

Ground-Water Quality at 94 Dairies in New Mexico

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In July 1998 two staff members from the Dallas Office of the U.S. Environmental Protection Agency (EPA) visited the Ground Water Quality Bureau of the New Mexico Environment Department and collected ground-water quality information at 94 dairies permitted by the State. This data-collection effort was part of a larger project to assess the ground-water-quality impacts of animal feeding operations in the five-State area comprising EPA Region 6.

New Mexico requires operators to monitor and report ground-water quality at dairy operations in the State, thus offering a unique opportunity to access a large data base suitable for statistical analysis.

Where available, information collected consisted of dairy location, depth to ground water, locations of monitor wells and the most recent four quarters of water-quality information on nitrate/nitrite and Kjeldahl nitrogen for ground water and waste lagoons. The number of monitoring wells at individual dairies range from 1 to 11. Site maps of all permitted dairies in the State were provided by the Bureau.

The dairies are concentrated in five areas; three of these are over river alluvium (middle Rio Grande, southern Rio Grande, Pecos River near Roswell), and two areas are on the eastern side of the State over the Ogallala aquifer. The alluvial environments are characterized by shallow ground water with strong temporal variations in flow direction and an abundance of highly permeable coarse-grained sediments. Ground water in the Ogallala aquifer typically occurs at greater depths and is generally considered less vulnerable.

The statistics of most interest for ground-water quality are median nitrate concentration and the percent of samples exceeding the maximum contaminant level (MCL) for nitrate as established by EPA under its public water-supply program. Analyses of 1,031 nitrate samples from the 94 New Mexico dairies showed the following:

- Median nitrate concentration for all samples was 4.4 milligrams per liter (mg/L).
- Thirty-six percent of dairies reported nitrate concentrations above the MCL of 10 mg/L.
- Monitoring wells located near the upgradient (with respect to ground water) boundary of the property exceeded the nitrate MCL at 20% of dairies having such wells (7 of 35). Cumulative effects caused by clustering of dairies in small areas are at least partly responsible for the high nitrate concentrations entering the individual sites.
- Samples from wells downgradient from waste lagoons suggest that these structures are typically involved in the most severe cases of contamination (59% of samples with nitrate-nitrogen above 100 mg/l are downgradient from lagoons).
- Samples from areas where liquid wastes are land applied had a high median nitrate concentration (8.3 mg/l) and a high percentage of values above the MCL (42% of the 36 dairies where ground water is monitored at land-application sites show nitrate above the MCL for those sites).
- Ground water from wells in barn areas and near runoff ponds had relatively low median nitrate concentrations, but wells downgradient from stock pens had very high nitrate levels (median of 18 mg/l with 7 of the 12 sites exceeding the MCL)

There appears to be a strong correlation between depth to ground water and nitrate concentration at the dairies, with few high nitrate concentrations where the water table is over 100-feet deep.

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