD NOT REQUIRING A CONCENTRATION STEP FOR CN.

(CA) = SEE CORRECTIVE ACTIONS FORM.

\*\*= MATRIX INTERFERENCE

SW-846, 3rd Edition, latest EPA-approved edition.

EPA 600/4-79-020, Revised March 1983.

STANDARD METHODS, For the Examination of Water and Wastewater, latest EPA-approved edition.

NIOSH Manual of Analytical Methods, 4th Edition.

ANNUAL BOOK OF ASTM STANDARDS, VOLUMES 11.01 and 11.02, latest EPA-approved edition.

METHODS FOR THE DETERMINATION OF INORGANIC SUBSTANCES IN ENVIRONMENTAL SAMPLES,

EPA600/R-93/100, AUGUST 1993

METHODS FOR SOIL ANALYSIS, PART 2, CHEMICAL AND MICROBIOLOGICAL PROPERTIES, 2ND EDITION.

AEN-PN USES THE MOST CURRENT PROMULGATED METHODS FROM THE REFERENCES LISTED ABOVE.

1. COLIFORM. COLIFORM PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN  
THE LOGARITHM OF COLONIES PER 100 MLS OF SAMPLE ON DUPLICATE PLATES.
2. PH. PH PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN THE  
SAMPLE AND DUPLICATE ANALYSIS.
3. FLASHPOINT. FLASHPOINT PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN  
THE SAMPLE AND DUPLICATE ANALYSIS.

RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION).

RPT LMTS = REPORTING LIMITS BASED ON METHOD DETECTION LIMIT STUDIES.

DPH = DOLLY P. HWANG

RB = REBECCA BROWN

WH = WENDY HAGGARD

ED = ESTHER DANTIN

CR = CYNTHIA ROBERTS

AB = AMY BRADLEY

BE = BETTY EVERTON

PLD = PAULA L. DOUGHTY

JTZ = JONATHAN T. ZIENTARSKI

RH = RICKY HAGENDORFER

**AEN PENSACOLA  
INORGANIC QUALITY CONTROL REPORT**

PROOFED: DPH 7/8/98

PARAMETER: CHLORIDE BATCH ID: CIW076 METHOD REFERENCE: SM4500CLB, SW9253

PREP DATE: 7-6-98 REPORT LIMIT: WATER: 1 SOIL: N/A BLANK: NO

ANALYSIS DATE: 7-6-98 TIME ON: 11:00 TIME OFF: 12:10 ANALYST: ED

| QC TYPE | FOUND | TRUE | % REC | FOUND | % REC | LIMITS  |
|---------|-------|------|-------|-------|-------|---------|
| ICV     | 98.7  | 100  | 99%   |       |       | 90-110% |

| BATCH REPORT       |    | STD COMPOUND | SOURCE       | LOT #     |
|--------------------|----|--------------|--------------|-----------|
| # Samples in batch | 13 | CCV NaCl     | Mallinckrodt | 7581 KJPY |
| # QC in batch      | 9  | ICV KCl      | Mallinckrodt | 6858 KJPP |
| # Samples prepped  |    |              |              |           |

| LAB ID   | QA/QC CODE |
|----------|------------|
| 807097-1 | 11MS       |
| 2        |            |
| 3        |            |
| 4        |            |
| 5        |            |
| 6        |            |
| 807095-1 |            |
| 807098-2 |            |
| 5        |            |
| 7        |            |
| 807118-1 |            |
| 2        |            |
| 3        |            |
|          |            |
|          |            |
|          |            |
|          |            |
|          |            |
|          |            |

**SAMPLE DUPLICATE**

SAMPLE ID: 807097-4

SAMPLE VALUE: 34.8

SAMPLE DUP: 34.9

DUPLICATE RPD: 0

RPD LIMIT: 5

REPORTING LIMIT: 1

**SAMPLE SPIKE MS/MSD**

SAMPLE ID: 807097-4

SAMPLE RESULT: 34.8

SPIKE RESULT: 89.5

SPIKE ADDED: 55.0

% RECOVERY: 99.100%

CONTROL LIMIT: DPH 7/3/98 90-111

REPORTING LIMITS: 1

**QA/QC CODE LEGEND:**

- A - Matrix interference color / turbidity sample size adjustment.
- B - Matrix interference encountered, cause unknown.
- C - Reanalysis (Sample has been previously analyzed).
- D - Add on analysis (Holding time may have been exceeded).
- E - Sample is nonhomogenous.
- F - Sample is 2 phase and / or hazardous (Complete hazardous form).
- G - Sample arrived unpreserved or incorrectly preserved.
- H - Analysis done on water phase only.
- I - Analysis done on non-water phase only.

cs\forms\CHLORIDE.QSH

# American Environmental Network of Florida

## PROJECT SAMPLE INSPECTION FORM

Lab Accession #: 807095

Date Received: 03-JUL-98

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. Was there a Chain of Custody? <input checked="" type="radio"/> Yes No*</p> <p>2. Was Chain of Custody properly filled out and relinquished? <input checked="" type="radio"/> Yes No*</p> <p>3. Were samples received cold? <input checked="" type="radio"/> Yes No* N/A<br/>(Criteria: 2° - 6°C: AEN-SOP 1055)</p> <p>4. Were all samples properly labeled and identified? <input checked="" type="radio"/> Yes No*</p> <p>5. Did samples require splitting? Yes* <input checked="" type="radio"/> No<br/>Req By: PM Client Other*</p> <p>6. Were samples received in proper containers for analysis requested? <input checked="" type="radio"/> Yes No*</p> <p>7. Were all sample containers received intact? <input checked="" type="radio"/> Yes No*</p> | <p>8. Were samples checked for preservative? <input checked="" type="radio"/> Yes No* N/A<br/>(Check pH of all H<sub>2</sub>O requiring preservative (AEN-PH SOP 917) except VOA vials that require zero headspace)*</p> <p>9. Is there sufficient volume for analysis requested? <input checked="" type="radio"/> Yes No*</p> <p>10. Were samples received within Holding Time? <input checked="" type="radio"/> Yes No*<br/>(REFER TO AEN-SOP 1040)</p> <p>11. Is Headspace visible &gt; ¼" in diameter in VOA vials? * If any headspace is evident, comment in out-of-control Yes* No N/A</p> <p>12. If sent, were matrix spike bottles returned? Yes No* <input checked="" type="radio"/> N/A</p> <p>13. Was Project Manager notified of problems? (initials: _____) Yes No* <input checked="" type="radio"/> N/A</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Airbill Number(s): \_\_\_\_\_

Shipped By: Fedex

Cooler Number(s): 2195

Shipping Charges: N/A

Cooler Weight(s): N/A

Cooler Temp(s) (°C): 4.0°C

CCK7  
(LIST THERMOMETER NUMBER(S) FOR VERIFICATION)

### Out of Control Events and Inspection Comments:

Temp blank not submitted - Samples packed on blue ice,  
temp taken of Ambient air. 7/3/98

(USE BACK OF PSIF FOR ADDITIONAL NOTES AND COMMENTS)

Inspected By: H. Kitt Date: 03-JUL-98 Logged By: H. Kitt Date: 03-JUL-98

- \* Note all Out-of-Control and/or questionable events on Comment Section of this form.
- \* Note who requested the splitting of samples on the Comment Section of this form.
- + All preservatives for the State of North Carolina, the State of New York, and other requested samples are to be recorded on the sheet provided to record pH results (AEN-SOP 938, section 2.2.9).
- \* According to EPA, ¼" of headspace is allowed in 40 ml vials requiring volatile analysis, however, AEN makes it policy to record any headspace as out-of-control (AEN-SOP 938, section 2.2.12).

| NETWORK PROJECT MANAGER: KIMBERLY D. McNEILL                                                                                                                                  |  |  |  | ANALYSIS REQUEST                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| <div>COMPANY: AMERICAN ENVIRONMENTAL NETWORK<br/>ADDRESS: 2709-D Pan American Freeway, NE<br/>Albuquerque, NM 87107</div>                                                     |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |  |  |  |  |  |  |  |  |  |
| <div>CLIENT PROJECT MANAGER:<br/>Kim McNeill</div>                                                                                                                            |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |  |  |  |  |  |  |  |  |  |
| <div>SAMPLE ID: 807305-01<br/>DATE: 7/1<br/>TIME: 955<br/>MATRIX: AQ<br/>LAB ID:</div>                                                                                        |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |  |  |  |  |  |  |  |  |  |
| <div>PROJECT INFORMATION</div> <div>PROJECT NUMBER: 807305<br/>PROJECT NAME: Marathon Oil Co.<br/>OC LEVEL: STD IV<br/>OC REQUIRED: MS MSD BLANK<br/>TA: STANDARD RUSHI</div> |  |  |  | <div>SAMPLE RECEIPT</div> <div>TOTAL NUMBER OF CONTAINERS:<br/>CHAIN OF CUSTODY SEALS:<br/>INTACT?<br/>RECEIVED GOOD COND/COLD:<br/>LAB NUMBER:</div>                                                                                                                                                                                                                                                                                                                   |  |  |  |  |  |  |  |  |  |  |  |
|                                                                                                                                                                               |  |  |  | <div>SAMPLES SENT TO:</div> <div>CONNECTICUT<br/>ILLINOIS<br/>MASSACHUSETTS<br/>PENNSYLVANIA<br/>PORTLAND<br/>PHOENIX<br/>N. CAROLINA</div>                                                                                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |
|                                                                                                                                                                               |  |  |  | <div>RELINQUISHED BY: 1.</div> <div>Signature: [Signature]<br/>Printed Name: [Name]<br/>Date: 7/2/98<br/>Time: 1700<br/>Abuquerque<br/>RECEIVED BY: 1.</div>                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |  |  |  |  |  |
|                                                                                                                                                                               |  |  |  | <div>RELINQUISHED BY: 2.</div> <div>Signature: [Signature]<br/>Printed Name: [Name]<br/>Date: 7/3/98<br/>Time: 0830<br/>Abuquerque<br/>RECEIVED BY: (LAB) 2.</div>                                                                                                                                                                                                                                                                                                      |  |  |  |  |  |  |  |  |  |  |  |
| <div>DUE DATE: 7/16<br/>RUSH SURCHARGE:<br/>CLIENT DISCOUNT:<br/>SPECIAL CERTIFICATION REQUIRED: <input type="checkbox"/> YES <input type="checkbox"/> NO</div>               |  |  |  | <div>Metals - TAL<br/>Metals - PP List<br/>Metals - RCRA<br/>RCRA Metals by TCLP (1311)<br/>TOX<br/>TOC<br/>Gen Chemistry: Chloride<br/>Oil and Grease<br/>BOD<br/>COD<br/>Pesticides/PCB (608/8080)<br/>Herbicides (615/8150)<br/>Base/Neutral Acid Compounds GC/MS (625/8270)<br/>Volatile Organics GC/MS (624/8240)<br/>Polynuclear Aromatics (610/8310)<br/>8240 (TCLP 1311) ZHE<br/>8270 (TCLP 1311)<br/>TO-14<br/>Gross Alpha/Beta<br/>NUMBER OF CONTAINERS</div> |  |  |  |  |  |  |  |  |  |  |  |

SHADED AREAS ARE FOR LAB USE ONLY

PLEASE FILL THIS FORM IN COMPLETELY.

|                                |  |                                                                                                                                |  |                                                 |  |                 |  |               |  |                                                                                                     |  |                             |  |                |  |
|--------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------|--|-----------------|--|---------------|--|-----------------------------------------------------------------------------------------------------|--|-----------------------------|--|----------------|--|
| PROJECT MANAGER: Gary Richards |  | COMPANY: Atlantic Corp                                                                                                         |  | ADDRESS: 8429 Westchester - 1 <sup>st</sup> Fl. |  | PHONE: 828-2804 |  | FAX: 828-2805 |  | BILL TO: Same                                                                                       |  | COMPANY: _____              |  | ADDRESS: _____ |  |
| PROJECT INFORMATION            |  | PHASE                                                                                                                          |  | DATE                                            |  | TIME            |  | LAB           |  | ANALYSIS REQUEST                                                                                    |  | RECEIVED BY                 |  | DATE           |  |
| PROJ NO: _____                 |  | RUSH <input type="checkbox"/> 24hr <input type="checkbox"/> 48hr <input type="checkbox"/> 72hr <input type="checkbox"/> 1 WEEK |  | (NORMAL) <input type="checkbox"/>               |  |                 |  |               |  | Petroleum Hydrocarbons (418.1) TRPH                                                                 |  | RECEIVED BY: _____          |  | DATE: _____    |  |
| PROJ NAME: Sandra Webb         |  | CERTIFICATION REQUIRED: <input type="checkbox"/> NM <input type="checkbox"/> SDWA <input type="checkbox"/> OTHER               |  | METHANOL PRESERVATION <input type="checkbox"/>  |  |                 |  |               |  | (MOD.8015) Diesel/Direct Inject                                                                     |  | Signature: _____            |  | Time: 12:30    |  |
| SHIPPED VIA: _____             |  | COMMENTS: FIXED FEE <input type="checkbox"/>                                                                                   |  |                                                 |  |                 |  |               |  | 8021 (BTEX)/8015 (Gasoline)                                                                         |  | Printed Name: Gary Richards |  | Date: 7-2-95   |  |
| NO CONTAINERS: _____           |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | 8021 (BTEX) <input type="checkbox"/> MTBE <input type="checkbox"/> TMB <input type="checkbox"/> PCE |  | Company: Atlantic Corp      |  |                |  |
| RECEIVED INACTIVELY: _____     |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | 8021 (TCL)                                                                                          |  | Signature: _____            |  | Time: _____    |  |
| BULK/DISC: _____               |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | 8021 (EDX)                                                                                          |  | Printed Name: _____         |  | Date: _____    |  |
|                                |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | 8021 (HALO)                                                                                         |  | Company: _____              |  |                |  |
|                                |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | 8021 (CUST)                                                                                         |  |                             |  |                |  |
|                                |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | 504.1 EDB <input type="checkbox"/> / DBCP <input type="checkbox"/>                                  |  |                             |  |                |  |
|                                |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | 8260 (TCL) Volatile Organics                                                                        |  |                             |  |                |  |
|                                |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | 8260 (Full) Volatile Organics                                                                       |  |                             |  |                |  |
|                                |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | 8260 (CUST) Volatile Organics                                                                       |  |                             |  |                |  |
|                                |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | 8260 (Landfill) Volatile Organics                                                                   |  |                             |  |                |  |
|                                |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | Pesticides /PCB (608/8081)                                                                          |  |                             |  |                |  |
|                                |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | Herbicides (615/8151)                                                                               |  |                             |  |                |  |
|                                |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | Base/Neutral/Acid Compounds GC/MS (625/8270)                                                        |  |                             |  |                |  |
|                                |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | Polynuclear Aromatics (610/8310)                                                                    |  |                             |  |                |  |
|                                |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | General Chemistry:                                                                                  |  |                             |  |                |  |
|                                |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | Fe, Al, (total)                                                                                     |  |                             |  |                |  |
|                                |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | Priority Pollutant Metals (13)                                                                      |  |                             |  |                |  |
|                                |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | Target Analyte List Metals (23)                                                                     |  |                             |  |                |  |
|                                |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | RCRA Metals (8)                                                                                     |  |                             |  |                |  |
|                                |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | RCRA Metals by TCLP (Method 1311)                                                                   |  |                             |  |                |  |
|                                |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | Metals:                                                                                             |  |                             |  |                |  |
|                                |  |                                                                                                                                |  |                                                 |  |                 |  |               |  | NUMBER OF CONTAINERS: _____                                                                         |  |                             |  |                |  |

PLEASE FILL THIS FORM IN COMPLETELY.

