



STATE OF WASHINGTON  
DEPARTMENT OF ECOLOGY

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September 6, 2000

Mr. Marvin Furman  
U.S. Department of Energy  
P.O. Box 550, MSIN: A5-13  
Richland, Washington 99352

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EDMC

Dear Mr. Furman:

Re: Groundwater Contamination Depth Data

During our discussions on the installation of Tri-Party Agreement Milestone M-24-00L/M groundwater monitoring wells for calendar year (CY) 2000, the Washington State Department of Ecology (Ecology) indicated the need for additional data to understand the vertical distribution of contamination in the 200 West Area (as required by 40 Code of Federal Regulations, Subpart F as referenced by Washington Administrative Code 173-303-400). Upon Ecology's request, on August 25, 2000, you faxed contaminant depth distribution information and data obtained during the installation of CY 1998 and 1999 groundwater monitoring wells. Your provision of this information and data is appreciated. This aquifer depth data represents a start towards meeting interim status groundwater assessment requirements for vertical contamination delineation associated with the tank farm waste management areas (WMAs).

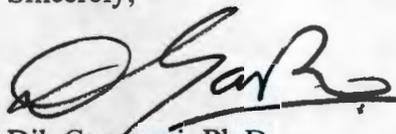
Upon review of the data, Ecology has concluded that the depth distribution data is of significant qualitative value. Perhaps the most important conclusion reached from the profiles, data, and trends is that there is a strong indication that contaminants are more deeply distributed than previously assumed. In other words, the data represents qualitative evidence that contaminants are not restricted to the very top of the aquifer. Although it may be argued that the data is not quantitative, it may also be argued that such qualitative data is of particular and immediate importance to support future quantitative characterization requirements (i.e., interim status groundwater assessment requirements). Due to the significance of this data, Ecology concurs that it is reasonable to consider potential "drag-down" effects during drilling as contributing to the occurrence of contamination at depth. Upon review of the data, it is Ecology's conclusion that contaminant concentrations observed at depth are not entirely attributable to a "drag-down" effect. Considering the data provided (see enclosure), it is Ecology's position that a comparison of contaminants, sampling modes, and respective depths indicates: 1) contaminants are occurring deeper than previously assumed; 2) a favorable comparison between the sampling methods and

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concentration measurements; and 3) contaminants at depth cannot be attributed entirely to "drag-down" during drilling. Therefore, from the few depth (aquifer) profiles obtained thus far, there is ample justification to obtain additional such characterization information during the installation of CY 2000 groundwater monitoring wells, as we discussed during the TPA Milestone M-24-00L/M workshops/negotiations.

Ecology urges that the U.S. Department of Energy meet the characterization objectives discussed during the TPA Milestone M-24-00L/M workshops/negotiations. Ecology representatives look forward to meeting with you and your project scientists on September 7 or 8, 2000, to discuss this issue. If you have any questions regarding this letter, please call Alisa Huckaby, the Ecology groundwater monitoring lead, at (509) 736-3034.

Sincerely,



Dib Goswami, Ph.D.  
Senior Hydrologist  
Nuclear Waste Program

ADH:SL:lkd

cc/enc: Doug Sherwood, EPA  
Stan Sobczyk, NPT  
Wade Riggsbee, YIN  
Merilyn Reeves, HAB  
Mary Lou Blazek, OOE

**Administrative Record: S-SX, T, and TX-TY WMAs**

cc: Wade Ballard, USDOE  
John Silko, USDOE  
Mike Thompson, USDOE  
Garret Day, BHI  
John Fruchter, PNNL  
Floyd Hodges, PNNL  
Vern Johnson, PNNL  
Stuart Luttrell, PNNL  
Susan Narbutovskih, PNNL  
Marty Gardner, WMH

