



# Ammonium contamination of the soil-groundwater exposure pathway - assessment of MNA concepts and possible anammox reactions

## AMMONIUM-BELASTUNG DES WIRKUNGSPFADES BODEN-GRUNDWASSER - BEWERTUNG VON MNA-KONZEPTEN UND MÖGLICHEN ANAMMOX-REAKTIONEN

Natural degradation and retention processes (natural attenuation, NA) can slow down or stop the migration of contaminants in aquifers. Ammonium, which is frequently observed downstream of old landfill sites, can be classified as being readily microbiologically degradable and is therefore basically suitable for MNA concepts. In Baden-Württemberg to date, NA processes have been examined further in four reference locations and several other locations. Apart from the familiar aerobic oxidative degradation processes, some other processes also occurred, which were apparent due to deficits in the nitrogen balance. It is presumed that this process is caused by an only recently discovered bacterium, which converts nitrite and ammonium to molecular nitrogen under anaerobic conditions. This so-called anammox reaction has been detected in the oxygen minimum zones of the ocean and in wastewater treatment plants. The discovery of anammox bacteria changes the nitrogen cycle and other associated substance and energy cycles. If suitable environmental conditions exist downstream of an old landfill site, the anammox reaction could make a substantial contribution to the control and steady state of the contaminant plume. The bacteria's environmental requirements, their need for nutri-

ents or interactions with other organisms have not yet been adequately researched. Studies of the bacterium are currently related to aquatic systems only. Specific statements about their behaviour in water-bearing soil strata are not available at the present time. The following report summarises the findings to date regarding natural contaminant reduction in ammonium pollution cases and highlights the possible role of the anammox reaction.