SHADED AREAS ARE FOR LAB USE ONLY.

|                                      |  |                                 |  |                              |  |                                |  |                          |  |                                                                    |  |                                       |  |
|--------------------------------------|--|---------------------------------|--|------------------------------|--|--------------------------------|--|--------------------------|--|--------------------------------------------------------------------|--|---------------------------------------|--|
| PROJECT MANAGER: <u>Paul Peacock</u> |  | COMPANY: <u>Martinez Oil Co</u> |  | ADDRESS: <u>P.O. Box 552</u> |  | PHONE: <u>Midland TX 79702</u> |  | FAX: <u>915 687-8312</u> |  | BILL TO: <u>Same as Above</u>                                      |  | COMPANY ADDRESS: <u>Same as Above</u> |  |
| SAMPLE ID                            |  | DATE                            |  | TIME                         |  | MATRIX                         |  | LAB ID                   |  | Petroleum Hydrocarbons (418.1) TRPH                                |  | (MOD.8015) Diesel/Direct Inject       |  |
| Lyman                                |  | 7-1-98                          |  | 9:48                         |  | water                          |  | 1015                     |  | 8021 (BTEX) <input checked="" type="checkbox"/> 8021 (TCL)         |  | 8021 (EDX)                            |  |
| Lyman                                |  | "                               |  | 9:55                         |  | "                              |  | 1015                     |  | 8021 (HALO)                                                        |  | 8021 (CUST)                           |  |
| W. STRIPPER INLET                    |  | "                               |  | 10:10                        |  | "                              |  | 023                      |  | 504.1 EDB <input type="checkbox"/> / DBCP <input type="checkbox"/> |  | chloride                              |  |
| W. STRIPPER OUTLET                   |  | "                               |  | 10:15                        |  | "                              |  | 031                      |  | 8260 (TCL) Volatile Organics                                       |  | 8260 (Full) Volatile Organics         |  |
| E. STRIPPER INLET                    |  | "                               |  | 10:20                        |  | "                              |  | 041                      |  | 8260 (CUST) Volatile Organics                                      |  | 8260 (Landfill) Volatile Organics     |  |
| E. STRIPPER OUTLET                   |  | "                               |  | 10:25                        |  | "                              |  | 051                      |  | Pesticides /PCB (608/8081)                                         |  | Herbicides (615/8151)                 |  |
|                                      |  |                                 |  |                              |  |                                |  |                          |  | Base/Neutral/Acid Compounds GC/MS (625/8270)                       |  | Polynuclear Aromatics (610/8310)      |  |
|                                      |  |                                 |  |                              |  |                                |  |                          |  | General Chemistry:                                                 |  |                                       |  |
|                                      |  |                                 |  |                              |  |                                |  |                          |  | Priority Pollutant Metals (13)                                     |  | Target Analyte List Metals (23)       |  |
|                                      |  |                                 |  |                              |  |                                |  |                          |  | RCRA Metals (8)                                                    |  | RCRA Metals by TCLP (Method 1311)     |  |
|                                      |  |                                 |  |                              |  |                                |  |                          |  | Metals:                                                            |  |                                       |  |
|                                      |  |                                 |  |                              |  |                                |  |                          |  | NUMBER OF CONTAINERS                                               |  | 2                                     |  |

|                                      |                                                                                                                                                                               |                                                   |  |                     |                 |                     |               |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|--|---------------------|-----------------|---------------------|---------------|
| PROJECT INFORMATION                  |                                                                                                                                                                               | PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS |  | RELINQUISHED BY:    |                 | RECEIVED BY:        |               |
| PROJ NO.                             | (RUSH) <input type="checkbox"/> 12hr <input type="checkbox"/> 48hr <input type="checkbox"/> 72hr <input type="checkbox"/> 1 WEEK (NORMAL) <input checked="" type="checkbox"/> |                                                   |  | Signature           | Time            | Signature           | Time          |
| PROJ NAME: <u>Indith Basin Remed</u> | CERTIFICATION REQUIRED <input type="checkbox"/> NM <input type="checkbox"/> SDWA <input type="checkbox"/> OTHER                                                               |                                                   |  | <u>B. G. Hayden</u> | <u>10:30 AM</u> | <u>Paul Peacock</u> | <u>7-1-98</u> |
| P.O. NO.                             | METHANOL PRESERVATION <input type="checkbox"/>                                                                                                                                |                                                   |  | Printed Name        | Date            | Printed Name        | Date          |
| SHIPPED VIA                          | COMMENTS: <u>FIXED FEE !!</u>                                                                                                                                                 |                                                   |  | <u>B. G. Hayden</u> | <u>7-1-98</u>   | <u>Paul Peacock</u> | <u>7-1-98</u> |
| SAMPLE RECEIPT                       |                                                                                                                                                                               |                                                   |  | RECEIVED BY: (LAB)  |                 | RECEIVED BY: (LAB)  |               |
| NO. CONTAINERS                       | <u>11</u>                                                                                                                                                                     |                                                   |  | Signature           | Time            | Signature           | Time          |
| CUSTODY SEALS                        | <u>011/NA</u>                                                                                                                                                                 |                                                   |  | <u>Paul Peacock</u> | <u>10:45</u>    | <u>Paul Peacock</u> | <u>10:45</u>  |
| RECEIVED INTACT                      | <u>YES</u>                                                                                                                                                                    |                                                   |  | Printed Name        | Date            | Printed Name        | Date          |
| BLUE ICE/CE                          | <u>22</u>                                                                                                                                                                     |                                                   |  | <u>Paul Peacock</u> | <u>7/2/98</u>   | <u>Paul Peacock</u> | <u>7/2/98</u> |

# *American Environmental Network, Inc.*

AEN I.D. 806305

July 16, 1998

MARATHON OIL COMPANY  
P.O. BOX 552  
MIDLAND, TX 79702-0552

Project Name IB REMEDIATION  
Project Number (none)

Attention: PAUL PEACOCK

On 6/3/98 American Environmental Network (NM), Inc. (ADHS License No. AZ0015), received a request to analyze **aqueous and air** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

EPA method 8021 was performed by American Environmental Network (NM) Inc., Albuquerque, NM.

All other parameters were performed by American Environmental Network (FL) Inc., Pensacola, FL.

If you have any questions or comments, please do not hesitate to contact us at (505)344-3777.



Kimberly D. McNeill  
Project Manager



H. Mitchell Rubenstein, Ph. D.  
General Manager

MR: mt

Enclosure

|              |                        |               |           |
|--------------|------------------------|---------------|-----------|
| CLIENT       | : MARATHON OIL COMPANY | AEN I.D.      | : 806305  |
| PROJECT #    | : (none)               | DATE RECEIVED | : 6/3/98  |
| PROJECT NAME | : IB REMEDIATION       | REPORT DATE   | : 7/16/98 |

| AEN<br>ID. # | CLIENT DESCRIPTION | MATRIX  | DATE<br>COLLECTED |
|--------------|--------------------|---------|-------------------|
| 01           | STRIPPER INLET W   | AQUEOUS | 6/2/98            |
| 02           | STRIPPER OUTLET W  | AQUEOUS | 6/2/98            |
| 03           | STRIPPER INLET E   | AQUEOUS | 6/2/98            |
| 04           | STRIPPER OUTLET E  | AQUEOUS | 6/2/98            |
| 05           | BS-4 (VE)          | AIR     | 6/2/98            |
| 06           | 19-SHALLOW (VE)    | AIR     | 6/2/98            |

# GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8021)  
 CLIENT : MARATHON OIL COMPANY  
 PROJECT # : (none)  
 PROJECT NAME : IB REMEDIATION

AEN I.D.: 806305

| SAMPLE        |                   | MATRIX     | DATE    | DATE      | DATE     | DIL.   |
|---------------|-------------------|------------|---------|-----------|----------|--------|
| ID. #         | CLIENT I.D.       |            | SAMPLED | EXTRACTED | ANALYZED | FACTOR |
| 01            | STRIPPER INLET W  | AQUEOUS    | 6/2/98  | NA        | 6/4/98   | 20     |
| 02            | STRIPPER OUTLET W | AQUEOUS    | 6/2/98  | NA        | 6/4/98   | 1      |
| 03            | STRIPPER INLET E  | AQUEOUS    | 6/2/98  | NA        | 6/4/98   | 20     |
| PARAMETER     |                   | DET. LIMIT | UNITS   | 01        | 02       | 03     |
| BENZENE       |                   | 0.5        | UG/L    | 76        | 1.2      | 88     |
| TOLUENE       |                   | 0.5        | UG/L    | 19        | 5.7      | 24     |
| ETHYLBENZENE  |                   | 0.5        | UG/L    | 90        | 3.0      | 120    |
| TOTAL XYLENES |                   | 0.5        | UG/L    | 430       | 18       | 510    |

## SURROGATE:

BROMOFLUOROBENZENE (%)

91

88

93

SURROGATE LIMITS ( 80 - 120 )

## CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8021)  
 CLIENT : MARATHON OIL COMPANY  
 PROJECT # : (none)  
 PROJECT NAME : IB REMEDIATION

AEN I.D.: 806305

| SAMPLE ID. #  | CLIENT I.D.       | MATRIX  | DATE SAMPLED | DATE EXTRACTED | DATE ANALYZED | DIL. FACTOR |
|---------------|-------------------|---------|--------------|----------------|---------------|-------------|
| 04            | STRIPPER OUTLET E | AQUEOUS | 6/2/98       | NA             | 6/4/98        | 1           |
| PARAMETER     | DET. LIMIT        | UNITS   | 04           |                |               |             |
| BENZENE       | 0.5               | UG/L    | 1.8          |                |               |             |
| TOLUENE       | 0.5               | UG/L    | 6.4          |                |               |             |
| ETHYLBENZENE  | 0.5               | UG/L    | 3.9          |                |               |             |
| TOTAL XYLENES | 0.5               | UG/L    | 21           |                |               |             |

SURROGATE:  
 BROMOFLUOROBENZENE (%) 90  
 SURROGATE LIMITS ( 80 - 120 )

CHEMIST NOTES:  
 N/A

GAS CHROMATOGRAPHY RESULTS  
REAGENT BLANK

|              |                        |                |           |
|--------------|------------------------|----------------|-----------|
| TEST         | BTEX (EPA 8021)        | AEN I.D.       | : 806305  |
| BLANK I. D.  | : 060498               | DATE EXTRACTED | : N/A     |
| CLIENT       | : MARATHON OIL COMPANY | DATE ANALYZED  | : 6/4/98  |
| PROJECT #    | : (none)               | SAMPLE MATRIX  | : AQUEOUS |
| PROJECT NAME | : IB REMEDIATION       |                |           |

| PARAMETER     | UNITS |      |
|---------------|-------|------|
| BENZENE       | UG/L  | <0.5 |
| TOLUENE       | UG/L  | <0.5 |
| ETHYLBENZENE  | UG/L  | <0.5 |
| TOTAL XYLENES | UG/L  | <0.5 |

SURROGATE:  
BROMOFLUOROBENZENE (%) 86

SURROGATE LIMITS: ( 80 - 120 )

CHEMIST NOTES:  
N/A

GAS CHROMATOGRAPHY QUALITY CONTROL  
MSMSD

|              |                        |                |           |
|--------------|------------------------|----------------|-----------|
| TEST         | : BTEX (EPA 8021)      | AEN I.D.       | : 806305  |
| MSMSD #      | : 806305-04            | DATE EXTRACTED | : N/A     |
| CLIENT       | : MARATHON OIL COMPANY | DATE ANALYZED  | : 6/4/98  |
| PROJECT #    | : (none)               | SAMPLE MATRIX  | : AQUEOUS |
| PROJECT NAME | : IB REMEDIATION       | UNITS          | : UG/L    |

| PARAMETER     | SAMPLE<br>RESULT | CONC<br>SPIKE | SPIKED<br>SAMPLE | %<br>REC | DUP<br>SPIKE | DUP<br>% REC | RPD | REC<br>LIMITS | RPD<br>LIMITS |
|---------------|------------------|---------------|------------------|----------|--------------|--------------|-----|---------------|---------------|
| BENZENE       | 1.8              | 10.0          | 10.3             | 85       | 10.5         | 87           | 2   | ( 80 - 120 )  | 20            |
| TOLUENE       | 6.4              | 10.0          | 14.9             | 85       | 14.8         | 84           | 1   | ( 80 - 120 )  | 20            |
| ETHYLBENZENE  | 3.9              | 10.0          | 13.1             | 92       | 13.3         | 94           | 2   | ( 80 - 120 )  | 20            |
| TOTAL XYLENES | 20.8             | 30.0          | 45.9             | 84       | 45.7         | 83           | 0   | ( 80 - 120 )  | 20            |