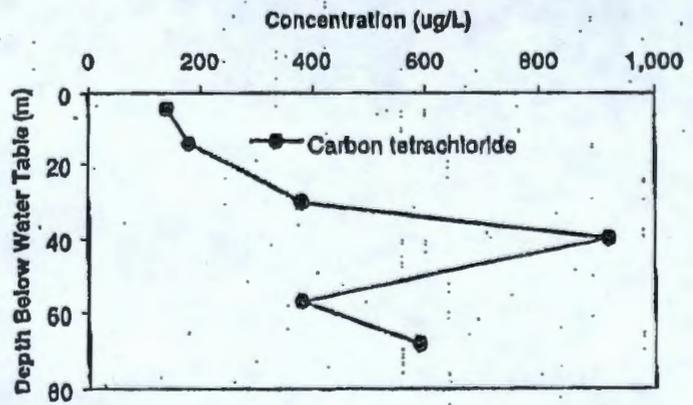
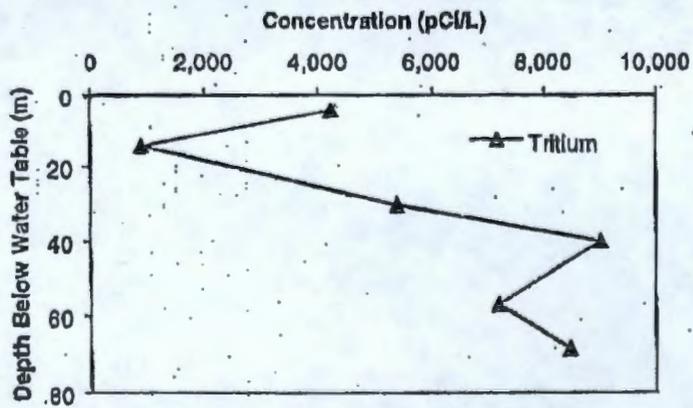
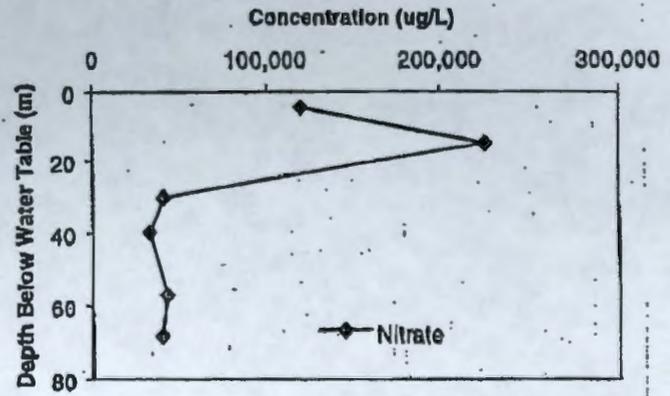
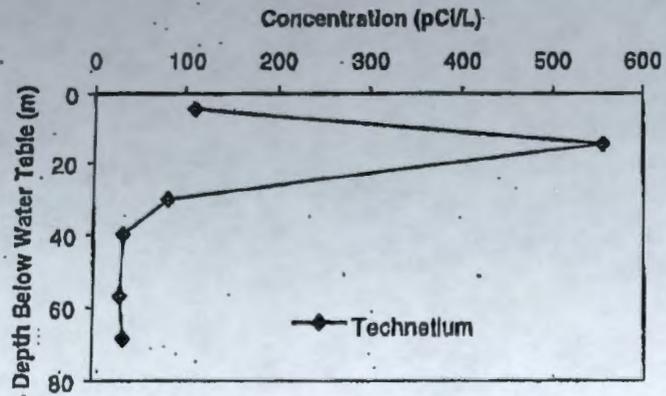
|                   |           |         |           |            |   |
|-------------------|-----------|---------|-----------|------------|---|
| Post-it* Fax Note | 7671      | Date    | 8/24/02   | # of pages | 7 |
| To                | A. Huxley | From    | M. Furman |            |   |
| Co./Dept.         |           | Co.     |           |            |   |
| Phone #           | 736-3034  | Phone # | 373-9630  |            |   |
| Fax #             | 736-3030  | Fax #   |           |            |   |

