



2.4 Analytics

2.4.1 Assessment of Natural Background Levels (NBLs) in the Upper Rhine Valley (France, Germany and Switzerland)

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According to the requirements of the EU Water Framework Directive (EU-WFD, article 17.2a) criteria for the assessment of the chemical status of groundwater have to be developed, which may serve as starting points for a trend reversal (article 17.2b) in case the good status is failed. Against this background in the EU project BRIDGE an EU-wide applicable approach to assess natural background levels (NBLs) and threshold values (TVs) for the definition of the groundwater chemical status has been developed by the authors.

The procedure developed here had been applied to the aquifers of the Upper Rhine Valley Germany and France, i.e. aquifers with high relevance for water supply (Loose-rock sediments of Quaternary). In total data from about 1700 monitoring stations each were used. The natural background levels (NBLs) are assessed based on observed concentration distributions for up to 25 different hydrochemical parameters (e.g. electric conductivity, O₂, pH, DOC, Ca, Mg, Na, K, NH₄, Fe, Mn, HCO₃, Cl, SO₄, NO₃).

In order to assess NBLs for each of the investigated parameters the observed concentration distributions are separated into a natural and an influenced component. This is done by excluding samples with purely anthropogenic substances (e.g. PAC, pesticides) as well as samples, for which indicator substances for anthropogenic inputs (e.g. nitrate) are exceeding a certain value. The remaining groundwater samples are evaluated statistically. The NBLs are defined as the concentration range between the 10% and 90% percentiles of the concentration distributions.

In the contribution, the methodology developed will be described and selected results for the Upper Rhine Valley will be presented. This will be followed by the discussion of possible consequences of using the results for the derivation of threshold values (TVs) for the groundwater and for the definition of the "good groundwater chemical status".

The study has been carried out in the framework of the EU-SPECIFIC TARGETED RESEARCH PROJECT BRIDGE (Background cRiteria for the IDentification of Groundwater thresholds).

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2.4.2 Influence of Seepage of Biologically Treated Waste Water on the Groundwater Condition

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In Austria approximately 14 percent of the households are not connected to public sewage system. Due to the low population density in some areas it is expected, that in future, for economic reasons, five percent of the households will not be connected to public sewage system. One possibility of sewage disposal in these areas is treatment in small sewage treatment plants. If there is no receiving water, infiltration of the treated effluent into the subsurface is one possibility under specific conditions.

To examine these conditions, model calculations of the spreading of the waste water in subsurface were carried out for typical hydrogeologic situations in Austria and for a range of chemical and hygienic substances. The unsaturated and saturated zone were represented separately by analytical model approaches. Monte Carlo simulations were performed where soil parameters, concentrations of the treated sewage, transport parameters and boundary conditions varied.

The results of the simulations show that for low permeability's the chemical substances determine the critical spreading length. With increase permeability's the hygienic parameters play increasingly role. This is because of the reduced filtering of viruses. Based on these results a procedure for estimating the sphere of influence of seepage of treated sewage is being derived that complies with the quality requirements of drinking water.

This work has been supported by the Austrian Ministry of Agriculture, Forestry, Environment and Water Management

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