CHEMIST NOTES:  
N/A

% Recovery = 
$$\frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

RPD (Relative Percent Difference) = 
$$\frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

| NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL                                                                              |  |  |                            |  |  | ANALYSIS REQUEST                             |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|---------------------------------------------------------------------------------------------------------------------------|--|--|----------------------------|--|--|----------------------------------------------|--|----------|--|---------------|--|-----------------------------|--|----------|--|---------|--|------------|--|
| <div>COMPANY: AMERICAN ENVIRONMENTAL NETWORK<br/>ADDRESS: 2709-D Pan American Freeway, NE<br/>Albuquerque, NM 87107</div> |  |  |                            |  |  |                                              |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| <div>CLIENT PROJECT MANAGER:<br/><br/>Kim McNeill</div>                                                                   |  |  |                            |  |  |                                              |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| <div>SAMPLE ID: 805633</div>                                                                                              |  |  |                            |  |  |                                              |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| <div>DATE: 6/2 TIME: 940 MATRIX: AIR LAB ID: -06</div>                                                                    |  |  |                            |  |  |                                              |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  | Metals - TAL                                 |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  | Metals - PP List                             |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  | Metals - RCRA                                |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  | RCRA Metals by TCLP (1311)                   |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  |                                              |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  | TOX                                          |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  | TOC                                          |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  | Gen Chemistry                                |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  |                                              |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  | Oil and Grease                               |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  | BOD                                          |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  | COD                                          |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  | Pesticides/PCB (608/8080)                    |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  | Herbicides (615/8150)                        |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  | Base/Neutral Acid Compounds GC/MS (625/8270) |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  | Volatile Organics GC/MS (624/8240)           |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  | Polynuclear Aromatics (610/8310)             |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  | 8240 (TCLP 1311) ZHE                         |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  | 8270 (TCLP 1311)                             |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  |                                              |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  | TO-14                                        |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  | Gross Alpha/Beta                             |  |          |  |               |  |                             |  |          |  |         |  |            |  |
|                                                                                                                           |  |  |                            |  |  | NUMBER OF CONTAINERS                         |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| <div>PROJECT INFORMATION</div>                                                                                            |  |  |                            |  |  | <div>SAMPLE RECEIPT</div>                    |  |          |  |               |  | <div>SAMPLES SENT TO:</div> |  |          |  |         |  |            |  |
| PROJECT NUMBER: 806305                                                                                                    |  |  | TOTAL NUMBER OF CONTAINERS |  |  | CONNECTICUT                                  |  | ILLINOIS |  | MASSACHUSETTS |  | PENNSYLVANIA                |  | PORTLAND |  | PHOENIX |  | N.CAROLINA |  |
| PROJECT NAME: Marathon Oil Co.                                                                                            |  |  | CHAIN OF CUSTODY SEALS     |  |  |                                              |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| OC LEVEL: STD IV                                                                                                          |  |  | INTACT?                    |  |  |                                              |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| OC REQUIRED: MS MSD BLANK                                                                                                 |  |  | RECEIVED GOOD COND/COLD    |  |  |                                              |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| LAT: STANDARD RUSH                                                                                                        |  |  | LAB NUMBER                 |  |  |                                              |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| DUE DATE: 6/15                                                                                                            |  |  |                            |  |  |                                              |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| RUSH SURCHARGE:                                                                                                           |  |  |                            |  |  |                                              |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| CLIENT DISCOUNT:                                                                                                          |  |  |                            |  |  |                                              |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| SPECIAL CERTIFICATION REQUIRED: YES NO                                                                                    |  |  |                            |  |  |                                              |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| RELINQUISHED BY: 1.                                                                                                       |  |  |                            |  |  | RELINQUISHED BY: 2.                          |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| Signature: [Signature] Time: 1700                                                                                         |  |  |                            |  |  | Signature: [Signature] Time: 0816            |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| Printed Name: Francine Torrio                                                                                             |  |  |                            |  |  | Printed Name: [Name]                         |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| Date: 6/3/98                                                                                                              |  |  |                            |  |  | Date: 6/4/98                                 |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| Abuquerque                                                                                                                |  |  |                            |  |  | Company:                                     |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| RECEIVED BY: 1.                                                                                                           |  |  |                            |  |  | RECEIVED BY: (LAB) 2.                        |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| Signature: [Signature] Time: 1700                                                                                         |  |  |                            |  |  | Signature: [Signature] Time: 0816            |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| Printed Name: [Name]                                                                                                      |  |  |                            |  |  | Printed Name: [Name]                         |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| Date: 6/3/98                                                                                                              |  |  |                            |  |  | Date: 6/4/98                                 |  |          |  |               |  |                             |  |          |  |         |  |            |  |
| Company: [Name]                                                                                                           |  |  |                            |  |  | Company: [Name]                              |  |          |  |               |  |                             |  |          |  |         |  |            |  |

SHADED AREAS ARE FOR LAB USE ONLY.

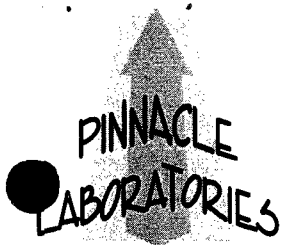
|                                                                                                     |
|-----------------------------------------------------------------------------------------------------|
| Petroleum Hydrocarbons (418.1) TRPH                                                                 |
| (MOD.8015) Diesel/Direct Inject                                                                     |
| (M8015) Gas/Purge & Trap                                                                            |
| 8021 (BTEX) <input checked="" type="checkbox"/> 8045 (S&S) <input type="checkbox"/>                 |
| 8021 (BTEX) <input type="checkbox"/> MTBE <input type="checkbox"/> TMB <input type="checkbox"/> PCE |
| 8021 (TCL)                                                                                          |
| 8021 (EDX)                                                                                          |
| 8021 (HALO)                                                                                         |
| 8021 (CUST)                                                                                         |
| 504.1 EDB <input type="checkbox"/> / DBCP <input type="checkbox"/>                                  |
| TO-14                                                                                               |
| 8260 (TCL) Volatile Organics                                                                        |
| 8260 (Full) Volatile Organics                                                                       |
| 8260 (CUST) Volatile Organics                                                                       |
| 8260 (Landfill) Volatile Organics                                                                   |
| Pesticides /PCB (608/8081)                                                                          |
| Herbicides (615/8151)                                                                               |
| Base/Neutral/Acid Compounds GC/MS (625/8270)                                                        |
| Polynuclear Aromatics (610/8310)                                                                    |
| General Chemistry:                                                                                  |
|                                                                                                     |
|                                                                                                     |
| Priority Pollutant Metals (13)                                                                      |
| Target Analyte List Metals (23)                                                                     |
| RCRA Metals (8)                                                                                     |
| RCRA Metals by TCLP (Method 1311)                                                                   |
| Metals:                                                                                             |
|                                                                                                     |
| NUMBER OF CONTAINERS: 12                                                                            |

NUMBER OF CONTAINERS: 1

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|
| 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|

PLEASE FILL THIS FORM IN COMPLETELY.

1/5/98 AE  
American Environmental Network (NM), Inc. • 2709 D Pan American Freeway, NE • Albuquerque, New Mexico 87107 • (505) 344-3111 • Fax (505) 344-4413  
DISTRIBUTION: write  
Canary - originator



2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

AEN I.D. 805304

May 14, 1998

MARATHON OIL COMPANY  
P.O. BOX 552  
MIDLAND, TX 79702-0552

Project Name IB REMEDIATION  
Project Number (none)

Attention: PAUL PEACOCK

On 5/1/98 American Environmental Network (NM), Inc. (ADHS License No. AZ0015), received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

Chloride was performed by American Environmental Network (FL) Inc., Pensacola, FL.

All other parameters were performed by American Environmental Network (NM) Inc., Albuquerque, NM.

If you have any questions or comments, please do not hesitate to contact us at (505)344-3777.

Kimberly D. McNeill  
Project Manager

H. Mitchell Rubenstein, Ph. D.  
General Manager

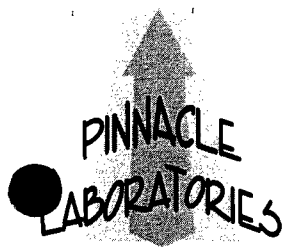
MR: mt

Enclosure

**MCR**

MAR 02 1999

Environmental & Safety

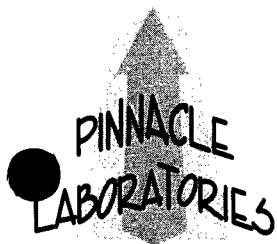


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Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : IB REMEDIATION

AEN I.D. : 805304  
DATE RECEIVED : 5/1/98  
REPORT DATE : 5/14/98

| AEN   |                    |         | DATE      |
|-------|--------------------|---------|-----------|
| ID. # | CLIENT DESCRIPTION | MATRIX  | COLLECTED |
| 01    | LYMON              | AQUEOUS | 4/30/98   |
| 02    | 1 LYMAN            | AQUEOUS | 4/30/98   |
| 03    | LYMAN              | AQUEOUS | 4/30/98   |
| 04    | E. STRIPPER INLET  | AQUEOUS | 4/30/98   |
| 05    | E. STRIPPER OUTLET | AQUEOUS | 4/30/98   |
| 06    | W. STRIPPER INLET  | AQUEOUS | 4/30/98   |
| 07    | W. STRIPPER OUTLET | AQUEOUS | 4/30/98   |



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### GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8021)  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : IB REMEDIATION

AEN I.D.: 805304

| SAMPLE ID. #  | CLIENT I.D.       | MATRIX  | DATE SAMPLED | DATE EXTRACTED | DATE ANALYZED | DIL. FACTOR |
|---------------|-------------------|---------|--------------|----------------|---------------|-------------|
| 02            | 1 LYMAN           | AQUEOUS | 4/30/98      | NA             | 5/5/98        | 1           |
| 03            | LYMAN             | AQUEOUS | 4/30/98      | NA             | 5/5/98        | 1           |
| 04            | E. STRIPPER INLET | AQUEOUS | 4/30/98      | NA             | 5/5/98        | 20          |
| PARAMETER     | DET. LIMIT        | UNITS   | 02           | 03             | 04            |             |
| BENZENE       | 0.5               | UG/L    | < 0.5        | < 0.5          |               | 69          |
| TOLUENE       | 0.5               | UG/L    | < 0.5        | < 0.5          |               | 69          |
| ETHYLBENZENE  | 0.5               | UG/L    | < 0.5        | < 0.5          |               | 23          |
| TOTAL XYLENES | 0.5               | UG/L    | < 0.5        | < 0.5          |               | 530         |

#### SURROGATE:

BROMOFLUOROBENZENE (%)

99

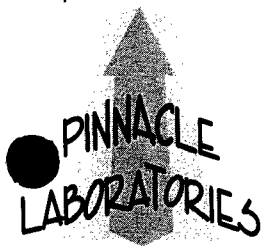
96

103

SURROGATE LIMITS ( 80 - 120 )

#### CHEMIST NOTES:

N/A



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Albuquerque, New Mexico 87107  
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Fax (505) 344-4413

### GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8021)  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : IB REMEDIATION

AEN I.D.: 805304

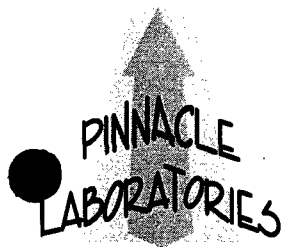
| SAMPLE        |                    | MATRIX     | DATE    | DATE      | DATE     | DIL.   |
|---------------|--------------------|------------|---------|-----------|----------|--------|
| ID. #         | CLIENT I.D.        |            | SAMPLED | EXTRACTED | ANALYZED | FACTOR |
| 05            | E. STRIPPER OUTLET | AQUEOUS    | 4/30/98 | NA        | 5/5/98   | 1      |
| 06            | W. STRIPPER INLET  | AQUEOUS    | 4/30/98 | NA        | 5/5/98   | 20     |
| 07            | W. STRIPPER OUTLET | AQUEOUS    | 4/30/98 | NA        | 5/5/98   | 5      |
| PARAMETER     |                    | DET. LIMIT | UNITS   | 05        | 06       | 07     |
| BENZENE       |                    | 0.5        | UG/L    | < 0.5     | 59       | < 2.5  |
| TOLUENE       |                    | 0.5        | UG/L    | 9.8       | 23       | 14     |
| ETHYLBENZENE  |                    | 0.5        | UG/L    | 3.6       | 66       | 8.3    |
| TOTAL XYLENES |                    | 0.5        | UG/L    | 21        | 470      | 59     |

#### SURROGATE:

|                               |     |    |       |
|-------------------------------|-----|----|-------|
| BROMOFLUOROBENZENE (%)        | 109 | 98 | 123 * |
| SURROGATE LIMITS ( 80 - 120 ) |     |    |       |

#### CHEMIST NOTES:

\* - SURROGATE RECOVERY HIGH DUE TO MATRIX INTERFERENCE.



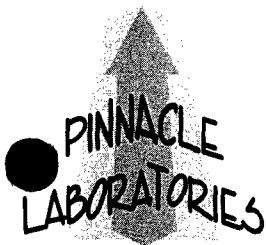
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GAS CHROMATOGRAPHY RESULTS  
REAGENT BLANK

|              |                        |                |           |
|--------------|------------------------|----------------|-----------|
| TEST         | : BTEX (EPA 8021)      | AEN I.D.       | : 805304  |
| BLANK I. D.  | : 050498               | DATE EXTRACTED | : NA      |
| CLIENT       | : MARATHON OIL COMPANY | DATE ANALYZED  | : 5/4/98  |
| PROJECT #    | : (none)               | SAMPLE MATRIX  | : AQUEOUS |
| PROJECT NAME | : IB REMEDIATION       |                |           |

| PARAMETER     | UNITS |      |
|---------------|-------|------|
| BENZENE       | UG/L  | <0.5 |
| TOLUENE       | UG/L  | <0.5 |
| ETHYLBENZENE  | UG/L  | <0.5 |
| TOTAL XYLENES | UG/L  | <0.5 |

SURROGATE:  
BROMOFLUOROBENZENE (%) 105  
SURROGATE LIMITS: ( 80 - 120 )  
CHEMIST NOTES:  
N/A



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GAS CHROMATOGRAPHY RESULTS  
REAGENT BLANK

|              |                        |                |           |
|--------------|------------------------|----------------|-----------|
| TEST         | : BTEX (EPA 8021)      | AEN I.D.       | : 805304  |
| BLANK I. D.  | : 050598               | DATE EXTRACTED | : NA      |
| CLIENT       | : MARATHON OIL COMPANY | DATE ANALYZED  | : 5/5/98  |
| PROJECT #    | : (none)               | SAMPLE MATRIX  | : AQUEOUS |
| PROJECT NAME | : IB REMEDIATION       |                |           |

| PARAMETER     | UNITS |      |
|---------------|-------|------|
| BENZENE       | UG/L  | <0.5 |
| TOLUENE       | UG/L  | <0.5 |
| ETHYLBENZENE  | UG/L  | <0.5 |
| TOTAL XYLENES | UG/L  | <0.5 |

SURROGATE:

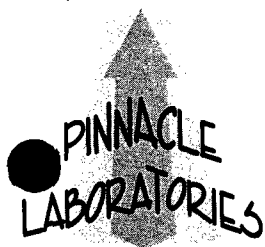
BROMOFLUOROBENZENE (%)

104

SURROGATE LIMITS: ( 80 - 120 )

CHEMIST NOTES:

N/A



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Fax (505) 344-4413

GAS CHROMATOGRAPHY QUALITY CONTROL  
MSMSD

TEST : BTEX (EPA 8021)  
MSMSD # : 805304-03  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : IB REMEDIATION