**DEPTH DISRIBU**

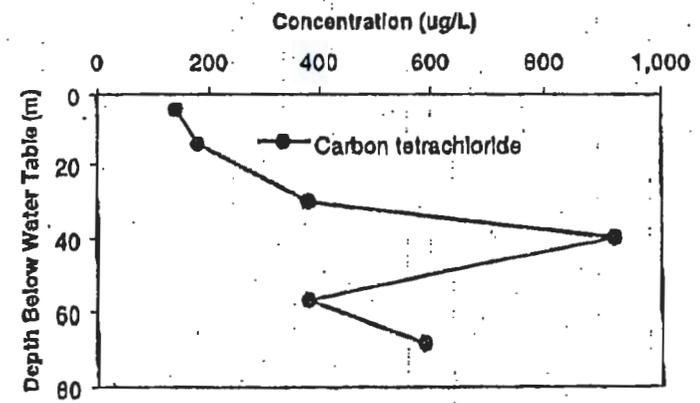
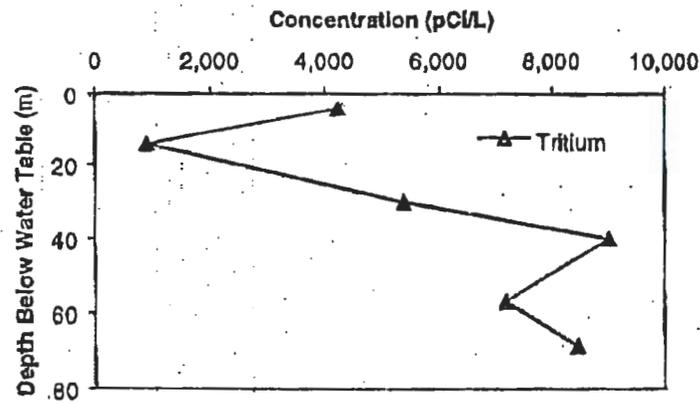
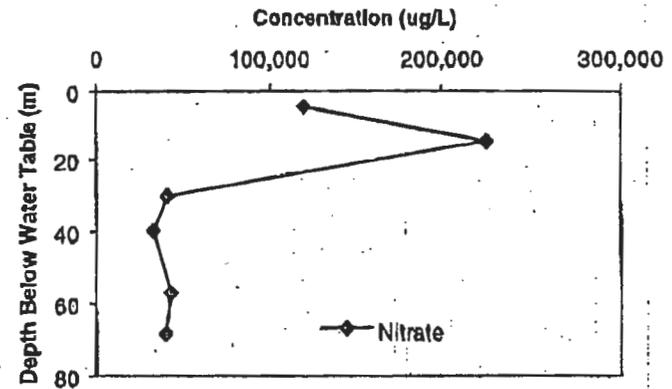
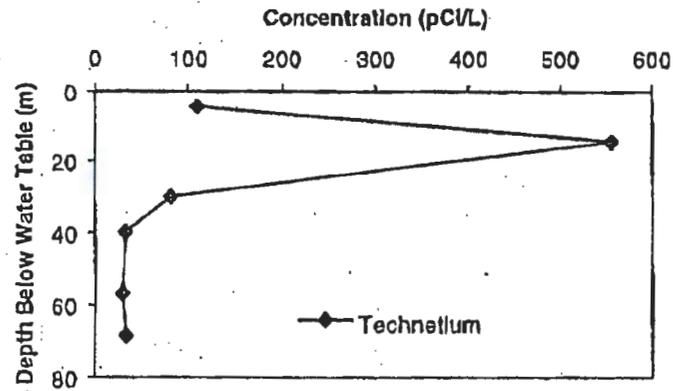
Available depth distribution data and related information for locations in vicinity of the single shell tank farms are summarized in the attached depth profile plots and tables. Data for WMA T and WMA TX-TY were reported in the annual groundwater monitoring report for FY 1999 (PNNL-13116). The depth data for WMA S-SX are from the draft assessment report currently in preparation.

The depth information provided is based on samples collected by the following methods 1) at selected depths during drilling when a packer/pump assembly was placed at the end of the drive casing, 2) samples pumped from the screened interval after the borehole was completed as a shallow depth monitoring well and 3) samples of slurry cuttings collected after casing sections were added during air rotary drilling at the SX tank farm (well 299-W22-50). All available depth data were used to prepare the attached concentration versus depth plots.

