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# The Dutch secret: how to provide safe drinking water without chlorine in the Netherlands

P. W. M. H. Smeets[1,2], G. J. Medema[1], and J. C. van Dijk[2]
[1]Kiwa Water Research, Groningenhaven 7, 3433 PE Nieuwegein, The Netherlands
[2]Technical University Delft, P.O. Box 5048, 2600 GA Delft, The Netherlands

Abstract. The Netherlands is one of the few countries where chlorine is not used at all, neither for primary disinfection nor to maintain a residual disinfectant in the distribution network. The Dutch approach that allows production and distribution of drinking water without the use of chlorine while not compromising microbial safety at the tap, can be summarized as follows:

1. Use the best source available, in order of preference:
   – microbiologically safe groundwater,
   – surface water with soil passage such as artificial recharge or bank filtration,
   – direct treatment of surface water in a multiple barrier treatment;
2. Use a preferred physical process treatment such as sedimentation, filtration and UV-disinfection. If absolutely necessary, also oxidation by means of ozone or peroxide can be used, but chlorine is avoided;
3. Prevent ingress of contamination during distribution;
4. Prevent microbial growth in the distribution system by production and distribution of biologically stable (biostable) water and the use of biostable materials;
5. Monitor for timely detection of any failure of the system to prevent significant health consequences.

New developments in safe drinking water in the Netherlands include the adaptation of the Dutch drinking water decree, implementation of quantitative microbial risk assessment (QMRA) by water companies and research into source water quality, drinking water treatment efficacy, safe distribution and biostability of drinking water during distribution and *Legionella*. This paper summarizes how the Dutch water companies warrant the safety of the drinking water without chlorine.

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