AEN I.D. : 805304  
DATE EXTRACTED : NA  
DATE ANALYZED : 5/5/98  
SAMPLE MATRIX : AQUEOUS  
UNITS : UG/L

| PARAMETER     | SAMPLE<br>RESULT | CONC<br>SPIKE | SPIKED<br>SAMPLE | %<br>REC | DUP<br>SPIKE | DUP<br>% REC | RPD | REC<br>LIMITS | RPD<br>LIMITS |
|---------------|------------------|---------------|------------------|----------|--------------|--------------|-----|---------------|---------------|
| BENZENE       | <0.5             | 10.0          | 9.4              | 94       | 9.6          | 96           | 2   | ( 80 - 120 )  | 20            |
| TOLUENE       | <0.5             | 10.0          | 9.8              | 98       | 9.9          | 99           | 1   | ( 80 - 120 )  | 20            |
| ETHYLBENZENE  | <0.5             | 10.0          | 10.4             | 104      | 10.6         | 106          | 2   | ( 80 - 120 )  | 20            |
| TOTAL XYLENES | <0.5             | 30.0          | 31.4             | 105      | 31.6         | 105          | 1   | ( 80 - 120 )  | 20            |

CHEMIST NOTES:  
N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



# *American Environmental Network, Inc.*

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SIGNATURE PAGE

Reviewed by:

AEN Project Manager

Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.  
ALBUQUERQUE, NEW MEXICO

Project Name: MOC  
Project Number: 805304  
Project Location: IB REMEDATION  
Accession Number: 805014

Project Manager: KIMBERLY D. MCNEILL  
Sampled By: N/S

Analysis Report

Analysis: Group of Single Wetchem

|                   |                                                  |
|-------------------|--------------------------------------------------|
| Accession:        | 805014                                           |
| Client:           | AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC. |
| Project Number:   | 805304                                           |
| Project Name:     | MOC                                              |
| Project Location: | IB REMEDATION                                    |
| Department:       | WET CHEM                                         |

[0] Page 1  
Date 12-May-98

"FINAL REPORT FORMAT - SINGLE"

Accession: 805014  
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.  
Project Number: 805304  
Project Name: MOC  
Project Location: IB REMEDATION  
Test: Group of Single Wetchem  
Matrix: WATER  
QC Level: II

Lab ID: 001  
Client Sample Id: 805304-01

Sample Date/Time: 30-APR-98 1405  
Received Date: 02-MAY-98

| Parameters:          | Units: | Results: | Rpt Lmts: | Q: | Batch: | Analyst: |
|----------------------|--------|----------|-----------|----|--------|----------|
| CHLORIDE (4500-CL B) | MG/L   | 15       | 1         |    | CIW048 | RB       |

Comments:

[0] Page 2  
Date 12-May-98

"Method Report Summary"

Accession Number: 805014  
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.  
Project Number: 805304  
Project Name: MOC  
Project Location: IB REMEDATION  
Test: Group of Single Wetchem

---

| Client Sample Id: | Parameter:           | Unit: | Result: |
|-------------------|----------------------|-------|---------|
| 805304-01         | CHLORIDE (4500-CL B) | MG/L  | 15      |

## Data Qualifiers for Final Report

Pensacola Inorganic/Organic

|                   |                                                                                                   |
|-------------------|---------------------------------------------------------------------------------------------------|
| ●                 | Adjusted reporting limit due to sample matrix (dilution prior to digestion and/or analysis)       |
| +                 | Elevated reporting limit due to dilution into calibration range                                   |
| *                 | Elevated reporting limit due to matrix interference (dilution prior to digestion and/or analysis) |
| #                 | Elevated reporting limit due to insufficient sample size                                          |
| D                 | Diluted out                                                                                       |
| J5                | The reported value is quantitated as a TIC; therefore, it is estimated                            |
| ND = Not Detected | N/S = Not Submitted      N/A = Not Applicable                                                     |

Florida Projects Inorganic/Organic

|                    |                                                                                                               |
|--------------------|---------------------------------------------------------------------------------------------------------------|
| Y1                 | Improper preservation, no preservative present in sample upon receipt                                         |
| Y2                 | Improper preservation, incorrect preservative present in sample upon receipt                                  |
| Y3                 | Improper preservation, sample temperature exceeded EPA temperature limits of 2-6°C upon receipt               |
| Y (FL description) | The laboratory analysis was from an unpreserved or improperly preserved sample. The data may not be accurate. |
| Q                  | Sample held beyond the accepted holding time                                                                  |
| I                  | The reported value is < Laboratory RL and > laboratory MDL                                                    |
| U1                 | The reported value is ≤ Laboratory MDL (value for sample result is reported as the MDL)                       |
| U (FL description) | Indicates the compound was analyzed for but not detected.                                                     |
| T                  | The reported value is < Laboratory MDL (value shall not be used for statistical analysis)                     |
| V                  | The analyte was detected in both the sample and the associated method blank.                                  |
| J1                 | Surrogate recovery limits have been exceeded                                                                  |
| J2                 | The sample matrix interfered with the ability to make any accurate determinations                             |
| J3                 | The reported value failed to meet the established quality control criteria for either precision or accuracy   |
| J (FL description) | Estimated value; not accurate.                                                                                |

AFCEE Projects (under QAPP) and All Other (AEN-PN) Projects/Sites for Inorganic/Organic Parameters

|                       |                                                                                                                  |
|-----------------------|------------------------------------------------------------------------------------------------------------------|
| J4                    | (For positive results)      Temperature limits exceeded ( $\leq 2^{\circ}\text{C}$ or $\geq 6^{\circ}\text{C}$ ) |
| J (AFCEE description) | The analyte was positively identified, the quantitation is an estimation                                         |
| R1                    | (For nondetects)      Temperature limits exceeded ( $\leq 2^{\circ}\text{C}$ or $\geq 6^{\circ}\text{C}$ )       |
| ●                     | Improper preservation, no preservative present in sample upon receipt                                            |
| R3                    | Improper preservation, incorrect preservative present in sample upon receipt                                     |
| R4                    | Holding time exceeded                                                                                            |
| R5                    | Collection requirements not met, improper container used for sample                                              |
| R (AFCEE description) | The data are unusable due to deficiencies in the ability to analyze the sample and meet QC criteria              |
| F                     | < RL and > laboratory MDL                                                                                        |
| F (AFCEE description) | The analyte was positively identified but the associated numerical value is below the AFCEE or lab RL            |
| U2                    | ≤ Laboratory MDL (value for result will be the MDL, never below the MDL)                                         |
| U (AFCEE description) | The analyte was analyzed for but not detected. The associated numerical value is at or below the MDL             |
| B (AFCEE description) | The analyte was found in the associated blank, as well as in the sample                                          |

ICR Projects Inorganic/Organic

|    |            |
|----|------------|
| A  | Acceptable |
| R6 | Rejected   |

Examples: ICR Flags

R6 = Laboratory extracted the sample but the refrigerator malfunctioned so the extract became warm and client was notified  
R6 = Sample arrived in laboratory in good condition; however, the laboratory did not analyze it within EPA's established holding time limit.

CLP and CLP-like Projects

Refer to referenced CLP Statement of Work (SOW) for explanation of data qualifiers

IDL = Laboratory Instrument Detection Limit

MDL = Laboratory Method Detection Limit

RL = Reporting Limit (AFCEE RLs are listed in the AFCEE QAPP)

CLP CRDL = CLP Contract Required Detection Limit (these limits are listed in the EPA CLP Statement of Work or SOW)

CLP CRQL = CLP Contract Required Quantitation Limit (these limits are listed in the EPA CLP Statement of Work or SOW)

**Any time** a sample arrives at the laboratory improperly preserved (at improper pH or temperature) or after holding time has expired or prepared or analyzed after holding time, client must be notified in writing (i.e. case narrative).

AEN-Pensacola uses the most current promulgated methods contained in the reference manuals.

Quality Control Report

Analysis: Group of Single Wetchem

|                   |                                                  |
|-------------------|--------------------------------------------------|
| Accession:        | 805014                                           |
| Client:           | AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC. |
| Project Number:   | 805304                                           |
| Project Name:     | MOC                                              |
| Project Location: | IB REMEDATION                                    |
| Department:       | WET CHEM                                         |

[0] Page 1  
Date 12-May-98

"WetChem Quality Control Report"

|                |           |
|----------------|-----------|
| Parameter:     | CHLORIDE  |
| Batch Id:      | CIW048    |
| Blank Result:  | <1        |
| Anal. Method:  | 325.3     |
| Prep. Method:  | N/A       |
| Analysis Date: | 04-MAY-98 |
| Prep. Date:    | 04-MAY-98 |

Sample Duplication

|             |          |
|-------------|----------|
| Sample Dup: | 805003-1 |
| Rept Limit: | <1       |

|                |      |
|----------------|------|
| Sample Result: | 52.4 |
| Dup Result:    | 52.3 |
| Sample RPD:    | 0    |
| Max RPD:       | 6    |
| Dry Weight%    | N/A  |

Matrix Spike

|                |          |
|----------------|----------|
| Sample Spiked: | 805003-1 |
| Rept Limit:    | <1       |

|                |        |
|----------------|--------|
| Sample Result: | 52.4   |
| Spiked Result: | 107.8  |
| Spike Added:   | 55.0   |
| % Recovery:    | 101    |
| % Rec Limits:  | 88-113 |
| Dry Weight%    | N/A    |

ICV

|               |        |
|---------------|--------|
| ICV Result:   | 99     |
| True Result:  | 100    |
| % Recovery:   | 99     |
| % Rec Limits: | 90-110 |

LCS

|               |  |
|---------------|--|
| LCS Result:   |  |
| True Result:  |  |
| % Recovery:   |  |
| % Rec Limits: |  |

[0] Page 2  
Date 12-May-98

----- Common Footnotes WetChem -----

N/A = NOT APPLICABLE.  
 N/S = NOT SUBMITTED.  
 N/C = SAMPLE AND DUPLICATE RESULTS ARE AT OR BELOW AEN REPORTING LIMIT;  
 THEREFORE, THE RPD IS "NOT CALCULABLE" AND NO CONTROL LIMITS APPLY.  
 N/D = NOT DETECTED.  
 R = REACTIVE  
 T = TOTAL  
 G = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X AEN REPORTING LIMIT AND  
 THE ABSOLUTE DIFFERENCE BETWEEN THE SAMPLE AND DUPLICATE RESULT IS AT  
 OR BELOW AEN REPORTING LIMIT; THEREFORE, THE RESULTS ARE "IN CONTROL".  
 Q = THE ANALYTICAL (POST-DISTILLATION) SPIKE IS REPORTED DUE TO PERCENT RECOVERY  
 BEING OUTSIDE ACCEPTANCE LIMITS ON THE MATRIX (PRE-DISTILLATION) SPIKE.  
 # = ELEVATED REPORTING LIMIT DUE TO INSUFFICIENT SAMPLE.  
 + = ELEVATED REPORTING LIMIT DUE TO DILUTION INTO CALIBRATION RANGE.  
 \* = ELEVATED REPORTING LIMIT DUE TO MATRIX INTERFERENCE (DILUTION PRIOR DIGESTION  
 AND/OR ANALYSIS).  
 @ = ADJUSTED REPORTING LIMIT DUE TO SAMPLE MATRIX (DILUTION PRIOR TO DIGESTION  
 AND/OR ANALYSIS).  
 P = ANALYTICAL (POST DIGESTION) SPIKE.  
 I = DUPLICATE INJECTION.  
 & = AUTOMATED  
 F = SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.  
 N/C+ = NOT CALCULABLE  
 H = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X AEN REPORTING LIMIT AND THE  
 ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE AEN REPORTING  
 LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".  
 A = SAMPLE AND DUPLICATE RESULTS ARE "OUT OF CONTROL".  
 Z = THE SAMPLE RESULT FOR THE SPIKE IS BELOW THE REPORTING LIMIT. HOWEVER,  
 THIS RESULT IS REPORTED FOR ACCURATE QC CALCULATIONS.  
 NH= SAMPLE AND / OR DUPLICATE RESULT IS BELOW 5 X AEN REPORTING LIMIT  
 AND THE ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE AEN  
 REPORTING LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".  
 SAMPLE IS NON-HOMOGENEOUS.  
 (\*) = REPORTING LIMITS RAISED DUE TO CLP METHOD NOT REQUIRING A CONCENTRATION STEP FOR CN.  
 (CA) = SEE CORRECTIVE ACTIONS FORM.  
 \*\*= MATRIX INTERFERENCE  
 SW-846, 3rd Edition, latest EPA-approved edition.  
 EPA 600/4-79-020, Revised March 1983.  
 STANDARD METHODS, For the Examination of Water and Wastewater, latest EPA-approved edition.  
 NIOSH Manual of Analytical Methods, 4th Edition.  
 ANNUAL BOOK OF ASTM STANDARDS, VOLUMES 11.01 and 11.02, latest EPA-approved edition.  
 METHODS FOR THE DETERMINATION OF INORGANIC SUBSTANCES IN ENVIRONMENTAL SAMPLES,  
 EPA600/R-93/100, AUGUST 1993  
 METHODS FOR SOIL ANALYSIS, PART 2, CHEMICAL AND MICROBIOLOGICAL PROPERTIES, 2ND EDITION.  
 AEN-PN USES THE MOST CURRENT PROMULGATED METHODS FROM THE REFERENCES LISTED ABOVE.

1. COLIFORM. COLIFORM PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN  
 THE LOGARITHM OF COLONIES PER 100 MLS OF SAMPLE ON DUPLICATE PLATES.
2. PH. PH PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN THE  
 SAMPLE AND DUPLICATE ANALYSIS.
3. FLASHPOINT. FLASHPOINT PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN  
 THE SAMPLE AND DUPLICATE ANALYSIS.

RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION).  
 RPT LMTS = REPORTING LIMITS BASED ON METHOD DETECTION LIMIT STUDIES.