## Depth Distribution of Key Contaminants, Well 299-W14-14, WMA TX-TY

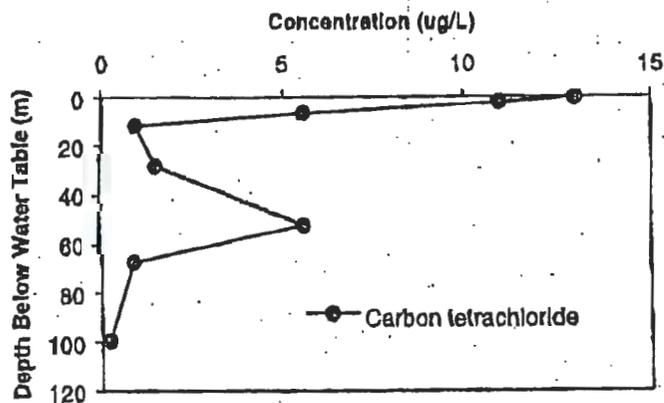
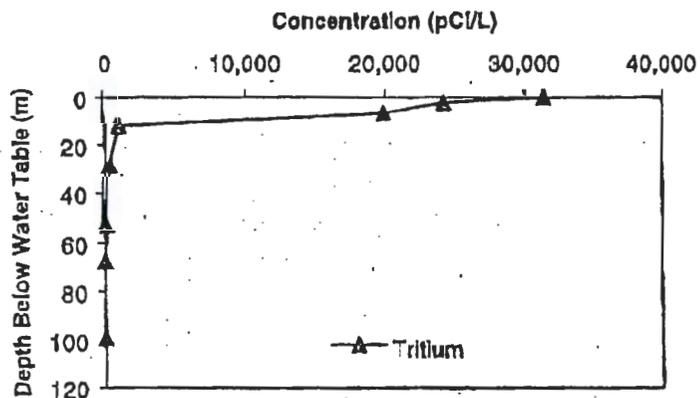
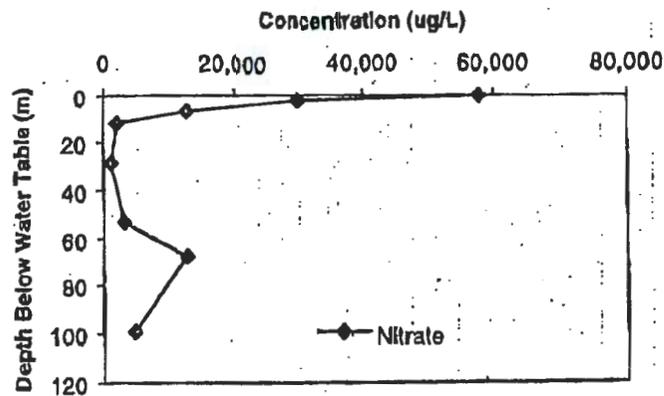
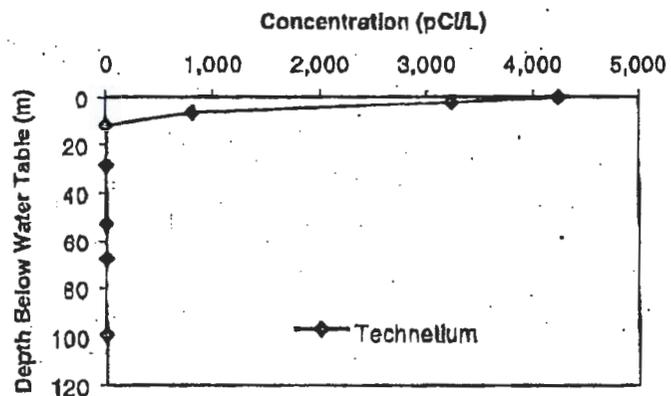


## Depth Distribution of Key Contaminants, Well 299-W14-14, WMA TX-TY



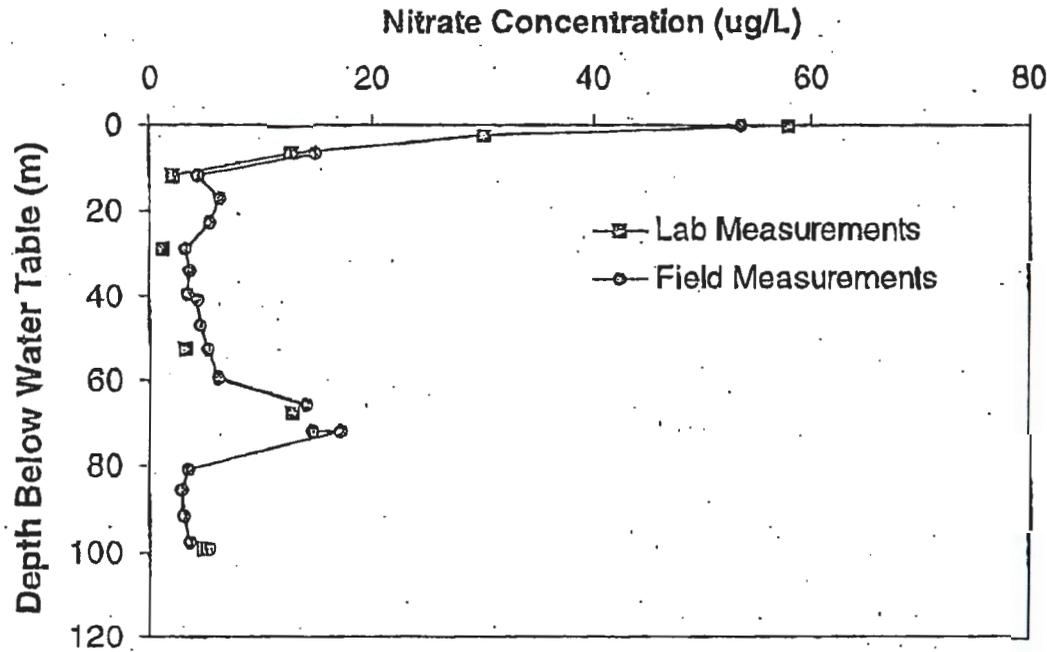
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## Depth Distribution of Key Contaminants, Well 299-W22-50, WMA S-SX



