



## WATER RESOURCES RESEARCH GRANT PROPOSAL

**Project ID:** 2003OR29B

**Title:** Investigation of Nitrate Transport Across the Willamette Silt of the Southern Willamette Valley

**Project Type:** Research

**Focus Categories:** Groundwater, Nitrate Contamination, Management and Planning

**Keywords:** Groundwater, Willamette Silt, Nitrate, Redox reaction

**Start Date:** 02/15/2003

**End Date:** 02/14/2004

**Federal Funds:** \$14557.00

**Matching Funds:** \$37515.00

**Congressional District:** Oregon 4th and 5th

**Principal Investigators:** Haggerty, Roy

**Abstract:** Nitrate in groundwater in Oregon's Southern Willamette Valley has been a concern for several years, with more than 7% of domestic wells in 2001 reporting concentrations exceeding the USEPA's Maximum Contaminant Level of 10 ppm [ODEQ, pers. comm., 2002]. However, not all groundwater is equally affected, due to differences in land use, agricultural practices, and particularly geology. The Willamette Silt, which overlies much of the Willamette Aquifer, acts as a hydraulic barrier to nitrate transport and, more importantly, acts as a natural biogeochemical "reactor-bed" for denitrification. Prior work [Iverson and Haggerty, 2002; Iverson, 2002] in the Northern Willamette Valley shows that nitrate does not penetrate beyond a redox front in the Silt approximately 25 ft below ground surface, providing very effective protection to the Aquifer. Across the Willamette Valley wherever the Willamette Aquifer is overlain by the Willamette Silt nitrate concentrations are generally low [see data in Hinkle, 1997, p. 23]. This appears to be less true, however, in the Southern Willamette Valley, where the Silt is thinner and there may be geochemical differences that do not allow the Silt to protect the Aquifer to the same degree as in the Northern Valley. We will investigate the extent to which the Willamette Silt in the Southern Valley protects groundwater in the underlying Willamette Aquifer from nitrate contamination. We will drill 30 boreholes through the Willamette Silt in the region bounded by Corvallis, Albany, Coburg and Junction City. Many (12-15) of the boreholes will be placed in and around areas with known

elevated nitrate concentrations in the underlying aquifer, and will be selected in consultation with cooperators ODEQ and ChevronTexaco. A subset (2-4) of the wells boreholes will be developed and maintained as monitoring wells in conjunction with ongoing monitoring of nitrate in nearby, deeper wells already installed. All boreholes will produce continuous core samples that will be analyzed for nitrate, redox conditions (as indicated by Fe<sup>2+</sup>/Fe<sup>3+</sup>), pH, and organic carbon. Core will be logged, frozen, and stored for future geochemical work. Two maps will be produced showing the thickness of the Willamette Silt across the Southern Willamette Valley and the depth to the redox front. Since the redox front is likely to be the lower limit of nitrate penetration, the maps will be invaluable to management in the area. All maps, geologic and geochemical data will be made publicly available via the PI's Willamette Silt website (<http://my.science.orst.edu/~haggertr/WS/>).

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