**Investigation of domestic wells in the vicinity of tight gas exploitation in Lower Saxony**

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With 94.9% of all produced raw gas, Lower Saxony is not only Germany´s main region of natural gas exploitation but has also the largest reserves. Here we find 98.4% of the domestic raw gas reserves. More recently, the exploitation of tight gas from sandstone as well as the exploration of other unconventional gas resources (e.g. shale gas or coal-bed methane) by means of hydraulic fracturing (HF) is challenged by societal concerns about environmental pollution. Also in Lower Saxony, the public discussion on a local scale centers on health risks for the general population as a result of environmental impacts, e.g. on the groundwater and drinking water quality by emissions from the natural gas production. Therefore, in April 2014 a total of 16 representative water samples were taken from private wells in the communities Hemslingen, Söhlingen and Wittorf (rural district Rotenburg) and were analysed a) on selected parameters of the German Drinking Water Ordinance (DWO) and b) by a non-target GC-MS screening. In the vicinity of these domestic wells an intensive natural gas exploitation takes place; in one case a disposal well was neighbouring. All residential estates are connected to the central water supply; the private wells are used only for the abstraction of irrigation water. This implicates that the wells are not subject to official monitoring of the drinking water quality. The sampling points were chosen in consultation with the local citizens' initiative. The chemical analysis was a service provided by the health authorities for the residental population.

For the quantitative determination of selected parameters of the DWO established routine methods were applied which met the quality requirements of Part II of the DWO. The qualitative and quantitative non-target GC-MS screening differentiates between very volatile organic compounds (VVOCs: headspace GC-MS) and semivolatile organic compounds (SVOCs: solid phase extraction followed by GC-MS). The indicator parameters pH and conductivity were within the requirements of the DWO. The Fe and Mn levels were slightly elevated in all samples caused by the geological background. The concentrations of benzene, benzo(a)pyrene and PAHs in the 16 samples were below the limit values of DWO; all concentrations were at the same time below the respective LODs. The measured levels of the metalloids and metals Sb, As, Pb, Cd, Cr, Hg, Se and U were below the drinking water limit values; only in one sample Al exceeds with a concentration of 0.72 mg/L the DWO´s limit value of 0.2 mg/L. The compounds *quantified* by means of non-target GC-MS screening (THM, CS2, styrene, 2,4-dimethylphenol, di-n-octyl phthalate, PAHs, including fluoranthene) were measured at concentrations with no relevance to human health. In 11 samples an additional 16 substances were determined *qualitatively* and only their health hazard could be discussed. Their concentrations can be assumed to be in the lowest trace range of approximately 1 µg/L or below. A final health risk assessment of these substances can be made only after quantification. Against the background of the specific geological setting *Rotliegend*, our data show that the tight gas exploitation has not led to environmental impacts on the near-surface groundwater of the investigated domestic wells.