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### Nitrate Concentrations Versus Depth, Well 299-W22-50, WMA S-SX



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The field data points (solid circles) shown above are field screen results for samples collected after each section of new temporary drive casing was added. The solid squares indicate those samples collected by placement of a packer and pump assembly at the bottom of the temporary drive casing. The Ringold lower mud occurs at ~75-80 m below the water table.

Table 2.8-3. Results from Discrete Level Groundwater Sampling During Drilling of Well 299-W10-24<sup>(a)</sup>

| Depth Below Surface (m) | Depth Below Water Table (m) | Carbon Tetrachloride ( $\mu\text{g/L}$ ) | Technetium-99 (pCi/L) | Tritium (pCi/L) | Nitrate (mg/L) |
|-------------------------|-----------------------------|--|-----------------------|-----------------|----------------|
| 70.9 <sup>(b)</sup>     | 0.3                         | Not analyzed                             | 13,000                | 7,380           | 120            |
| 75.2 <sup>(c)</sup>     | 4.6                         | Not analyzed                             | 2,090                 | 20,600          | 456            |
| 87.5                    | 16.9                        | 490                                      | 358                   | 29,600          | 531            |
| 99.1                    | 30.8                        | 1,600                                    | 374                   | 26,700          | 443            |
| 116.7                   | 46.3                        | 760                                      | 212                   | 19,500          | 349            |
| 122.5                   | 52.2                        | 360                                      | 126                   | 12,700          | 301            |
| 131.4 <sup>(d)</sup>    | 61.0                        | 220                                      | 96                    | 9,220           | 282            |

- (a) Sampled October 9 through October 16, 1998.  
 (b) Sampled with Kabis Sampler in well 299-W11-27 on August 13, 1998.  
 (c) Sampled in well 299-W10-24 after completion on December 15, 1998.  
 (d) Collected below Ringold lower mud unit.

Table 2.8-4. Results of Discrete Level Sampling During Drilling of Well 299-W14-14<sup>(a)</sup>

| Depth Below Surface (m) | Depth Below Water Table (m) | Carbon Tetrachloride ( $\mu\text{g/L}$ ) | Technetium-99 (pCi/L) | Tritium (pCi/L) | Nitrate (mg/L) |
|-------------------------|-----------------------------|--|-----------------------|-----------------|----------------|
| 70.5 <sup>(b)</sup>     | 4.3                         | 140                                      | 110                   | 4,230           | 120            |
| 80.8                    | 14.5                        | 180                                      | 556                   | 893             | 226            |
| 96.3                    | 30.1                        | 380                                      | 81                    | 5,380           | 41             |
| 106.1                   | 39.8                        | 920                                      | 32                    | 9,010           | 33             |
| 122.5                   | 56.9                        | 380                                      | 29                    | 7,180           | 43             |
| 134.7 <sup>(c)</sup>    | 68.5                        | 590                                      | 33                    | 8,460           | 40             |

- (a) Samples taken October 24 through November 9, 1998.  
 (b) Sample taken from screened interval after well completion on December 10, 1998.  
 (c) Collected below Ringold lower mud unit.

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Table 2. Depth Distribution of Key Contaminants and Hydrochemical Parameters.