DPH = DOLLY P. HWANG      RB = REBECCA BROWN      WH = WENDY HAGGARD  
 ED = ESTHER DANTIN      CR = CYNTHIA ROBERTS      AB = AMY BRADLEY  
 BE = BETTY EVERTON      PLD = PAULA L. DOUGHTY      JTZ = JONATHAN T. ZIENTARSKI  
 RH = RICKY HAGENDORFER

# American Environmental Network of Florida

## PROJECT SAMPLE INSPECTION FORM

Lab Accession #: 205014

Date Received: 02-May-98

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. Was there a Chain of Custody? <u>Yes</u> No*</p> <p>2. Was Chain of Custody properly filled out and relinquished? <u>Yes</u> No*</p> <p>3. Were samples received cold? <u>Yes</u> No* N/A<br/>(Criteria: 2° - 6°C: AEN-SOP 1055)</p> <p>4. Were all samples properly labeled and identified? <u>Yes</u> No*</p> <p>5. Did samples require splitting? Yes* <u>No</u><br/>Req By: PM Client Other*</p> <p>6. Were samples received in proper containers for analysis requested? <u>Yes</u> No*</p> <p>7. Were all sample containers received intact? <u>Yes</u> No*</p> | <p>8. Were samples checked for preservative? <u>Yes</u> No* N/A<br/><small>(Check pH of all H<sub>2</sub>O requiring preservative except VOA vials that require zero headspace)*</small></p> <p>9. Is there sufficient volume for analysis requested? <u>Yes</u> No*</p> <p>10. Were samples received within Holding Time? <u>Yes</u> No* <small>(REFER TO AEN-SOP 1040)</small></p> <p>11. Is Headspace visible &gt; ¼" in diameter in VOA vials? * If any headspace is evident, comment in out-of-control section. Yes* No <u>N/A</u></p> <p>12. If sent, were matrix spike bottles returned? Yes No* <u>N/A</u></p> <p>13. Was Project Manager notified of problems? (initials: _____) Yes No* <u>N/A</u></p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Airbill Number(s): 3678766813

Shipped By: FEDEX

Cooler Number(s): Client Cooler

Shipping Charges: N/A

Cooler Weight(s): N/A

Cooler Temp(s) (°C): 3.0°C - CCHB

(LIST THERMOMETER NUMBER(S) FOR VERIFICATION)

### Out of Control Events and Inspection Comments:

(USE BACK OF PSIFFOR ADDITIONAL NOTES AND COMMENTS)

Inspected By: PHE Date: 5/2/98 Logged By: PHE Date: 5/2/98

*Note all Out-of-Control and/or questionable events on Comment Section of this form.*

*Note who requested the splitting of samples on the Comment Section of this form.*

+ *All preservatives for the State of North Carolina, the State of New York, and other requested samples are to be recorded on the sheet provided to record pH results (AEN-SOP 938, section 2.2.9).*

\* *According to EPA, ¼" of headspace is allowed in 40 ml vials requiring volatile analysis, however, AEN makes it policy to record any headspace as out-of-control (AEN-SOP 938, section 2.2.12).*



ADDRESS: 11-700VE

**Metals:**

**NUMBER OF CONTAINERS**

14

long.

**THE**

THE UNIVERSITY OF CHICAGO

**DISTRIBUTION:** White - AEN, Canary - Originator

## CHAIN OF CUSTODY

DATE: 4-30-98 PAGE: 1 OF 1

AEN(NM) Accession #: 805304

SHADED AREAS ARE FOR LAB USE ONLY.

PLEASE FILL THIS FORM IN COMPLETELY.

|                                      |  |                                                                                                                                                                               |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |
|--------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------|--|----------------------------|--|--------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------|--|----------|--|
| PROJECT MANAGER: <u>Paul Peacock</u> |  | COMPANY: <u>MARTIN OIL CO</u>                                                                                                                                                 |  | ADDRESS: <u>P.O. Box 552</u> |  | PHONE: <u>915 687-8312</u> |  | FAX: <u>915 687-8305</u> |  | BILL TO:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  | COMPANY: <u>Same as Above</u> |  | ADDRESS: |  |
| SAMPLE ID                            |  | DATE                                                                                                                                                                          |  | TIME                         |  | MATRIX                     |  | LAB ID                   |  | Petroleum Hydrocarbons (418.1) TRPH<br>(MOD.8015) Diesel/Direct Inject<br>(M8015) Gas/Purge & Trap<br>8021 (BTEX)/8015 (Gasoline)<br>8021 (BTEX) <input type="checkbox"/> MTBE <input type="checkbox"/> TMB <input type="checkbox"/> PCE<br>8021 (TCL)<br>8021 (EDX)<br>8021 (HALO)<br>8021 (CUST)<br>504.1 EDB <input type="checkbox"/> / DBCP <input type="checkbox"/><br><u>BTEX (8020)</u><br>8260 (TCL) Volatile Organics<br>8260 (Full) Volatile Organics<br>8260 (CUST) Volatile Organics<br>8260 (Landfill) Volatile Organics<br>Pesticides /PCB (608/8081)<br>Herbicides (615/8151)<br>Base/Neutral/Acid Compounds GC/MS (625/8270)<br>Polynuclear Aromatics (610/8310)<br>General Chemistry:<br><u>Chloride</u><br>Priority Pollutant Metals (13)<br>Target Analyte List Metals (23)<br>RCRA Metals (8)<br>RCRA Metals by TCLP (Method 1311)<br>Metals: |  |                               |  |          |  |
| PROJECT INFORMATION                  |  | PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS                                                                                                                             |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |
| PROJ. NO.:                           |  | (RUSH) <input type="checkbox"/> 24hr <input type="checkbox"/> 48hr <input type="checkbox"/> 72hr <input type="checkbox"/> 1 WEEK (NORMAL) <input checked="" type="checkbox"/> |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |
| PROJ. NAME: <u>TPB Remediation</u>   |  | CERTIFICATION REQUIRED: <input type="checkbox"/> NM <input type="checkbox"/> SDWA <input type="checkbox"/> OTHER                                                              |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |
| PO. NO.:                             |  | METHANOL PRESERVATION <input type="checkbox"/>                                                                                                                                |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |
| SHIPPED VIA:                         |  | COMMENTS: FIXED FEE <input type="checkbox"/>                                                                                                                                  |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |
| SAMPLE RECEIPT                       |  | RECEIVED BY: <u>Paul Peacock</u> TIME: <u>1500</u> DATE: <u>4/30/98</u>                                                                                                       |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |
| NO. CONTAINERS: <u>7</u>             |  | RECEIVED BY: <u>John Caldwell</u> TIME: <u>1340</u> DATE: <u>5/1/98</u>                                                                                                       |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |
| CUSTODY SEALS: <u>COIN/NA</u>        |  | RECEIVED BY: <u>John Caldwell</u> TIME: <u>1340</u> DATE: <u>5/1/98</u>                                                                                                       |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |
| RECEIVED INTACT: <u>Yes</u>          |  | RECEIVED BY: <u>John Caldwell</u> TIME: <u>1340</u> DATE: <u>5/1/98</u>                                                                                                       |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |
| BLUE: <u>Yes</u>                     |  | RECEIVED BY: <u>John Caldwell</u> TIME: <u>1340</u> DATE: <u>5/1/98</u>                                                                                                       |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |
| PROJECT INFORMATION                  |  | RELINQUISHED BY: <u>Paul Peacock</u> TIME: <u>3:00 PM</u> DATE: <u>4-30-98</u>                                                                                                |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |
| PROJ. NO.:                           |  | RELINQUISHED BY: <u>Paul Peacock</u> TIME: <u>1340</u> DATE: <u>4/30/98</u>                                                                                                   |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |
| PROJ. NAME: <u>TPB Remediation</u>   |  | RELINQUISHED BY: <u>Paul Peacock</u> TIME: <u>1340</u> DATE: <u>4/30/98</u>                                                                                                   |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |
| PO. NO.:                             |  | RELINQUISHED BY: <u>Paul Peacock</u> TIME: <u>1340</u> DATE: <u>4/30/98</u>                                                                                                   |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |
| SHIPPED VIA:                         |  | RELINQUISHED BY: <u>Paul Peacock</u> TIME: <u>1340</u> DATE: <u>4/30/98</u>                                                                                                   |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |
| SAMPLE RECEIPT                       |  | RELINQUISHED BY: <u>Paul Peacock</u> TIME: <u>1340</u> DATE: <u>4/30/98</u>                                                                                                   |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |
| NO. CONTAINERS: <u>7</u>             |  | RELINQUISHED BY: <u>Paul Peacock</u> TIME: <u>1340</u> DATE: <u>4/30/98</u>                                                                                                   |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |
| CUSTODY SEALS: <u>COIN/NA</u>        |  | RELINQUISHED BY: <u>Paul Peacock</u> TIME: <u>1340</u> DATE: <u>4/30/98</u>                                                                                                   |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |
| RECEIVED INTACT: <u>Yes</u>          |  | RELINQUISHED BY: <u>Paul Peacock</u> TIME: <u>1340</u> DATE: <u>4/30/98</u>                                                                                                   |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |
| BLUE: <u>Yes</u>                     |  | RELINQUISHED BY: <u>Paul Peacock</u> TIME: <u>1340</u> DATE: <u>4/30/98</u>                                                                                                   |  |                              |  |                            |  |                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |                               |  |          |  |

# American Environmental Network, Inc.

AEN I.D. 802390

March 11, 1998

MARATHON OIL COMPANY  
P.O. BOX 552  
MIDLAND, TX 79702-0552

Project Name IB REMEDIATION  
Project Number 97002

Attention: PAUL PEACOCK

On 2/26/98 American Environmental Network (NM), Inc. (ADHS License No. AZ0015), received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

If you have any questions or comments, please do not hesitate to contact us at (505)344-3777.



Kimberly D. McNeill  
Project Manager



H. Mitchell Rubenstein, Ph. D.  
General Manager

MR: mt

Enclosure

MCR

MAR 11 1998

Environmental & Safety

|              |                        |               |           |
|--------------|------------------------|---------------|-----------|
| CLIENT       | : MARATHON OIL COMPANY | AEN I.D.      | : 802390  |
| PROJECT #    | : 97002                | DATE RECEIVED | : 2/26/98 |
| PROJECT NAME | : IB REMEDIATION       | REPORT DATE   | : 3/11/98 |

| AEN<br>ID. # | CLIENT DESCRIPTION | MATRIX  | DATE<br>COLLECTED |
|--------------|--------------------|---------|-------------------|
| 01           | WEST INLET #1      | AQUEOUS | 2/25/98           |
| 02           | WEST OUTLET #1     | AQUEOUS | 2/25/98           |
| 03           | EAST INLET #1      | AQUEOUS | 2/25/98           |
| 04           | EAST OUTLET #1     | AQUEOUS | 2/25/98           |
| 05           | TRIP BLANK         | AQUEOUS | 2/20/98           |

# GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8021)  
 CLIENT : MARATHON OIL COMPANY  
 PROJECT # : 97002  
 PROJECT NAME : IB REMEDIATION

AEN I.D.: 802390

| SAMPLE ID. #  | CLIENT I.D.    | MATRIX  | DATE SAMPLED | DATE EXTRACTED | DATE ANALYZED | DIL. FACTOR |
|---------------|----------------|---------|--------------|----------------|---------------|-------------|
| 01            | WEST INLET #1  | AQUEOUS | 2/25/98      | NA             | 3/4/98        | 50          |
| 02            | WEST OUTLET #1 | AQUEOUS | 2/25/98      | NA             | 3/4/98        | 5           |
| 03            | EAST INLET #1  | AQUEOUS | 2/25/98      | NA             | 3/4/98        | 100         |
| PARAMETER     | DET. LIMIT     | UNITS   | 01           | 02             | 03            |             |
| BENZENE       | 0.5            | UG/L    | 86           | 3.2            | 100           |             |
| TOLUENE       | 0.5            | UG/L    | 34           | 14             | 56            |             |
| ETHYLBENZENE  | 0.5            | UG/L    | 220          | 7.2            | 240           |             |
| TOTAL XYLENES | 0.5            | UG/L    | 990          | 35             | 1100          |             |

## SURROGATE:

BROMOFLUOROBENZENE (%)

102

95

105

SURROGATE LIMITS ( 80 - 120 )

## CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8021)  
 CLIENT : MARATHON OIL COMPANY  
 PROJECT # : 97002  
 PROJECT NAME : IB REMEDIATION

AEN I.D.: 802390

| SAMPLE ID. # | CLIENT I.D.    | MATRIX  | DATE SAMPLED | DATE EXTRACTED | DATE ANALYZED | DIL. FACTOR |
|--------------|----------------|---------|--------------|----------------|---------------|-------------|
| 04           | EAST OUTLET #1 | AQUEOUS | 2/25/98      | NA             | 3/4/98        | 10          |
| 05           | TRIP BLANK     | AQUEOUS | 2/20/98      | NA             | 3/3/98        | 1           |

| PARAMETER     | DET. LIMIT | UNITS | 04  | 05    |
|---------------|------------|-------|-----|-------|
| BENZENE       | 0.5        | UG/L  | 9.1 | < 0.5 |
| TOLUENE       | 0.5        | UG/L  | 44  | < 0.5 |
| ETHYLBENZENE  | 0.5        | UG/L  | 32  | < 0.5 |
| TOTAL XYLENES | 0.5        | UG/L  | 180 | < 0.5 |

SURROGATE:

BROMOFLUOROBENZENE (%) 104 98

SURROGATE LIMITS ( 80 - 120 )

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS  
REAGENT BLANK

|              |                        |                |           |
|--------------|------------------------|----------------|-----------|
| TEST         | : BTEX (EPA 8021)      | AEN I.D.       | : 802390  |
| BLANK I. D.  | : 030398 B             | DATE EXTRACTED | : N/A     |
| CLIENT       | : MARATHON OIL COMPANY | DATE ANALYZED  | : 3/3/98  |
| PROJECT #    | : 97002                | SAMPLE MATRIX  | : AQUEOUS |
| PROJECT NAME | : IB REMEDIATION       |                |           |

| PARAMETER     | UNITS |      |
|---------------|-------|------|
| BENZENE       | UG/L  | <0.5 |
| TOLUENE       | UG/L  | <0.5 |
| ETHYLBENZENE  | UG/L  | <0.5 |
| TOTAL XYLENES | UG/L  | <0.5 |

SURROGATE:

BROMOFLUOROBENZENE (%)

105

SURROGATE LIMITS: ( 80 - 120 )

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS  
REAGENT BLANK

|              |                        |                |           |
|--------------|------------------------|----------------|-----------|
| TEST         | : BTEX (EPA 8021)      | AEN I.D.       | : 802390  |
| BLANK I. D.  | : 030498               | DATE EXTRACTED | : N/A     |
| CLIENT       | : MARATHON OIL COMPANY | DATE ANALYZED  | : 3/4/98  |
| PROJECT #    | : 97002                | SAMPLE MATRIX  | : AQUEOUS |
| PROJECT NAME | : IB REMEDIATION       |                |           |

| PARAMETER     | UNITS |      |
|---------------|-------|------|
| BENZENE       | UG/L  | <0.5 |
| TOLUENE       | UG/L  | <0.5 |
| ETHYLBENZENE  | UG/L  | <0.5 |
| TOTAL XYLENES | UG/L  | <0.5 |

SURROGATE:

BROMOFLUOROBENZENE (%)

108

SURROGATE LIMITS: ( 80 - 120 )

CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY QUALITY CONTROL  
MSMSD

|              |                        |                |           |
|--------------|------------------------|----------------|-----------|
| TEST         | : BTEX (EPA 8021)      | AEN I.D.       | : 802390  |
| MSMSD #      | : 802397-04            | DATE EXTRACTED | : N/A     |
| CLIENT       | : MARATHON OIL COMPANY | DATE ANALYZED  | : 3/4/98  |
| PROJECT #    | : 97002                | SAMPLE MATRIX  | : AQUEOUS |
| PROJECT NAME | : IB REMEDIATION       | UNITS          | : UG/L    |

| PARAMETER     | SAMPLE<br>RESULT | CONC<br>SPIKE | SPIKED<br>SAMPLE | %<br>REC | DUP<br>SPIKE | DUP<br>% REC | RPD | REC<br>LIMITS | RPD<br>LIMITS |
|---------------|------------------|---------------|------------------|----------|--------------|--------------|-----|---------------|---------------|
| BENZENE       | 0.8              | 10.0          | 9.7              | 89       | 9.8          | 90           | 1   | ( 80 - 120 )  | 20            |
| TOLUENE       | 1.2              | 10.0          | 10.4             | 92       | 10.5         | 93           | 1   | ( 80 - 120 )  | 20            |
| ETHYLBENZENE  | 0.9              | 10.0          | 10.6             | 97       | 10.6         | 97           | 0   | ( 80 - 120 )  | 20            |
| TOTAL XYLENES | 1.5              | 30.0          | 30.2             | 96       | 30.1         | 95           | 0   | ( 80 - 120 )  | 20            |

CHEMIST NOTES:  
N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

**DISTRIBUTION:** White - AEN, Canary - Originator

# *American Environmental Network, Inc.*

AEN I.D. 801328

January 15, 1998

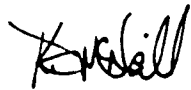
MARATHON OIL COMPANY  
P.O. BOX 552  
MIDLAND, TX 79702-0552

Project Name I.B. REMED  
Project Number 97002

Attention: PAUL PEACOCK

On 1/14/98 American Environmental Network (NM), Inc. (ADHS License No. AZ0015), received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

If you have any questions or comments, please do not hesitate to contact us at (505)344-3777.



