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Quarterly Groundwater Report for the Solid Waste Landfill July - September 2006

J. W. Lindberg

February 2007

Prepared for the U.S. Department of Energy
under Contract DE-AC05-76RL01830

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Summary

This report provides information on groundwater monitoring at the Solid Waste Landfill during the quarterly time period July to September 2006. Conditions remain very similar to those reported in the previous quarterly report. Six background threshold values, one WAC 173-200 Groundwater Quality Criterion, and one WAC 246-290-310 Maximum Contaminant Level were exceeded. The results that exceed applicable limits are consistent with the type of waste disposed to the landfill including sewage and chlorinated hydrocarbons from either the sewage or the 1100 Area heavy equipment garage and bus shop.

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1.0 Introduction

The Solid Waste Landfill (SWL) is co-located with the Nonradioactive Dangerous Waste Landfill (NRDWL) (see Figure 1) at the Central Landfill, which is ~5.5 kilometers southeast of the 200 East Area on the Hanford Site. Beginning in 1972, the Solid Waste Landfill received principally solid waste, including paper, construction debris, asbestos, and lunchroom waste. In addition to the solid waste, ~3,800,000 to 5,700,000 liters of sewage were disposed in trenches along the eastern and western sides of the Solid Waste Landfill between 1975 and 1987, and ~380,000 liters of Hanford Site bus-garage wash water were disposed in three short trenches along the western side of the site between 1986 and 1987 (Hartman 2000).

This report covers groundwater monitoring data from wells sampled during the period July through September 2006.

2.0 Groundwater Monitoring

The Solid Waste Landfill groundwater monitoring well network is sampled quarterly, usually in the months of November, February, May, and August. During the reporting quarter, six of the nine wells in the network were successfully sampled in accordance with the Solid Waste Landfill groundwater monitoring plan (Lindberg and Chou 2000). Five of the wells (see Figure 1) were sampled August 31, 2006, and the other one September 6, 2006. Three wells in the network (699-26-35A, 699-24-35, and 699-23-34A) were delayed beyond the end of the quarter because of extreme wildfire danger in the area, which restricted sampling vehicles to established roads. The sampling event was later cancelled for those wells because it was time to sample them for the October-December 2006 quarter.

2.1 Groundwater Constituents and Concentration Limits

The Solid Waste Landfill is monitored pursuant to WAC 173-304 regulations for the following required groundwater constituents:[1]

- Temperature (20.7 degrees Celsius)
- Specific conductance (583 μS/cm)
- Field pH (6.68-7.84)
- Total organic carbon (2,240 μg/L)
- Chloride (7,820 μg/L)
- Nitrate (29,000 μg/L)
- Nitrite (89 μg/L)
- Ammonium (90 μg/L)
- Sulfate (47,200 μg/L)
- Iron (160 μg/L - filtered)
- Zinc (42.3 μg/L - filtered)
- Manganese (10 μg/L - filtered)
- Coliform bacteria (1 colony/100 ml)
- Chemical oxygen demand (10,000 μg/L)

[1] Note: Reported groundwater results for these constituents are compared to background threshold values (in parentheses). The background threshold values are calculated from monitoring results from the two background (upgradient) wells, 699-24-35 and 699-26-35A.

The following site-specific constituents are also analyzed in Solid Waste Landfill groundwater samples:

- Volatile organic compounds (known to be discharged to landfill as waste)
- Filtered arsenic (detected in leachate collection system)
- 1,4-dioxane (detected in leachate collection system)

2.2 Exceedances of Limits

The following constituents exceeded applicable background comparison threshold values or Washington State groundwater quality criteria (WAC 173-200-040 or WAC 246-290-310) during the reporting quarter and are discussed further in Section 2.3 (the limits are in parenthesis).

