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02-WMD-0228

JUL 17 2002

Ms. Jane A. Hedges
Cleanup Section Manager
Nuclear Waste Program
State of Washington
Department of Ecology
1315 W. Fourth Avenue
Kennewick, Washington 99336

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EDMC

Dear Ms. Hedges:

ASSESSMENT REPORT FOR THE 1301-N FACILITY

The attached report is to comply with the requirements of 40CFR 265.93(d)(2) and (d)(5) to submit a written report containing assessment of the groundwater quality. The pH in downgradient well 199-N-3 is hypothesized to be part of the overall distribution of pH in the 100-N Area related to the biodegradation of petroleum contamination at an adjacent site, not an impact from the facility. Detection monitoring at the 1301-N facility will be continued. The attachment is to serve as the assessment plan and report.

If you have any questions, please contact Marvin J. Furman, Waste Management Division, at (509) 373-9630.

Sincerely,

John G. Morse

John G. Morse, Manager
Groundwater Protection Program

WMD:MJF

Attachment

cc w/attach:
D. Goswami, Ecology
S. P. Luttrell, PNNL
Admin Record

RCRA Assessment Report: pH in Well 199-N-3, Downgradient of the 1301-N Liquid Waste Disposal Facility

June 2002

Introduction

The 1301-N Liquid Waste Disposal Facility is regulated under the Resource Conservation and Recovery Act of 1976 (RCRA). Located in the 100 N Area (Figure 1), the facility received cooling water and related liquid from N Reactor from 1963 through 1985.