Kimberly D. McNeill  
Project Manager



H. Mitchell Rubenstein, Ph. D.  
General Manager

MR: mt

Enclosure

|              |                        |               |           |
|--------------|------------------------|---------------|-----------|
| CLIENT       | : MARATHON OIL COMPANY | AEN I.D.      | : 801328  |
| PROJECT #    | : 97002                | DATE RECEIVED | : 1/14/98 |
| PROJECT NAME | : I.B. REMED           | REPORT DATE   | : 1/15/98 |

| AEN<br>ID. # | CLIENT DESCRIPTION | MATRIX | DATE<br>COLLECTED |
|--------------|--------------------|--------|-------------------|
| 01           | WEST INLET #1      | AQ     | 1/13/98           |
| 02           | WEST OUTLET #1     | AQ     | 1/13/98           |
| 03           | EAST INLET #1      | AQ     | 1/13/98           |
| 04           | EAST OUTLET #1     | AQ     | 1/13/98           |
| 05           | TRIP BLANK         | AQ     | 1/6/98            |

# GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8021)  
 CLIENT : MARATHON OIL COMPANY  
 PROJECT # : 97002  
 PROJECT NAME : I.B. REMED

AEN I.D.: 801328

| SAMPLE ID. # | CLIENT I.D.    | MATRIX  | DATE SAMPLED | DATE EXTRACTED | DATE ANALYZED | DIL. FACTOR |
|--------------|----------------|---------|--------------|----------------|---------------|-------------|
| 01           | WEST INLET #1  | AQUEOUS | 1/13/98      | NA             | 1/14/98       | 25          |
| 02           | WEST OUTLET #1 | AQUEOUS | 1/13/98      | NA             | 1/14/98       | 2           |
| 03           | EAST INLET #1  | AQUEOUS | 1/13/98      | NA             | 1/14/98       | 40          |

| PARAMETER     | DET. LIMIT | UNITS | 01  | 02  | 03   |
|---------------|------------|-------|-----|-----|------|
| BENZENE       | 0.5        | UG/L  | 56  | 2.5 | 98   |
| TOLUENE       | 0.5        | UG/L  | 30  | 11  | 170  |
| ETHYLBENZENE  | 0.5        | UG/L  | 93  | 4.8 | 220  |
| TOTAL XYLENES | 0.5        | UG/L  | 380 | 29  | 1200 |

## SURROGATE:

BROMOFLUOROBENZENE (%) 98 97 118  
 SURROGATE LIMITS ( 80 - 120 )

## CHEMIST NOTES:

N/A

# GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8021)  
 CLIENT : MARATHON OIL COMPANY AEN I.D.: 801328  
 PROJECT # : 97002  
 PROJECT NAME : I.B. REMED

| SAMPLE ID. #  | CLIENT I.D.    | MATRIX  | DATE SAMPLED | DATE EXTRACTED | DATE ANALYZED | DIL. FACTOR |
|---------------|----------------|---------|--------------|----------------|---------------|-------------|
| 04            | EAST OUTLET #1 | AQUEOUS | 1/13/98      | NA             | 1/14/98       | 5           |
| 05            | TRIP BLANK     | AQUEOUS | 1/6/98       | NA             | 1/14/98       | 1           |
| PARAMETER     | DET. LIMIT     | UNITS   | 04           | 05             |               |             |
| BENZENE       | 0.5            | UG/L    | 3.4          | < 0.5          |               |             |
| TOLUENE       | 0.5            | UG/L    | 11           | < 0.5          |               |             |
| ETHYLBENZENE  | 0.5            | UG/L    | 4.8          | < 0.5          |               |             |
| TOTAL XYLENES | 0.5            | UG/L    | 31           | < 0.5          |               |             |

## SURROGATE:

BROMOFLUOROBENZENE (%)

108

98

SURROGATE LIMITS ( 80 - 120 )

## CHEMIST NOTES:

N/A

GAS CHROMATOGRAPHY RESULTS  
REAGENT BLANK

|              |                        |                |           |
|--------------|------------------------|----------------|-----------|
| TEST         | : BTEX (EPA 8021)      | AEN I.D.       | : 801328  |
| BLANK I. D.  | : 011498               | DATE EXTRACTED | : NA      |
| CLIENT       | : MARATHON OIL COMPANY | DATE ANALYZED  | : 1/14/98 |
| PROJECT #    | : 97002                | SAMPLE MATRIX  | : AQUEOUS |
| PROJECT NAME | : I.B. REMED           |                |           |

| PARAMETER     | UNITS |      |
|---------------|-------|------|
| BENZENE       | UG/L  | <0.5 |
| TOLUENE       | UG/L  | <0.5 |
| ETHYLBENZENE  | UG/L  | <0.5 |
| TOTAL XYLENES | UG/L  | <0.5 |

SURROGATE:  
BROMOFLUOROBENZENE (%) 109  
SURROGATE LIMITS: ( 80 - 120 )  
CHEMIST NOTES:  
N/A

GAS CHROMATOGRAPHY QUALITY CONTROL  
MSMSD

|              |                        |                |           |
|--------------|------------------------|----------------|-----------|
| TEST         | : BTEX (EPA 8021)      | AEN I.D.       | : 801328  |
| MSMSD #      | : 011498               | DATE EXTRACTED | : NA      |
| CLIENT       | : MARATHON OIL COMPANY | DATE ANALYZED  | : 1/14/98 |
| PROJECT #    | : 97002                | SAMPLE MATRIX  | : AQUEOUS |
| PROJECT NAME | : I.B. REMED           | UNITS          | : UG/L    |

| PARAMETER     | SAMPLE<br>RESULT | CONC<br>SPIKE | SPIKED<br>SAMPLE | %<br>REC | DUP<br>SPIKE | DUP<br>% REC | RPD | REC<br>LIMITS | RPD<br>LIMITS |
|---------------|------------------|---------------|------------------|----------|--------------|--------------|-----|---------------|---------------|
| BENZENE       | <0.5             | 10.0          | 9.6              | 96       | 9.8          | 98           | 2   | ( 80 - 120 )  | 20            |
| TOLUENE       | <0.5             | 10.0          | 9.5              | 95       | 9.8          | 98           | 3   | ( 80 - 120 )  | 20            |
| ETHYLBENZENE  | <0.5             | 10.0          | 9.4              | 94       | 9.8          | 98           | 4   | ( 80 - 120 )  | 20            |
| TOTAL XYLENES | <0.5             | 30.0          | 29.3             | 98       | 29.6         | 99           | 1   | ( 80 - 120 )  | 20            |

CHEMIST NOTES:  
N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

# CHAIN OF CUSTODY

DATE \_\_\_\_\_ PAGE 1 OF 1

## PROJECT MANAGER:

COMPANY: Meredith Oil Co  
 ADDRESS: 125 West Missouri Street  
Midland, TX, 79701  
 PHONE: 915-687-8312  
 FAX: 915-687-8305  
 BILL TO: Bag Menzies  
 COMPANY: Meredith Oil Co  
 ADDRESS: PO Box 552  
Midland, TX. 79702

|                 |         |      |       |
|-----------------|---------|------|-------|
| WEST LUL #1     | 1-13-98 | 1230 | Water |
| WEST out Let #1 | 1-13-98 | 1235 | ↑     |
| EAST LUL #1     | 1-13-98 | 1240 | ↑     |
| EAST out Let #1 | 1-13-98 | 1250 | ↑     |
| TRIP Blank      | 1-6-98  | 1400 | Water |

|                                              |   |
|----------------------------------------------|---|
| Petroleum Hydrocarbons (418.1) TRPH          |   |
| (MOD.8015) Diesel/Direct/Inject              |   |
| (M8015) Gas/Purge & Trap                     |   |
| Gasoline/BTEX & MTBE (M8015/8020)            |   |
| BTEX/MTBE (8020)                             | X |
| BTEX & Chlorinated Aromatics (602/8020)      |   |
| BTEX/MTBE/EDC & EDB (8020/8010/Short)        |   |
| Chlorinated Hydrocarbons (601/8010)          |   |
| 504 EDB DBCP                                 |   |
| Polynuclear Aromatics (610/8310)             |   |
| Volatile Organics (624/8240) GC/MS           |   |
| Volatile Organics (8260) GC/MS               |   |
| Pesticides/PCB (608/8080)                    |   |
| Herbicides (615/8150)                        |   |
| Base/Neutral/Acid Compounds GC/MS (625/8270) |   |
| General Chemistry:                           |   |
| Priority Pollutant Metals (13)               |   |
| Target Analyte List Metals (23)              |   |
| RCRA Metals (8)                              |   |
| RCRA Metals by TCLP (Method 1311)            |   |
| Metals:                                      |   |

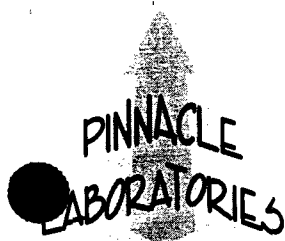
PLEASE FILL THIS FORM IN COMPLETELY.

PROJ NO: 97002  
 PROJ NAME: 113. Remed.  
 P.O. NO: \_\_\_\_\_  
 SHIPPED VIA: UPS

(PUSH) (12hr) (14hr) (172hr) (1 WEEK) (NORMAL) X  
 CERTIFICATION REQUIRED (1 NM) (1 SDWA) (1 OTHER)  
 METHANOL PRESERVATION (1)  
 COMMENTS: FIXED FEE (1)

Signature: [Signature] Time: 130 PM  
 Printed Name: Nick Thomas Date: 1-13-98  
 Company: MOORE ENVIRONMENTAL SERVICES

Signature: \_\_\_\_\_ Time: \_\_\_\_\_  
 Printed Name: \_\_\_\_\_ Date: \_\_\_\_\_  
 Company: \_\_\_\_\_



2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

AEN I.D. 805304

May 14, 1998

MARATHON OIL COMPANY  
P.O. BOX 552  
MIDLAND, TX 79702-0552

Project Name IB REMEDIATION  
Project Number (none)

Attention: PAUL PEACOCK

On 5/1/98 American Environmental Network (NM), Inc. (ADHS License No. AZ0015), received a request to analyze **aqueous** samples. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

Chloride was performed by American Environmental Network (FL) Inc., Pensacola, FL.

All other parameters were performed by American Environmental Network (NM) Inc., Albuquerque, NM.

If you have any questions or comments, please do not hesitate to contact us at (505)344-3777.

Kimberly D. McNeill  
Project Manager

H. Mitchell Rubenstein, Ph. D.  
General Manager

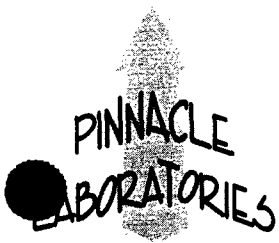
MR: mt

Enclosure

**MCR**

MAR 02 1999

Environmental & Safety

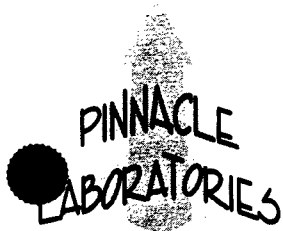


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Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

|              |                        |               |           |
|--------------|------------------------|---------------|-----------|
| CLIENT       | : MARATHON OIL COMPANY | AEN I.D.      | : 805304  |
| PROJECT #    | : (none)               | DATE RECEIVED | : 5/1/98  |
| PROJECT NAME | : IB REMEDIATION       | REPORT DATE   | : 5/14/98 |

---

| AEN<br>ID. # | CLIENT DESCRIPTION | MATRIX  | DATE<br>COLLECTED |
|--------------|--------------------|---------|-------------------|
| 01           | LYMON              | AQUEOUS | 4/30/98           |
| 02           | 1 LYMAN            | AQUEOUS | 4/30/98           |
| 03           | LYMAN              | AQUEOUS | 4/30/98           |
| 04           | E. STRIPPER INLET  | AQUEOUS | 4/30/98           |
| 05           | E. STRIPPER OUTLET | AQUEOUS | 4/30/98           |
| 06           | W. STRIPPER INLET  | AQUEOUS | 4/30/98           |
| 07           | W. STRIPPER OUTLET | AQUEOUS | 4/30/98           |



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Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

### GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8021)  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : IB REMEDIATION

AEN I.D.: 805304

| SAMPLE        |                   |            | DATE    | DATE      | DATE     | DIL.   |
|---------------|-------------------|------------|---------|-----------|----------|--------|
| ID. #         | CLIENT I.D.       | MATRIX     | SAMPLED | EXTRACTED | ANALYZED | FACTOR |
| 02            | 1 LYMAN           | AQUEOUS    | 4/30/98 | NA        | 5/5/98   | 1      |
| 03            | LYMAN             | AQUEOUS    | 4/30/98 | NA        | 5/5/98   | 1      |
| 04            | E. STRIPPER INLET | AQUEOUS    | 4/30/98 | NA        | 5/5/98   | 20     |
| PARAMETER     |                   | DET. LIMIT | UNITS   | 02        | 03       | 04     |
| BENZENE       |                   | 0.5        | UG/L    | < 0.5     | < 0.5    | 69     |
| TOLUENE       |                   | 0.5        | UG/L    | < 0.5     | < 0.5    | 69     |
| ETHYLBENZENE  |                   | 0.5        | UG/L    | < 0.5     | < 0.5    | 23     |
| TOTAL XYLENES |                   | 0.5        | UG/L    | < 0.5     | < 0.5    | 530    |