| Well       | Sample Date | Depth (m) | Mode <sup>a</sup> | Contaminants             |                        |           |                        |          |                         | Hydrochemical Parameters |                      |                   |                        |           |           |           |           |       |
|------------|-------------|-----------|-------------------|--------------------------|------------------------|-----------|------------------------|----------|-------------------------|--------------------------|----------------------|-------------------|------------------------|-----------|-----------|-----------|-----------|-------|
|            |             |           |                   | <sup>99</sup> Tc (pCi/L) | NO <sub>3</sub> (µg/L) | Cr (µg/L) | <sup>3</sup> H (pCi/L) | U (µg/L) | CCl <sub>4</sub> (µg/L) | pH                       | Conductivity (µS/cm) | Alkalinity (µg/L) | SO <sub>4</sub> (µg/L) | Cl (µg/L) | Na (µg/L) | Ca (µg/L) | Mg (µg/L) | Na/Ca |
| 299-W22-50 | 11/23/99    | 0.2       | DT/B              | 4,240                    | 37,991                 | 3.0U      | 31,400                 | 0.78     | 13                      | ---                      | ---                  | 100,000           | 14,200                 | 4,800     | 28,200    | 23,200    | 7,300     | 1.22  |
|            | 04/03/00    | 2.3       | S                 | 3,230                    | 30,102                 | 10.4      | 24,200                 | 4.29     | 11                      | 8.14                     | 278                  | ---               | 13,400                 | 3,100     | 23,900    | 22,600    | 7,100     | 1.06  |
|            | 11/29/99    | 6.7       | DT                | 812                      | 12,838                 | 3.0U      | 19,900                 | 3.34     | 5.6                     | 8.1                      | 235                  | 101,000           | 12,500                 | 2,500     | 20,400    | 17,800    | 6,020     | 1.15  |
|            | 12/14/99    | 11.9      | DT                | 7.03U                    | 2,125                  | 3.0U      | 969                    | 1.09     | 0.94                    | 8.2 <sup>b</sup>         | 228                  | 106,000           | 14,400                 | 3,100     | 11,600    | 26,300    | 9,250     | 0.44  |
|            | 12/15/99    | 28.7      | DT                | 0U                       | 1,151                  | 3.0U      | 304                    | 0.58     | 1.5                     | 7.9 <sup>b</sup>         | 242                  | 114,000           | 14,400                 | 4,400     | 12,700    | 28,700    | 10,200    | 0.44  |
|            | 12/17/99    | 53.0      | DT                | 0U                       | 3,187                  | 3.0U      | 185U                   | 0.79     | 5.6                     | 7.9 <sup>b</sup>         | 307                  | 126,000           | 16,100                 | 15,200    | 14,300    | 33,400    | 12,400    | 0.43  |
|            | 12/22/99    | 67.7      | DT                | 0.577U                   | 12,838                 | 3.0U      | 0U                     | 0.43     | 0.89                    | 7.7 <sup>h</sup>         | 323                  | 115,000           | 19,300                 | 10,000    | 15,500    | 33,000    | 12,500    | 0.47  |
|            | 01/12/00    | 99.4      | DT                | 0U                       | 4,869                  | 3.0U      | 0U                     | 30.90    | 0.23                    | 8.5 <sup>h</sup>         | 234                  | 96,000            | 18,900                 | 5,800     | 16,600    | 20,200    | 8,010     | 0.82  |
| 299-W22-48 | 10/26/99    | 0.6       | DT/B              | 39.5                     | 17,132                 | 3.2U      | 122U                   | 0.2      | 0.4                     | 7.97                     | 263                  | 74,000            | 21,300                 | 6,910     | 26,300    | 19,400    | 5,070     | 1.36  |
|            | 03/30/00    | 2.3       | S                 | 720                      | 18,593                 | 7.1       | 249U                   | 3.23     | 4                       | 8.59                     | 295                  | ---               | 19,200                 | 5,900     | 27,000    | 22,200    | 6,910     | 1.22  |
| 299-W22-49 | 11/04/99    | 0.5       | DT                | 32.5                     | 13,546                 | 3.2U      | 22,000                 | 0.82     | 0.6                     | 8.94                     | 245                  | 90,000            | 13,900                 | 5,330     | 25,600    | 16,200    | 5,070     | 1.58  |
|            | 03/30/00    | 2.3       | S                 | 58.3                     | 9,296                  | 4.6U      | 22,000                 | 3.27     | 6                       | 9.09                     | 240                  | ---               | 11,900                 | 2,800     | 23,300    | 17,600    | 5,960     | 1.32  |
|            | 11/08/99    | 6.7       | DT                | 2.96U                    | 7,880                  | 3.2U      | 18,900                 | 0.92     | 1                       | 8.1                      | 244                  | 86,000            | 15,400                 | 3,660     | 26,000    | 16,400    | 5,320     | 1.59  |

Note: U denotes analytical result is not detected.

(a) S = Sample collected by pumping from 4.5 m screened interval.  
DT = Sampled during drilling using temporary pump/screen and packer assembly.  
DT/B = Bailed during drilling.

(b) Laboratory result.