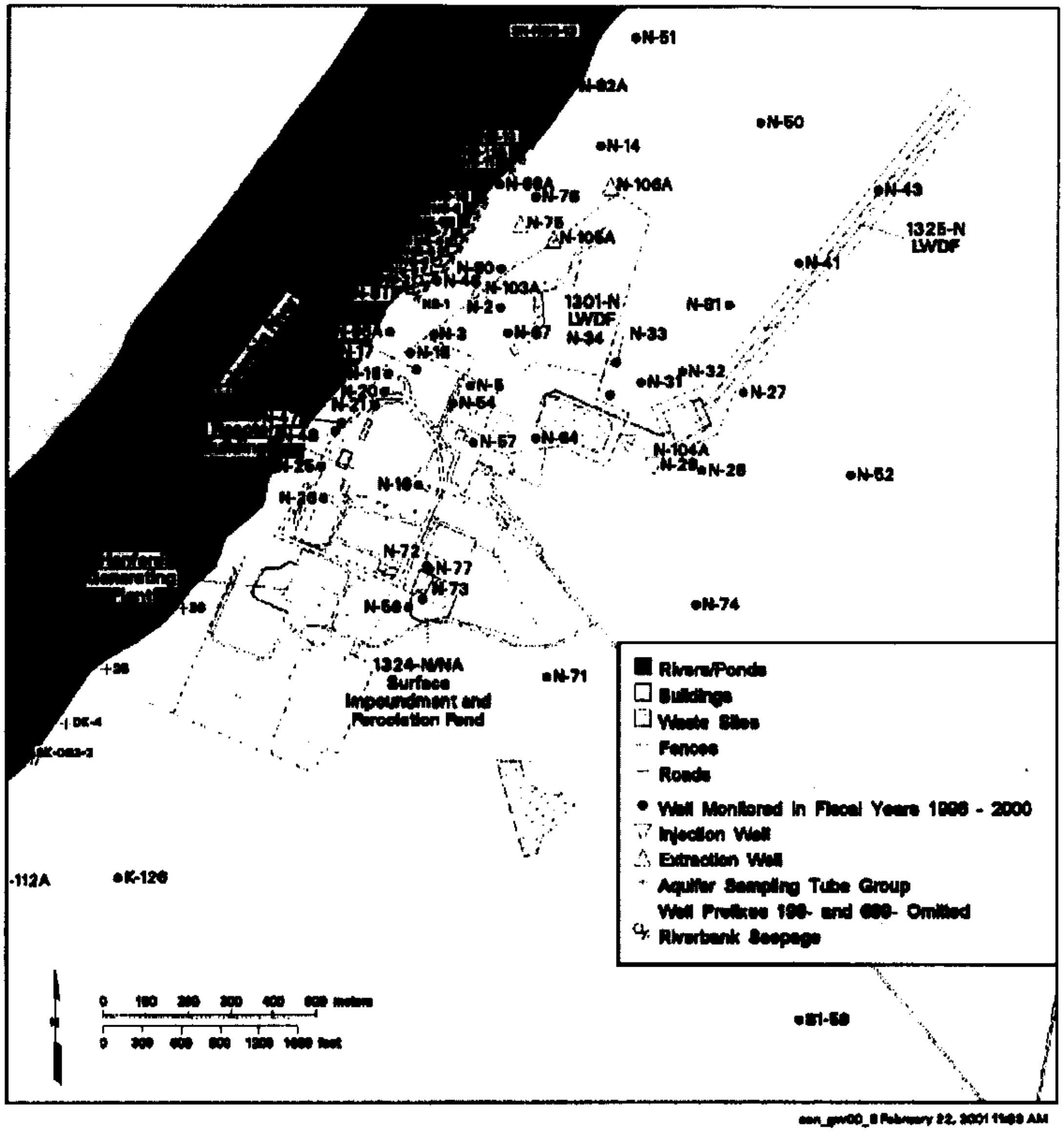

Figure 1. Locations of Monitoring Wells in the 100 N Area.

In March 2002, the average of replicate measurements of field pH in well 199-N-3 (7.25) was below the lower limit of the critical range for pH (7.34 to 8.44; Figure 2). The critical range was revised in fiscal year 2002 based on recent data from upgradient wells 199-N-34 and 199-N-57. Because the recent pH data in the upgradient wells showed less variability than earlier periods (see Figure 2), the critical range became narrower. Thus, although pH in well 199-N-3 did not decrease in March 2002, it was below the revised lower limit.

It appears that the lower-than-background pH in well 199-N-3 is caused by the overall distribution pattern of pH in the 100 N Area. An area of relatively low pH probably is related to the presence of hydrocarbon contamination from an old diesel spill site, located south of well 199-N-3. Because the low pH is not related to a release from the RCRA unit, the site may remain in detection monitoring.