#### SURROGATE:

BROMOFLUOROBENZENE (%)

99

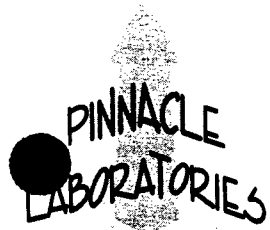
96

103

SURROGATE LIMITS ( 80 - 120 )

#### CHEMIST NOTES:

N/A



2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

# GAS CHROMATOGRAPHY RESULTS

TEST : BTEX (EPA 8021)  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : IB REMEDIATION

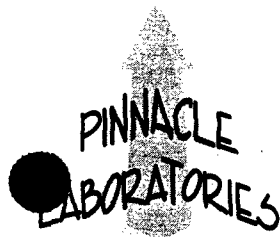
AEN I.D.: 805304

| SAMPLE ID. #  | CLIENT I.D.        | MATRIX  | DATE SAMPLED | DATE EXTRACTED | DATE ANALYZED | DIL. FACTOR |
|---------------|--------------------|---------|--------------|----------------|---------------|-------------|
| 05            | E. STRIPPER OUTLET | AQUEOUS | 4/30/98      | NA             | 5/5/98        | 1           |
| 06            | W. STRIPPER INLET  | AQUEOUS | 4/30/98      | NA             | 5/5/98        | 20          |
| 07            | W. STRIPPER OUTLET | AQUEOUS | 4/30/98      | NA             | 5/5/98        | 5           |
| PARAMETER     | DET. LIMIT         | UNITS   | 05           | 06             | 07            |             |
| BENZENE       | 0.5                | UG/L    | < 0.5        | 59             | < 2.5         |             |
| TOLUENE       | 0.5                | UG/L    | 9.8          | 23             | 14            |             |
| ETHYLBENZENE  | 0.5                | UG/L    | 3.6          | 66             | 8.3           |             |
| TOTAL XYLENES | 0.5                | UG/L    | 21           | 470            | 59            |             |

SURROGATE:  
BROMOFLUOROBENZENE (%) 109 98 123 \*  
SURROGATE LIMITS ( 80 - 120 )

## CHEMIST NOTES:

\* - SURROGATE RECOVERY HIGH DUE TO MATRIX INTERFERENCE.



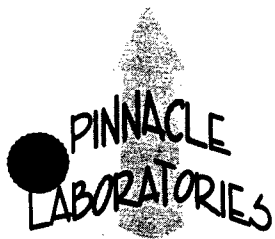
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Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

GAS CHROMATOGRAPHY RESULTS  
REAGENT BLANK

|              |                        |                |           |
|--------------|------------------------|----------------|-----------|
| TEST         | : BTEX (EPA 8021)      | AEN I.D.       | : 805304  |
| BLANK I. D.  | : 050498               | DATE EXTRACTED | : NA      |
| CLIENT       | : MARATHON OIL COMPANY | DATE ANALYZED  | : 5/4/98  |
| PROJECT #    | : (none)               | SAMPLE MATRIX  | : AQUEOUS |
| PROJECT NAME | : IB REMEDIATION       |                |           |

| PARAMETER     | UNITS |      |
|---------------|-------|------|
| BENZENE       | UG/L  | <0.5 |
| TOLUENE       | UG/L  | <0.5 |
| ETHYLBENZENE  | UG/L  | <0.5 |
| TOTAL XYLENES | UG/L  | <0.5 |

SURROGATE:  
BROMOFLUOROBENZENE (%) 105  
SURROGATE LIMITS: ( 80 - 120 )  
ANALYST NOTES:  
N/A



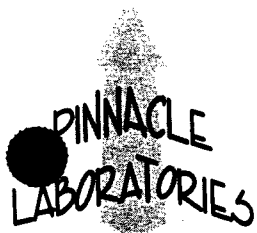
2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

GAS CHROMATOGRAPHY RESULTS  
REAGENT BLANK

|              |                        |                |           |
|--------------|------------------------|----------------|-----------|
| TEST         | : BTEX (EPA 8021)      | AEN I.D.       | : 805304  |
| BLANK I. D.  | : 050598               | DATE EXTRACTED | : NA      |
| CLIENT       | : MARATHON OIL COMPANY | DATE ANALYZED  | : 5/5/98  |
| PROJECT #    | : (none)               | SAMPLE MATRIX  | : AQUEOUS |
| PROJECT NAME | : IB REMEDIATION       |                |           |

| PARAMETER     | UNITS |      |
|---------------|-------|------|
| BENZENE       | UG/L  | <0.5 |
| TOLUENE       | UG/L  | <0.5 |
| ETHYLBENZENE  | UG/L  | <0.5 |
| TOTAL XYLENES | UG/L  | <0.5 |

SURROGATE:  
BROMOFLUOROBENZENE (%) 104  
SURROGATE LIMITS: ( 80 - 120 )  
CHEMIST NOTES:  
N/A



2709-D Pan American Freeway NE  
Albuquerque, New Mexico 87107  
Phone (505) 344-3777  
Fax (505) 344-4413

GAS CHROMATOGRAPHY QUALITY CONTROL  
MSMSD

TEST : BTEX (EPA 8021)  
MSMSD # : 805304-03  
CLIENT : MARATHON OIL COMPANY  
PROJECT # : (none)  
PROJECT NAME : IB REMEDIATION  
AEN I.D. : 805304  
DATE EXTRACTED : NA  
DATE ANALYZED : 5/5/98  
SAMPLE MATRIX : AQUEOUS  
UNITS : UG/L

| PARAMETER     | SAMPLE<br>RESULT | CONC<br>SPIKE | SPIKED<br>SAMPLE | %<br>REC | DUP<br>SPIKE | DUP<br>% REC | RPD | REC<br>LIMITS | RPD<br>LIMITS |
|---------------|------------------|---------------|------------------|----------|--------------|--------------|-----|---------------|---------------|
| BENZENE       | <0.5             | 10.0          | 9.4              | 94       | 9.6          | 96           | 2   | ( 80 - 120 )  | 20            |
| TOLUENE       | <0.5             | 10.0          | 9.8              | 98       | 9.9          | 99           | 1   | ( 80 - 120 )  | 20            |
| ETHYLBENZENE  | <0.5             | 10.0          | 10.4             | 104      | 10.6         | 106          | 2   | ( 80 - 120 )  | 20            |
| TOTAL XYLENES | <0.5             | 30.0          | 31.4             | 105      | 31.6         | 105          | 1   | ( 80 - 120 )  | 20            |

CHEMIST NOTES:  
N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$



# *American Environmental Network, Inc.*

11 EAST OLIVE ROAD • PENSACOLA, FL 32514 • (850) 474-1001

SIGNATURE PAGE

Reviewed by:

A handwritten signature in cursive script, appearing to read 'M. Patrick', is written over a horizontal line.

AEN Project Manager

Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.  
ALBUQUERQUE, NEW MEXICO

Project Name: MOC  
Project Number: 805304  
Project Location: IB REMEDATION  
Accession Number: 805014

Project Manager: KIMBERLY D. MCNEILL  
Sampled By: N/S

Analysis Report

Analysis: Group of Single Wetchem

|                   |                                                  |
|-------------------|--------------------------------------------------|
| Accession:        | 805014                                           |
| Client:           | AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC. |
| Project Number:   | 805304                                           |
| Project Name:     | MOC                                              |
| Project Location: | IB REMEDATION                                    |
| Department:       | WET CHEM                                         |

[0] Page 1  
Date 12-May-98

"FINAL REPORT FORMAT - SINGLE"

Accession: 805014  
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.  
Project Number: 805304  
Project Name: MOC  
Project Location: IB REMEDATION  
Test: Group of Single Wetchem  
Matrix: WATER  
QC Level: II

Lab ID: 001  
Client Sample Id: 805304-01

Sample Date/Time: 30-APR-98 1405  
Received Date: 02-MAY-98

| Parameters:          | Units: | Results: | Rpt Lmts: | Q: | Batch: | Analyst: |
|----------------------|--------|----------|-----------|----|--------|----------|
| CHLORIDE (4500-CL B) | MG/L   | 15       | 1         |    | CIW048 | RB       |

Comments:

[0] Page 2  
Date 12-May-98

"Method Report Summary"

Accession Number: 805014  
Client: AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC.  
Project Number: 805304  
Project Name: MOC  
Project Location: IB REMEDIATION  
Test: Group of Single Wetchem

---

| Client Sample Id: | Parameter:           | Unit: | Result: |
|-------------------|----------------------|-------|---------|
| 805304-01         | CHLORIDE (4500-CL B) | MG/L  | 15      |

## Data Qualifiers for Final Report

AEN-Pensacola Inorganic/Organic

|                   |                                                                                                   |
|-------------------|---------------------------------------------------------------------------------------------------|
| +                 | Adjusted reporting limit due to sample matrix (dilution prior to digestion and/or analysis)       |
| *                 | Elevated reporting limit due to dilution into calibration range                                   |
| #                 | Elevated reporting limit due to matrix interference (dilution prior to digestion and/or analysis) |
| D                 | Elevated reporting limit due to insufficient sample size                                          |
|                   | Diluted out                                                                                       |
| J5                | The reported value is quantitated as a TIC; therefore, it is estimated                            |
| ND = Not Detected | N/S = Not Submitted      N/A = Not Applicable                                                     |

Florida Projects Inorganic/Organic

|                    |                                                                                                               |
|--------------------|---------------------------------------------------------------------------------------------------------------|
| Y1                 | Improper preservation, no preservative present in sample upon receipt                                         |
| Y2                 | Improper preservation, incorrect preservative present in sample upon receipt                                  |
| Y3                 | Improper preservation, sample temperature exceeded EPA temperature limits of 2-6°C upon receipt               |
| Y (FL description) | The laboratory analysis was from an unpreserved or improperly preserved sample. The data may not be accurate. |
| Q                  | Sample held beyond the accepted holding time                                                                  |
| I                  | The reported value is < Laboratory RL and > laboratory MDL                                                    |
| U1                 | The reported value is ≤ Laboratory MDL (value for sample result is reported as the MDL)                       |
| U (FL description) | Indicates the compound was analyzed for but not detected.                                                     |
| T                  | The reported value is < Laboratory MDL (value shall not be used for statistical analysis)                     |
| V                  | The analyte was detected in both the sample and the associated method blank.                                  |
| J1                 | Surrogate recovery limits have been exceeded                                                                  |
| J2                 | The sample matrix interfered with the ability to make any accurate determinations                             |
| J3                 | The reported value failed to meet the established quality control criteria for either precision or accuracy   |
| J (FL description) | Estimated value; not accurate.                                                                                |

AFCEE Projects (under QAPP) and All Other (AEN-PN) Projects/Sites for Inorganic/Organic Parameters

|                       |                                                                                                       |
|-----------------------|-------------------------------------------------------------------------------------------------------|
| J4                    | (For positive results)      Temperature limits exceeded (≤2°C or ≥ 6°C)                               |
| J (AFCEE description) | The analyte was positively identified, the quantitation is an estimation                              |
| R1                    | (For nondetects)      Temperature limits exceeded (≤2°C or ≥ 6°C)                                     |
|                       | Improper preservation, no preservative present in sample upon receipt                                 |
|                       | Improper preservation, incorrect preservative present in sample upon receipt                          |
| R4                    | Holding time exceeded                                                                                 |
| R5                    | Collection requirements not met, improper container used for sample                                   |
| R (AFCEE description) | The data are unusable due to deficiencies in the ability to analyze the sample and meet QC criteria   |
| F                     | < RL and > laboratory MDL                                                                             |
| F (AFCEE description) | The analyte was positively identified but the associated numerical value is below the AFCEE or lab RL |
| U2                    | ≤ Laboratory MDL (value for result will be the MDL, never below the MDL)                              |
| U (AFCEE description) | The analyte was analyzed for but not detected. The associated numerical value is at or below the MDL  |
| B (AFCEE description) | The analyte was found in the associated blank, as well as in the sample                               |

ICR Projects Inorganic/Organic

|    |            |
|----|------------|
| A  | Acceptable |
| R6 | Rejected   |

Examples: ICR Flags

R6 = Laboratory extracted the sample but the refrigerator malfunctioned so the extract became warm and client was notified

R6 = Sample arrived in laboratory in good condition; however, the laboratory did not analyze it within EPA's established holding time limit.

CLP and CLP-like Projects

Refer to referenced CLP Statement of Work (SOW) for explanation of data qualifiers

IDL = Laboratory Instrument Detection Limit

MDL = Laboratory Method Detection Limit

RL = Reporting Limit (AFCEE RLs are listed in the AFCEE QAPP)

CLP CRDL = CLP Contract Required Detection Limit (these limits are listed in the EPA CLP Statement of Work or SOW)

CLP CRQL = CLP Contract Required Quantitation Limit (these limits are listed in the EPA CLP Statement of Work or SOW)

Any time a sample arrives at the laboratory improperly preserved (at improper pH or temperature) or after holding time has expired or prepared or analyzed after holding time, client must be notified in writing (i.e. case narrative).

AEN-Pensacola uses the most current promulgated methods contained in the reference manuals.

