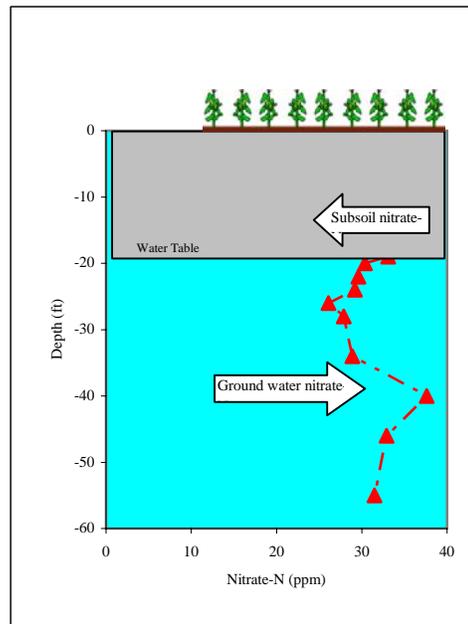


Nitrate in Ground Water

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Nitrate is a highly soluble form of nitrogen that has fast become one of the most common contaminants in ground water. Though both natural and manmade sources of nitrate occur in ground water, *sources due to human activities are by far the most important* in areas with elevated concentrations. Activities that have been shown to contribute to nitrate contamination in ground water include excessive application of nitrogen fertilizer and leakage from wastewater impoundments.

Excess application of either commercial **fertilizer or livestock waste** to row crops, pastures, and even urban areas has been linked to high levels of nitrate in ground water. While nitrate salts are not typically applied as a fertilizer, both anhydrous ammonia and organically-derived ammonia is readily converted to nitrate by naturally-occurring bacteria in soils receiving these forms of nitrogen. If not immediately utilized as a nutrient by plants or other microorganisms, nitrate can easily be leached from the soil into the subsoil where it is unavailable as a nutrient (see figure at right). Nitrate in the subsoil is then gradually **leached** downward as water percolates from the surface and recharges the underlying ground water. *This leaching process typically takes many years* so that contamination to ground water does not occur until well after any buildup of nitrate in the subsoil.



When nitrate concentrations increase in a drinking water supply, it often is the result of a problem or practice that occurred in the area years before the contamination is discovered. Tracing the source of the contamination may require extensive sampling of the ground water as well as the sediments to see where the nitrate may be coming from. Sediment cores can be collected and analyzed to estimate how much nitrate has accumulated above the water table. Nitrogen isotopes, non-radioactive, alternative forms, can be measured in the nitrate to provide clues about the most likely sources. *Movement of nitrate through the subsoil is highly variable, but depends mostly on how readily water moves to the water table.*

Research conducted at the University of Nebraska has helped bring about a better understanding of the causes of nitrate contamination in ground water. Field studies have demonstrated that nitrate occurs and leaches through the subsoil. Methods for removing nitrate from contaminated ground water continue to be investigated as are new techniques for determining transport rates and better identifying sources.