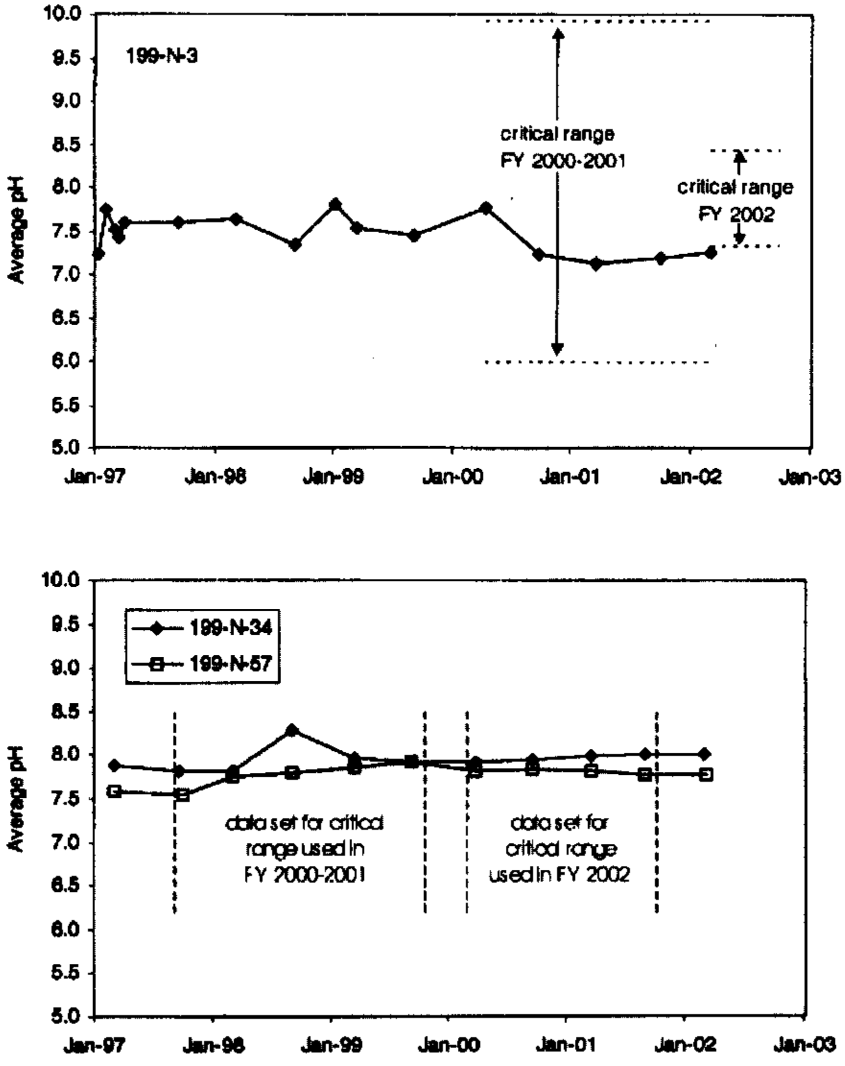

Figure 2. Average pH in Downgradient well 199-N-3 and Upgradient Wells 199-N-34 and 199-N-57.

Effluent Characteristics

Samples of the effluent disposed to the 1301-N facility in 1985 had pH between 6.56 and 6.97 (DOE 1998, Table A-1). Effluent discharge ceased in 1985 and it is not credible to believe that effects of the effluent discharged more than 17 years ago cause the currently low pH. Furthermore, well 199-N-67, which is not in the RCRA monitoring network but is much closer to the 1301-N facility than well 199-N-3, has pH of ≥ 7.4, slightly higher than well 199-N-3.

Distribution of pH

Groundwater pH in the 100 N Area ranges from < 7 to 8.5. Figure 3 is a map of groundwater pH from samples collected in September 2001 or March 2002. An isopleth of pH 7.8 is shown to illustrate the region of relatively low pH in the central 100 N Area.