Constituents Exceeding Background Threshold Values
Chemical oxygen demand (10,000 μg/L)
Chloride (7,800 μg/L)
Coliform bacteria (1 colony per 100 ml)
Field pH (6.68 – 7.84)
Specific conductance (583 μS/cm)
Sulfate (47,200 μg/L)

Constituents Exceeding Groundwater Quality Criteria – (WAC 173-200)
Tetrachloroethene (0.8 μg/L)

Constituents Exceeding Washington *Maximum Contaminant Levels* (WAC 246-290-310)
Specific conductance (700 μS/cm)

2.3 Results

Chemical Oxygen Demand – Reported results for chemical oxygen demand at Solid Waste Landfill wells have been erratic, fluctuating from non-detect to values over 135,000 μg/L since the well network was installed in the 1980s. Higher results have occurred more often during the last few years. During the reporting quarter, results from four downgradient Solid Waste Landfill wells exceeded the background threshold value of 10,000 μg/L. The well with the highest reported value was well 699-24-33 with a result of 27,000 μg/L.

Chloride – Five downgradient Solid Waste Landfill wells had chloride concentrations greater than the 7,800 μg/L background threshold values during the reporting quarter. Since the year 2000 several of the network wells have had increasing chloride trends. The wells with the elevated chloride included 699-22-35 (8,400 μg/L), 699-24-34A (8,300 g/L), and 699-24-34B (8,400 μg/L).

Coliform Bacteria – Coliform bacteria were detected in two downgradient wells in the Solid Waste Landfill network during the reporting quarter. In both wells the results exceeded the background threshold value of 1 colony per 100 ml. The wells and their results that exceed the background threshold value included 699-24-34A (3.1 colonies per 100 ml) and 699-24-34C (16 colonies per 100 ml).

Coliform bacteria results have been sporadic, but the occurrence of background threshold value exceedances has been increasing in recent years.

Field pH – The background threshold range (6.68 to 7.84) was exceeded in one downgradient well during the reporting quarter. Well 699-23-34B had a pH value of 6.65, below the lower limit of the range. Low pH values have been reported at Solid Waste Landfill wells since the majority of the well network was installed in the 1980s.

Specific Conductance – The background threshold value (583 µS/cm) was exceeded at all six of the downgradient wells sampled during the reporting quarter. The Washington State maximum contaminant level (see WAC 246-290-310) for specific conductance (700 µS/cm) was also exceeded at five of the six downgradient wells. The highest result was 813 µS/cm at well 699-22-35. The overall trend in the majority of Solid Waste Landfill wells has been stable to slightly decreasing since 2005.

Sulfate – The result from one downgradient well exceeded the background threshold value of 47,200 µS/cm during the reporting quarter. The result was 66,900 µg/L at well 699-24-34B. Overall, sulfate concentrations have been rising at this well since 2005.

Tetrachloroethene – Three downgradient wells had tetrachloroethene results greater than the WAC 173-200-040 limit of 0.8 µg/L during the reporting quarter. The highest value reported during the reporting period was 1.4 µg/L at two wells, 699-24-33 and 699-24-34B. The general trend for tetrachloroethene at downgradient Solid Waste Landfill wells has been steady to decreasing concentrations since 1990.

3.0 Conclusions

The analytical results during the reporting quarter are typical of earlier results and are consistent with the type of waste disposed in the landfill including sewage material and chlorinated hydrocarbons from either the sewage or the 1100 Area heavy equipment garage and bus shop. Chloride and sulfate concentrations in Solid Waste Landfill continued rising slightly, and volatile organic compounds continued decreasing slightly in concentration. Chemical oxygen demand and coliform bacteria continued to be elevated sporadically in response to the sewage disposed at the site. Specific conductance decreased slightly from the previous quarter, but overall has been increasing at Solid Waste Landfill wells. Field measurements of pH in downgradient wells continued to be lower than wells upgradient of the site.

