Nitrate Groundwater Issues: New Mexico's Perspective

Bart Faris – New Mexico Environment Department

Nitrate is likely the most ubiquitous groundwater contaminant in the Southwest and possibly North America. A nationwide survey in the late 1980s indicated that nitrate contamination had probably impacted more public and domestic supply wells than any other contaminant. In 1992 the U.S. Environmental Protection Agency estimated that 2.4 percent of private wells nationwide exceeded the federal regulatory drinking water standard of 10 milligrams per liter (mg/l) nitrogen as nitrate (ITRC, 2000). By 2004, the New Mexico Environment Department determined that 220 nitrate contamination sites had adversely impacted 710 private and 82 public supply wells in the state, although 90 percent of New Mexico's population depends on groundwater for its drinking water (NMED, 2006).

Because nitrate is a regulated contaminant, the nitrate standard must be enforced. Yet the assessment and remediation of nitrate-contaminated groundwater has not received as much attention as contamination by carcinogenic contaminants and other "contaminants du jour" such as chlorinated solvents. If nitrate is such a widespread problem, why the lack of attention?

Why Remediation Doesn't Happen

The answers may rest in how nitrate is perceived in industry and by regulators. Since the most common solution to nitrate contamination is to use or add an alternate water supply, both the regulators and the regulated community may view the problem as resolved once this is accomplished. But simply switching to a different water source does not deal with the nitrate plume that may persist; rather it creates further problems in the future.

In such cases no single responsible party exists for regulators to pursue to demand remediation. States are consequently left with contaminated groundwater and no allocated or available resources for remediation.

Regulatory standards for domestic supply wells are also lacking in many states.

> **If nitrate-contaminated groundwater is such a widespread problem, why the lack of attention?**

Nitrate is not a Resource Conservation Recovery Act (RCRA) or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) constituent. Therefore these federal regulations do not apply to nitrate contamination unless the source is a RCRA or CERCLA constituent such as nitro-aromatic or nitric acid. Thus in many cases the states bear responsibility for regulating nitrate-contaminated groundwater plumes.

Furthermore, many nitrate-contaminated groundwater sites derive from nonpoint sources, such as areas in the Midwest where agricultural land has been consistently overfertilized but no single field is the sole source of the contamination. Housing developments with septic tank leach-field treatment systems have also caused regional nonpoint-source nitrate contamination.

States that have groundwater standards for nitrate also may have regulations to address nitrate contamination. Unfortunately, in many cases addressing the nitrate contamination has simply meant providing a clean alternate water supply or making recommendations to the domestic well owner, not remediating the contamination.

Improved Outlook

However, the tide may be changing. The technology to remediate nitrate plumes exists, and in New Mexico, according to statute and regulation, any groundwater contaminant plume, including nitrate, must be assessed and remediated. For those nitrate-contaminated sites where groundwater remediation has been required, the primary remedial action has involved the physical removal of

the contaminants through pumping. The extracted contaminated water has principally been disposed of either through irrigated cropland use, discharge to evaporative ponds, or discharge to a wastewater treatment plant.

Since these remedial techniques create discharge, permitting is necessary. In New Mexico, discharging a water contaminant to the surface or subsurface requires a pollution prevention permit to ensure that the contaminants are being destroyed or utilized and not simply moved from one place to another. If the discharge is to a treatment plant that in turn discharges to a U.S. waterway, a National Pollution Discharge Elimination System permit is needed for the plant, showing it can effectively treat a nitrate stream prior to discharge.

In-situ bioremediation (ISB) is a new and emerging nitrate remediation technology that is already commonly applied to other types of groundwater contaminant plumes. Volatile organic compounds can be readily reduced to inert or less harmful compounds either by naturally occurring bacteria (natural attenuation) or with the introduction of an electron donor (enhanced ISB) as is common for chlorinated solvent contamination. Similarly, ISB can convert nitrate in groundwater into harmless nitrogen gas with the introduction of a carbon source. Although the application to nitrogen contamination is still in development, ISB shows promise as a viable and cost-effective nitrate remediation technology.

Given the extent of nitrate-contaminated groundwater and its impacts to the water supply, regulators and the regulated community must take measures to address current nitrate plumes and continue to implement pollution-prevention measures to ensure the safety of our water supply now and in the foreseeable future. ■

Contact Bart Faris at bart.faris@state.nm.us.

Photo: Lynn Betts, USDA-NRCS

References

Interstate Technology Regulatory Cooperation Work Groups, 2000. Technology overview: Emerging technologies for enhanced in situ biodenitrification of nitrate-contaminated ground water. www.itrcweb.org/documents/EISBD-1.pdf.

New Mexico Environment Dept., Liquid Waste Program, 2006. Onsite sewage management in New Mexico, www.nmenv.state.nm.us.