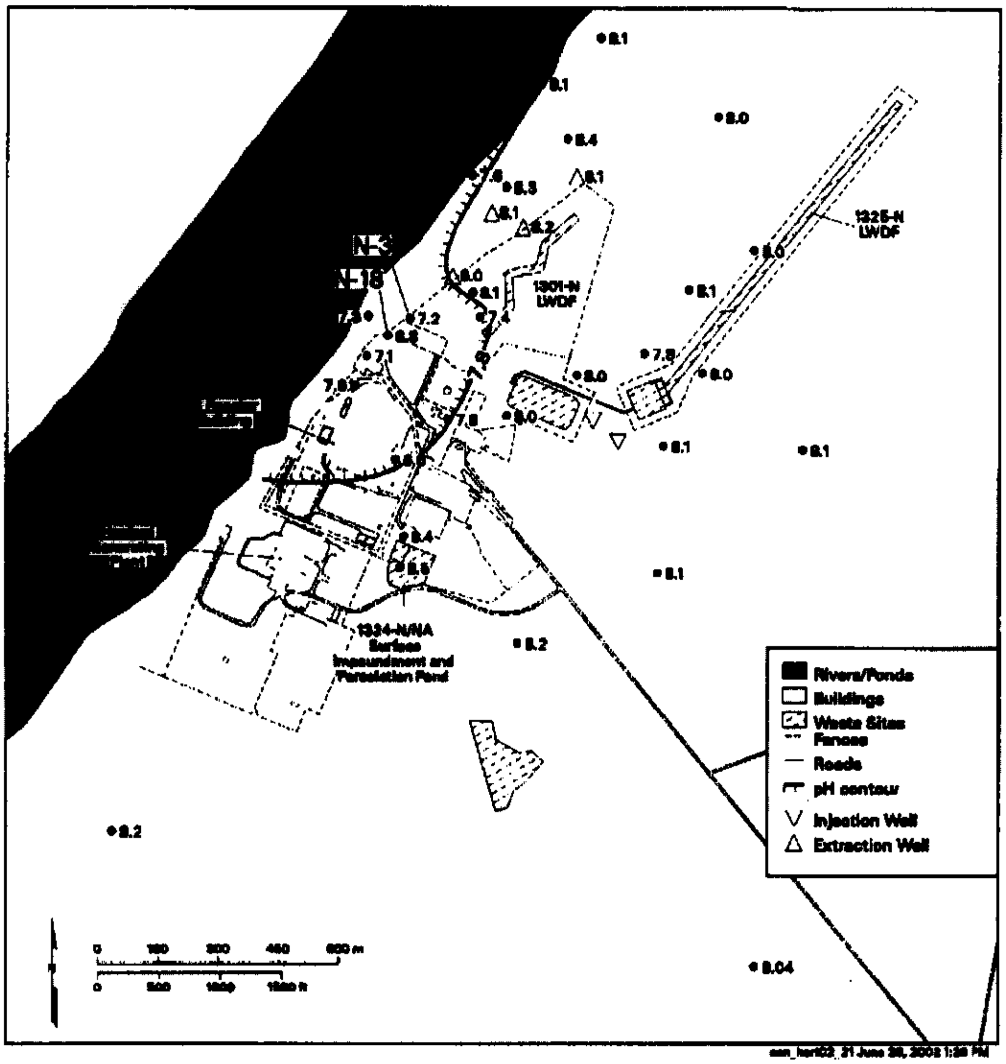

Figure 3. pH of Groundwater in 100 N Area (most recent data shown for each well, September 2001 through March 2002).

The surrounding region has pH 8.0 to 8.5. Well 199-N-3 is within the region of lower pH. Upgradient well 199-N-57 also has pH<8, but levels are consistently higher than in well 199-N-3. The other upgradient well (199-N-34) and the other downgradient wells for 1301-N (199-N-2, 199-N-105A) are in the region with pH≥ 8.

Well 199-N-18, downgradient of the largest diesel spill, has the lowest pH in 100 N Area groundwater (6.6 in September 2001). This well also has anomalously low nitrate concentrations (0 to 400 μg/L), and high manganese and iron concentrations in filtered samples (2 to 6 mg/L and 20 to 28 mg/L respectively). Well 199-N-16, located farther south, shares some of these anomalous characteristics and also has shown hydrocarbon contamination in the past. Consumption of nitrate (along with oxygen and sulfate) and the dissolution of metals such as iron and manganese are recognized indicators of biodegradation of petroleum products in groundwater (U.S. EPA 1999). Degradation of petroleum products ultimately produces carbon dioxide, lowering the pH of groundwater near the contaminated site. These effects may contribute to the observed low-pH region in the central 100 N Area.

Changes in Groundwater Chemistry

Changes in groundwater chemistry observed in well 199-N-3 appear to be related to the influence of waste sites located south of the well. These changes are significant to this assessment report because they indicate the direction of groundwater and plume movement, which are influencing pH in well 199-N-3. The 1324-NA percolation pond (see Figure 1) has created a plume of the nondangerous constituents sodium and sulfate that stretches from the pond toward the north, including well 199-N-3 and other nearby wells. Figure 4 shows distribution of specific conductance, which illustrates the location of the sulfate/sodium plume. Concentrations of sulfate, sodium, and specific conductance increased in well 199-N-3 between 1990 and 2001, indicating movement of the plume toward the north (Figure 5). Specific conductance in well 199-N-2, located northeast of 199-N-3, increased between 1996 and 2001, though levels are much lower than in well 199-N-3. The sudden decreases in specific conductance and related constituents in wells 199-N-2 and 199-N-3 in March 2002 appear to indicate that the center of the plume has passed these wells. Alternatively, the decreases could relate to a temporary increase in river stage.

Total organic carbon increased in well 199-N-3 between 1996 and 2000, exceeding the critical mean value in 1999 and 2000 (Figure 6). This exceedance was attributed to contamination from past leaks in diesel and fuel oil tanks and lines between the 1301-N crib and the reactor building, south of the well (DOE 1999). In 2001 and 2002, total organic carbon levels declined in well 199-N-3.