4.0 References

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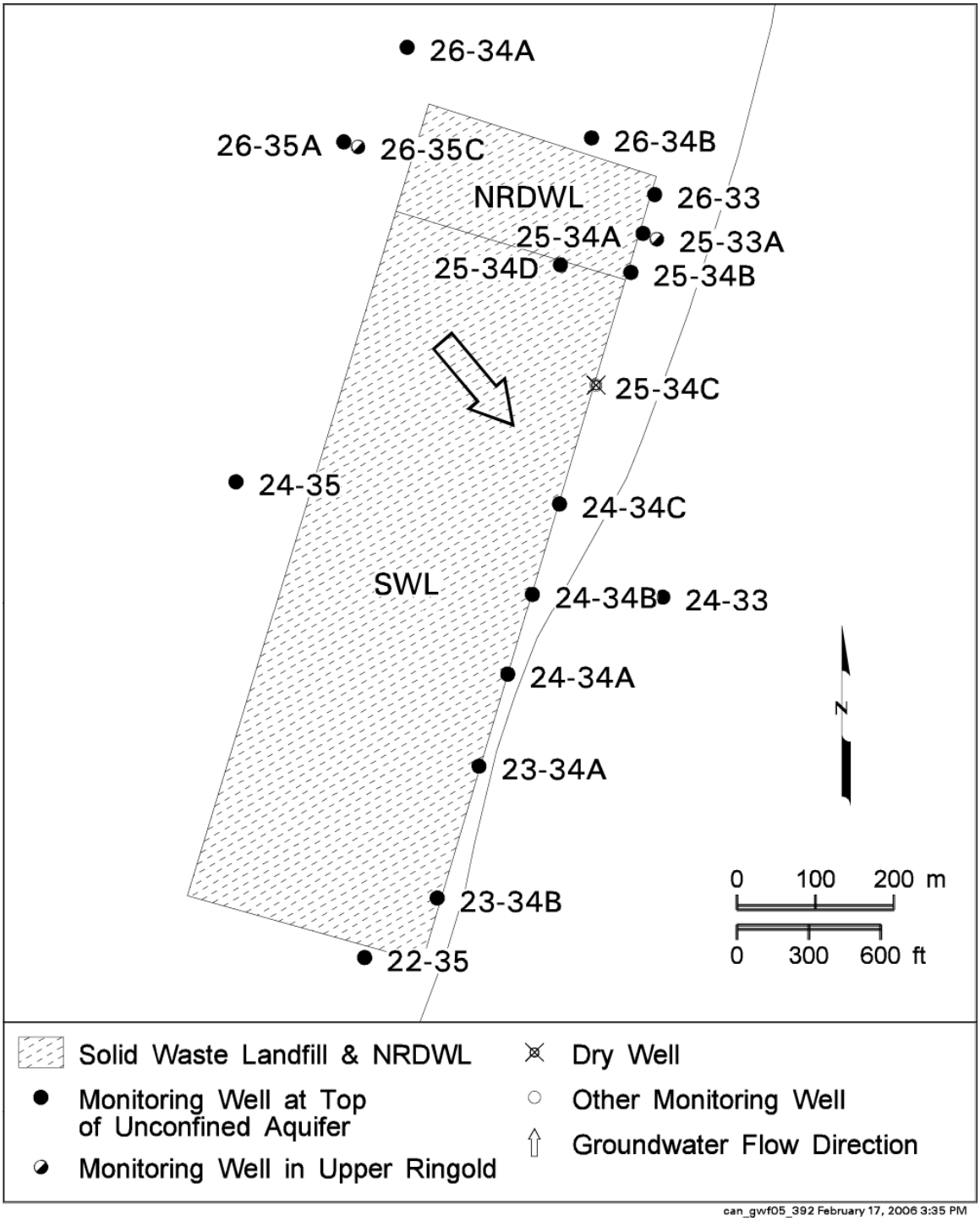

Figure 1. Monitoring Wells at the Solid Waste Landfill and Nonradioactive Dangerous Waste Landfill (from Hartman et al. 2006)

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