NOTAT

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Administrative considerations for setting a limit value for arsenic in drinking water

When authorities are establishing administrative limit values for drinking water, these administrative limit values are primarily based on the health based quality criteria. However, other issues as the background concentration and technical and economical considerations are relevant as well, as laid down in the Danish EPA guidance document for the setting of health based quality criteria for chemical substances in relation to soil, ambient air and drinking water[1].

The natural background concentration may have influence on setting an administrative limit value for a substance. The natural background concentrations of inorganic arsenic have been measured in Denmark in approximately 5000 ground water samples in the period 1993-2006. The mean concentration measured was 3.2 µg As/l. (GEUS (2007). In an investigation on 4833 ground water samples from 1991-2006 the concentration of arsenic in 83 % of the samples were below the limit value of 5 µg As/l and between 5 and 10 µg As/l in 10 % of the samples. In the remaining 7 % the concentration was above 10 µg As/l (BLST 2009).

In the EU, the drinking water standard for As is 10 µg/l. Recently (2011), the Commission stated as a result from a hearing that they would not take the initiative to change this limit. Also SCHER has recently (2010) concluded that in some regions of the EU, a level of up to 50 µg As/l may be tolerated for a shorter period of time. However, a minority opinion by two members of SCHER found such a high level unacceptable, as the risk is higher for children up to 18 years of age and for non-breast-fed infants, considering at least their comparatively higher intake. In particular, the major concern is arsenic levels above 20 µg/l.

The office of Environmental Health Hazard Assessment, California EPA had developed a Public Health Goal (PHG) for arsenic in drinking water of 0.004 µg/l corresponding to a calculated 10-6 lifetime risk level (OEHHA 2004); however, the California Department of Health services has set a regulatory drinking water standard at 10 µg/l based on economically and technically considerations, and has set the Detection limit of reporting (DLR)[2] to 2 µg/l.
http://www.clu-in.org/download/contaminantfocus/arsenic/Arsenic-CAfs.pdf

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[1] Metoder til fastsættelse af kvalitetskriterier for kemiske stoffer i jord, luft og drikkevand med henblik på at beskytte sundheden. Miljøstyrelsens vejledning nr. 5, 2006.

[2] Detection Limit for Purposes of Reporting (DLR) —The DLR is a parameter that is set by regulation for each reportable analyte. It is not laboratory specific and it is independent of the analytical method used (in cases where several methods are approved). The DLR cannot be changed by the laboratory. It is expected that a laboratory can achieve a Reporting Limit (RL, see above) that is lower than or equal to the DLR set by the State.

A Danish study (Baastrup et al. (2008)) on the health impact of low arsenic concentrations provides information that may support the establishment of an administrative limit value for inorganic arsenic in drinking water even though some limitations of the study should be acknowledged as well, such as the sensitivity of the study.

In the Danish study no significant relationship was found between exposure to arsenic in drinking water at the present levels and risk for cancer. Average arsenic exposure for the cohort ranged between 0.05 and 25.3 µg/l, and was thus 100-1,000 times lower than those reported in studies from Asia (Chen et al. 1986, 1988; Tsuda et al. 1995; Wu et al. 1989) and Latin America (Ferreccio et al. 2000; Hopenhayn-Rich et al. 1996, 1998; Marshall et al. 2007). References are quoted from Baastrup et al. 2008.

The authors however noted: "*It is possible that arsenic concentrations in the Danish drinking-water are below a low effect level; however, the results of the present study cannot rule out a weak adverse effect that is impossible to detect with the method used and the study size.*"

Conclusion:
Overall, it is acknowledged by the steering committee (see introduction to the report) that a health based quality criterion for inorganic arsenic should be as low as possible. However, for the establishment of an administrative limit value for inorganic arsenic in drinking water, it is important to also consider the natural background concentration as indicated above in order to set a level that is technically and economically feasible. In conclusion the current limit values of 5 µg/l at the entrance into the building, and of 10 µg/l in the water taken at the tap, are maintained as an administrative limit value for arsenic in drinking water.

References

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