Water-table maps of the 100 N Area indicate groundwater flow toward the northwest beneath the 1301-N and 1324-N/NA facilities. However, the distribution of the sulfate/sodium plume and the presence of elevated total organic carbon in well 199-N-3 indicate that contaminants are moving toward the north. This northward movement may be attributed to a combination of the following influences:

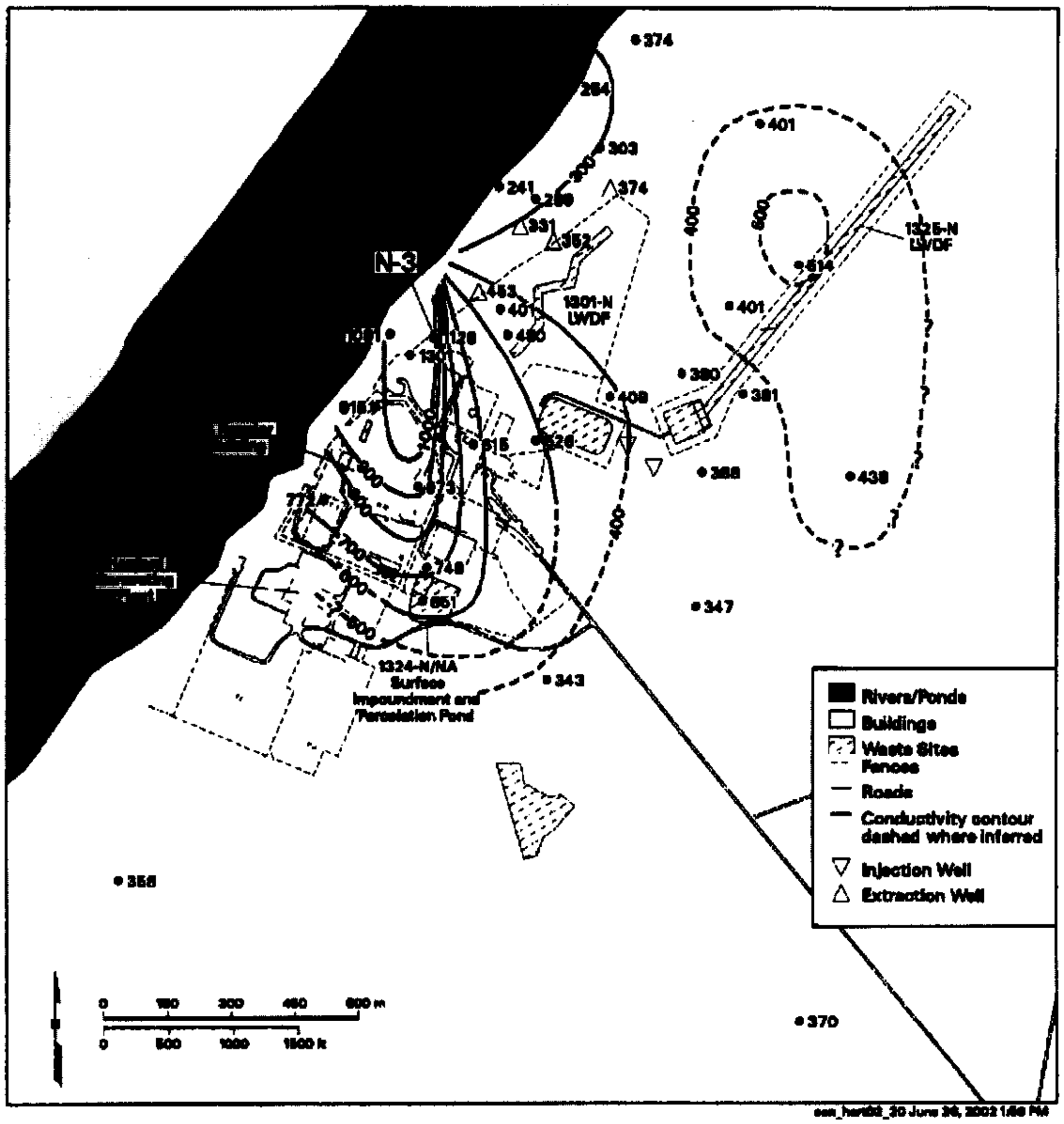

Figure 4. Specific Conductance of Groundwater in 100 N Area (most recent data shown for each well, September 2001 through March 2002).

- River stage fluctuations: as the river rises and falls, water flows into and out of the riverbank, resulting in spreading of the plume in a down-river direction.
- Groundwater extraction: the operation of a pump-and-treat system changes groundwater flow between the 1301-N trench and the river. Well 199-N-103A is an extraction well near 199-N-3 that may induce flow toward the north. The pump-and-treat system has been active since 1995.