Quality Control Report

Analysis: Group of Single Wetchem

|                   |                                                  |
|-------------------|--------------------------------------------------|
| Accession:        | 805014                                           |
| Client:           | AMERICAN ENVIRONMENTAL NETWORK (NEW MEXICO) INC. |
| Project Number:   | 805304                                           |
| Project Name:     | MOC                                              |
| Project Location: | IB REMEDATION                                    |
| Department:       | WET CHEM                                         |

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Date 12-May-98

"WetChem Quality Control Report"

|                |           |
|----------------|-----------|
| Parameter:     | CHLORIDE  |
| Batch Id:      | CIW048    |
| Blank Result:  | <1        |
| Anal. Method:  | 325.3     |
| Prep. Method:  | N/A       |
| Analysis Date: | 04-MAY-98 |
| Prep. Date:    | 04-MAY-98 |

Sample Duplication

|             |          |
|-------------|----------|
| Sample Dup: | 805003-1 |
| Rept Limit: | <1       |

|                |      |
|----------------|------|
| Sample Result: | 52.4 |
| Dup Result:    | 52.3 |
| Sample RPD:    | 0    |
| Max RPD:       | 6    |
| Dry Weight%    | N/A  |

Matrix Spike

|                |          |
|----------------|----------|
| Sample Spiked: | 805003-1 |
| Rept Limit:    | <1       |

|                |        |
|----------------|--------|
| Sample Result: | 52.4   |
| Spiked Result: | 107.8  |
| Spike Added:   | 55.0   |
| % Recovery:    | 101    |
| % Rec Limits:  | 88-113 |
| Dry Weight%    | N/A    |

ICV

|               |        |
|---------------|--------|
| ICV Result:   | 99     |
| True Result:  | 100    |
| % Recovery:   | 99     |
| % Rec Limits: | 90-110 |

LCS

|               |  |
|---------------|--|
| LCS Result:   |  |
| True Result:  |  |
| % Recovery:   |  |
| % Rec Limits: |  |

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Date 12-May-98

----- Common Footnotes WetChem -----

N/A = NOT APPLICABLE.  
 N/S = NOT SUBMITTED.  
 N/C = SAMPLE AND DUPLICATE RESULTS ARE AT OR BELOW AEN REPORTING LIMIT;  
 THEREFORE, THE RPD IS "NOT CALCULABLE" AND NO CONTROL LIMITS APPLY.  
 N/D = NOT DETECTED.  
 R = REACTIVE  
 T = TOTAL  
 G = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X AEN REPORTING LIMIT AND  
 THE ABSOLUTE DIFFERENCE BETWEEN THE SAMPLE AND DUPLICATE RESULT IS AT  
 OR BELOW AEN REPORTING LIMIT; THEREFORE, THE RESULTS ARE "IN CONTROL".  
 Q = THE ANALYTICAL (POST-DISTILLATION) SPIKE IS REPORTED DUE TO PERCENT RECOVERY  
 BEING OUTSIDE ACCEPTANCE LIMITS ON THE MATRIX (PRE-DISTILLATION) SPIKE.  
 # = ELEVATED REPORTING LIMIT DUE TO INSUFFICIENT SAMPLE.  
 + = ELEVATED REPORTING LIMIT DUE TO DILUTION INTO CALIBRATION RANGE.  
 \* = ELEVATED REPORTING LIMIT DUE TO MATRIX INTERFERENCE (DILUTION PRIOR DIGESTION  
 AND/OR ANALYSIS).  
 @ = ADJUSTED REPORTING LIMIT DUE TO SAMPLE MATRIX (DILUTION PRIOR TO DIGESTION  
 AND/OR ANALYSIS).  
 P = ANALYTICAL (POST DIGESTION) SPIKE.  
 I = DUPLICATE INJECTION.  
 & = AUTOMATED  
 F = SAMPLE SPIKED > 4 X SPIKE CONCENTRATION.  
 N/C+ = NOT CALCULABLE  
 H = SAMPLE AND/OR DUPLICATE RESULT IS BELOW 5 X AEN REPORTING LIMIT AND THE  
 ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE AEN REPORTING  
 LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".  
 A = SAMPLE AND DUPLICATE RESULTS ARE "OUT OF CONTROL".  
 Z = THE SAMPLE RESULT FOR THE SPIKE IS BELOW THE REPORTING LIMIT. HOWEVER,  
 THIS RESULT IS REPORTED FOR ACCURATE QC CALCULATIONS.  
 NH= SAMPLE AND / OR DUPLICATE RESULT IS BELOW 5 X AEN REPORTING LIMIT  
 AND THE ABSOLUTE DIFFERENCE BETWEEN THE RESULTS EXCEEDS THE AEN  
 REPORTING LIMIT; THEREFORE, THE RESULTS ARE "OUT OF CONTROL".  
 SAMPLE IS NON-HOMOGENEOUS.  
 (\*) = REPORTING LIMITS RAISED DUE TO CLP METHOD NOT REQUIRING A CONCENTRATION STEP FOR CN.  
 (CA) = SEE CORRECTIVE ACTIONS FORM.  
 \*\*= MATRIX INTERFERENCE  
 SW-846, 3rd Edition, latest EPA-approved edition.  
 EPA 600/4-79-020, Revised March 1983.  
 STANDARD METHODS, For the Examination of Water and Wastewater, latest EPA-approved edition.  
 NIOSH Manual of Analytical Methods, 4th Edition.  
 ANNUAL BOOK OF ASTM STANDARDS, VOLUMES 11.01 and 11.02, latest EPA-approved edition.  
 METHODS FOR THE DETERMINATION OF INORGANIC SUBSTANCES IN ENVIRONMENTAL SAMPLES,  
 EPA600/R-93/100, AUGUST 1993  
 METHODS FOR SOIL ANALYSIS, PART 2, CHEMICAL AND MICROBIOLOGICAL PROPERTIES, 2ND EDITION.  
 AEN-PN USES THE MOST CURRENT PROMULGATED METHODS FROM THE REFERENCES LISTED ABOVE.

1. COLIFORM. COLIFORM PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN  
 THE LOGARITHM OF COLONIES PER 100 MLS OF SAMPLE ON DUPLICATE PLATES.
2. PH. PH PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN THE  
 SAMPLE AND DUPLICATE ANALYSIS.
3. FLASHPOINT. FLASHPOINT PRECISION IS MEASURED BY THE ABSOLUTE DIFFERENCE BETWEEN  
 THE SAMPLE AND DUPLICATE ANALYSIS.

RPD = RELATIVE PERCENT DIFFERENCE (OR DEVIATION).  
 RPT LMTS = REPORTING LIMITS BASED ON METHOD DETECTION LIMIT STUDIES.

DPH = DOLLY P. HWANG      RB = REBECCA BROWN      WH = WENDY HAGGARD  
 ED = ESTHER DANTIN      CR = CYNTHIA ROBERTS      AB = AMY BRADLEY  
 BE = BETTY EVERTON      PLD = PAULA L. DOUGHTY      JTZ = JONATHAN T. ZIENTARSKI  
 RH = RICKY HAGENDORFER

# American Environmental Network of Florida

## PROJECT SAMPLE INSPECTION FORM

Lab Accession #: 205014

Date Received: 02-May-98

1. Was there a Chain of Custody? ☒ Yes ☐ No\*
2. Was Chain of Custody properly filled out and relinquished? ☒ Yes ☐ No\*
3. Were samples received cold? ☒ Yes ☐ No\* N/A  
(Criteria: 2° - 6°C: AEN-SOP 1055)
4. Were all samples properly labeled and identified? ☒ Yes ☐ No\*
5. Did samples require splitting? Yes\* ☒ No  
Req By: PM Client Other\*
6. Were samples received in proper containers for analysis requested? ☒ Yes ☐ No\*
7. Were all sample containers received intact? ☒ Yes ☐ No\*

8. Were samples checked for preservative? ☒ Yes ☐ No\* N/A  
(Check pH of all H<sub>2</sub>O requiring preservative except VOA vials that require zero headspace)\*
9. Is there sufficient volume for analysis requested? ☒ Yes ☐ No\*
10. Were samples received within Holding Time? ☒ Yes ☐ No\*  
(REFER TO AEN-SOP 1040)
11. Is Headspace visible > ¼" in diameter in VOA vials? \* If any headspace is evident, comment in out-of-control section. Yes\* No ☒ N/A
12. If sent, were matrix spike bottles returned? Yes No\* ☒ N/A
13. Was Project Manager notified of problems? (initials: \_\_\_\_\_) Yes No\* ☒ N/A

Airbill Number(s): 367 8766 813

Shipped By: FEREX

Cooler Number(s): Client Cooler

Shipping Charges: N/A

Cooler Weight(s): N/A

Cooler Temp(s) (°C): 3.0°C - CCHB

(LIST THERMOMETER NUMBER(S) FOR VERIFICATION)

### Out of Control Events and Inspection Comments:

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(USE BACK OF PSIF FOR ADDITIONAL NOTES AND COMMENTS)

Inspected By: PKE Date: 5/2/98 Logged By: PKE Date: 5/2/98

*Note all Out-of-Control and/or questionable events on Comment Section of this form.*

*Note who requested the splitting of samples on the Comment Section of this form.*

+ All preservatives for the State of North Carolina, the State of New York, and other requested samples are to be recorded on the sheet provided to record pH results (AEN-SOP 938, section 2.2.9).

\* According to EPA, ¼" of headspace is allowed in 40 ml vials requiring volatile analysis, however, AEN makes it policy to record any headspace as out-of-control (AEN-SOP 938, section 2.2.12).

# Interlab Chain of Custody

DATE: 5/1/98 PAGE: 1 OF 1

NETWORK PROJECT MANAGER: KIMBERLY D. MCNEILL

COMPANY: AMERICAN ENVIRONMENTAL NETWORK  
ADDRESS: 2709-D Pan American Freeway, NE  
Albuquerque, NM 87107

805014

CLIENT PROJECT MANAGER:

Kim McNeill

SAMPLE ID DATE TIME MATRIX LAB ID

805304-01 4/30 1405 AQ 1

|                                              |  |
|----------------------------------------------|--|
| Metals - TAL                                 |  |
| Metals - PP List                             |  |
| Metals - RCRA                                |  |
| RCRA Metals by TCLP (1311)                   |  |
| Chloride                                     |  |
| TOX                                          |  |
| TOC                                          |  |
| Gen Chemistry                                |  |
| Oil and Grease                               |  |
| BOD                                          |  |
| COD                                          |  |
| Pesticides/PCB (608/8080)                    |  |
| Herbicides (615/8150)                        |  |
| Base/Neutral Acid Compounds GC/MS (625/8270) |  |
| Volatile Organics GC/MS (624/8240)           |  |
| Polynuclear Aromatics (610/8310)             |  |
| 8240 (TCLP 1311) ZHE                         |  |
| 8270 (TCLP 1311)                             |  |
| TO-14                                        |  |
| Gross Alpha/Beta                             |  |
| NUMBER OF CONTAINERS                         |  |

## PROJECT INFORMATION

## SAMPLE RECEIPT

## SAMPLES SENT TO:

## RELINQUISHED BY:

## RELINQUISHED BY:

PROJECT NUMBER: 805304

TOTAL NUMBER OF CONTAINERS

CONNECTICUT

Signature: [Signature] Time: [Time]

Signature: [Signature] Time: [Time]

PROJECT NAME: Martha Oil Co.

CHAIN OF CUSTODY SEALS

ILLINOIS

Printed Name: [Name] Date: 5/1/98

Printed Name: [Name] Date: [Date]

OC LEVEL: STD IV

INTACT?

MASSACHUSETTS

Signature: [Signature] Time: [Time]

Signature: [Signature] Time: [Time]

OC REQUIRED: MS MSD BLANK

RECEIVED GOOD COND/COLD

PENSACOLA

Signature: [Signature] Time: [Time]

Signature: [Signature] Time: [Time]

TAT: STANDARD RUSHI

LAB NUMBER

PORTLAND

Signature: [Signature] Time: [Time]

Signature: [Signature] Time: [Time]

DUE DATE: 5/13

RECEIVED BY: 1.

PHOENIX

Signature: [Signature] Time: [Time]

Signature: [Signature] Time: [Time]

RUSH SURCHARGE:

RECEIVED BY: 2.

N. CAROLINA

Signature: [Signature] Time: [Time]

Signature: [Signature] Time: [Time]

SPECIAL CERTIFICATE REQUIRED: ☐ YES ☐ NO

Company: AEM

Signature: [Signature] Time: [Time]

Signature: [Signature] Time: [Time]

## CHAIN OF CUSTODY

DATE: 4-30-98 PAGE: 1 OF 1

PROJECT MANAGER: Paul Peacock

COMPANY: MARATHON OIL Co

ADDRESS: P.O. Box 552

Midland TX 79702

PHONE: 915 687-8312

FAX: 915 687-8385

BILL TO:

Same as Above

COMPANY:

ADDRESS:

| DATE | TIME    | LOCATION | ANALYST | TESTS                                                                                               |
|------|---------|----------|---------|-----------------------------------------------------------------------------------------------------|
| 4-30 | 2:05 PM | water    |         | Petroleum Hydrocarbons (418.1) TRPH                                                                 |
| "    | 2:07 PM | "        |         | (MOD.8015) Diesel/Direct Inject                                                                     |
| "    | 2:09 PM | "        |         | (M8015) Gas/Purge & Trap                                                                            |
| "    | 2:44 PM | "        |         | 8021 (BTEX)/8015 (Gasoline)                                                                         |
| "    | 2:46 PM | "        |         | 8021 (BTEX) <input type="checkbox"/> MTBE <input type="checkbox"/> TMB <input type="checkbox"/> PCE |
| "    | 2:49 PM | "        |         | 8021 (TCL)                                                                                          |
| "    | 2:53 PM | "        |         | 8021 (EDX)                                                                                          |
| "    |         |          |         | 8021 (HALO)                                                                                         |
| "    |         |          |         | 8021 (CUST)                                                                                         |
| "    |         |          |         | 504.1 EDB <input type="checkbox"/> / DBCP <input type="checkbox"/>                                  |
| "    |         |          |         | BTEX (8020)                                                                                         |
| "    |         |          |         | 8260 (TCL) Volatile Organics                                                                        |
| "    |         |          |         | 8260 (Full) Volatile Organics                                                                       |
| "    |         |          |         | 8260 (CUST) Volatile Organics                                                                       |
| "    |         |          |         | 8260 (Landfill) Volatile Organics                                                                   |
| "    |         |          |         | Pesticides /PCB (608/8081)                                                                          |
| "    |         |          |         | Herbicides (615/8151)                                                                               |
| "    |         |          |         | Base/Neutral/Acid Compounds GC/MS (625/8270)                                                        |
| "    |         |          |         | Polynuclear Aromatics (610/8310)                                                                    |
| "    |         |          |         | General Chemistry:                                                                                  |
| "    |         |          |         | chloride                                                                                            |
| "    |         |          |         | Priority Pollutant Metals (13)                                                                      |
| "    |         |          |         | Target Analyte List Metals (23)                                                                     |
| "    |         |          |         | RCRA Metals (8)                                                                                     |
| "    |         |          |         | RCRA Metals by TCLP (Method 1311)                                                                   |
| "    |         |          |         | Metals:                                                                                             |

## PROJECT INFORMATION

PROJ. NO.:

PROJ. NAME: 78 Remediation

P.O. NO.:

SHIPPED VIA:

MATERIAL RECEIPT

ANALYST

ANALYST

ANALYST

ANALYST

ANALYST

ANALYST

## PHYSICAL/HOZHAZARD INFORMATION REQUIRED FOR DISPOSAL OF SOLIDS

(RUSH) ☐ 24hr ☐ 48hr ☐ 72hr ☐ 1 WEEK (NORMAL) ☒CERTIFICATION REQUIRED: ☐ NM ☐ SDWA ☐ OTHERMETHANOL PRESERVATION ☐COMMENTS: FIXED FEE ☐

## SIGNED AND DATED

Signature: [Signature]

Printed Name: [Name]

Date: 4-30-98

Time: 3:00 PM

Company: Marathon Oil Co

Signature: [Signature]

Printed Name: [Name]

Date: 4/30/98

Time: 1:50

Company: [Company]

Signature: [Signature]

DISTRIBUTION: White - [Distribution]

**DISTRIBUTION:** White - Canary - Originator