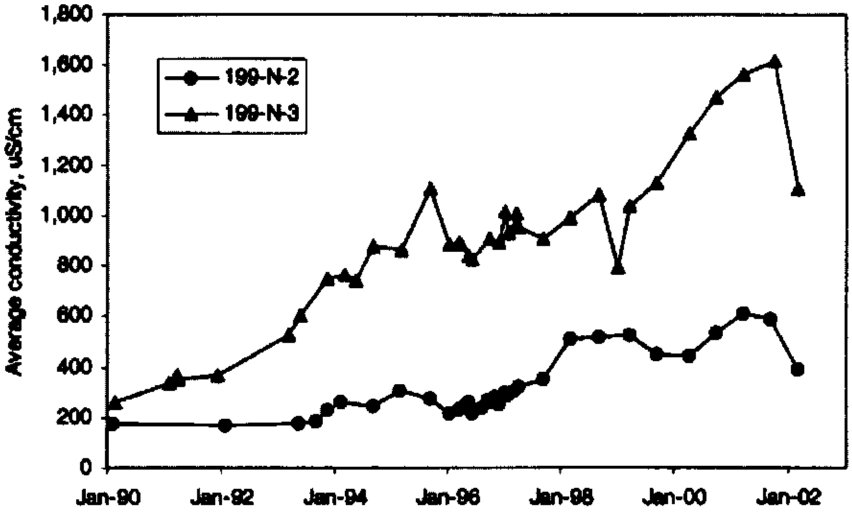

Figure 5. Average Specific Conductance in Downgradient Wells 199-N-2 and 199-N-3.

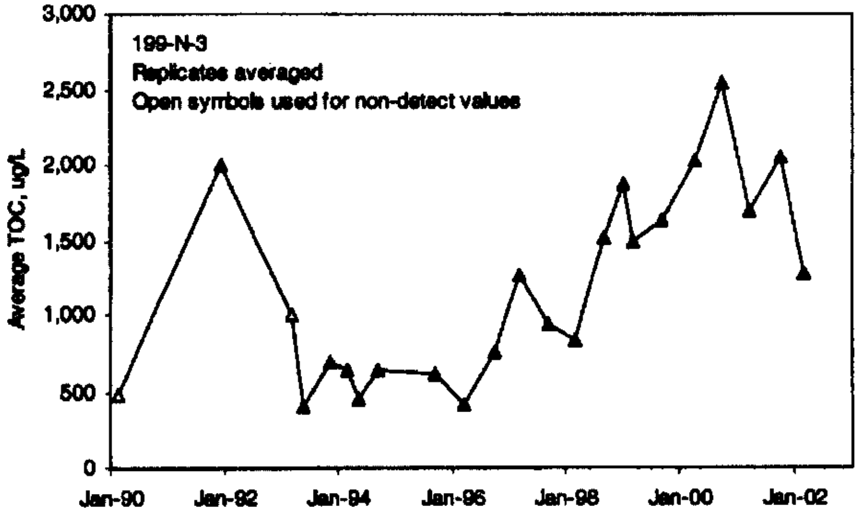

Figure 6. Average Total Organic Carbon in Downgradient Well 199-N-3.

Conclusions and Recommendations

The below-background pH in well 199-N-3 is part of the overall distribution of pH in 100 N Area groundwater, and does not appear to indicate contamination from the 1301-N

Liquid Waste Disposal Facility. The site should continue to be monitored under an indicator evaluation program (Hartman 2002).

References

DOE, 1998, *100-NR-1 Treatment, Storage, and Disposal Units Corrective Measures Study/Closure Plan*, DOE/RL-96-39, Rev. 0, U.S. Department of Energy, Richland, Washington.

DOE, 1999. "Notification of Total Organic Carbon (TOC) Exceedance at 1301-N Liquid Waste Disposal Facility." Letter from M.J. Furman, DOE/RL, to Stanislaw Leja, Department of Ecology, 066172, dated February 25, 1999.

Hartman, M.J., 2002. *Groundwater Monitoring Plan for the 1301-N, 1324-N/NA, and 1325-N RCRA Facilities*. PNNL-13914. Pacific Northwest National Laboratory, Richland, Washington.

U.S. EPA, 1999. *Commonly Asked Questions Regarding the Use of Natural Attenuation for Petroleum-Contaminated Sites at Federal Facilities*. http://www.epa.gov/swerffrr/petrol.htm.