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Family scale rural water treatment plant: intermittent slow sand filtration

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Table 2. Inorganic constituents of health significance

Constituent	Unit	Guideline value	Remarks
arsenic	mg/l	0.05	
asbestos	—	no guideline value set	
barium	—	no guideline value set	
beryllium	—	no guideline value set	
cadmium	mg/l	0.005	
chromium	mg/l	0.05	
cyanide	mg/l	0.1	
fluoride	mg/l	1.5	natural or deliberately added; local or climatic conditions may necessitate adaptation
hardness	—	no health-related guideline value set	
lead	mg/l	0.05	
mercury	mg/l	0.001	
nickel	—	no guideline value set	
nitrate	mg/l (N)	10	
nitrite	—	no guideline value set	
selenium	mg/l	0.01	
silver	—	no guideline value set	
sodium	—	no guideline value set	

Table 3. Organic constituents of health significance

Constituent	Unit	Guideline value	Remarks
aldrin and dieldrin	µg/l	0.03	
benzene	µg/l	10[a]	
benzo[*a*]pyrene	µg/l	0.01[a]	
carbon tetrachloride	µg/l	3[a]	tentative guideline value[b]
chlordane	µg/l	0.3	
chlorobenzenes	µg/l	no health-related guideline value set	odour threshold concentration between 0.1 and 3 µg/l
chloroform	µg/l	30[a]	disinfection efficiency must not be compromised when controlling chloroform content
chlorophenols	µg/l	no health-related guideline value set	odour threshold concentration 0.1 µg/l
2,4-D	µg/l	100[c]	
DDT	µg/l	1	
1,2-dichloroethane	µg/l	10[a]	
1,1-dichloroethene[d]	µg/l	0.3[a]	
heptachlor and heptachlor epoxide	µg/l	0.1	
hexachlorobenzene	µg/l	0.01[a]	
gamma-HCH (lindane)	µg/l	3	
methoxychlor	µg/l	30	
pentachlorophenol	µg/l	10	
tetrachloroethene[d]	µg/l	10[a]	tentative guideline value[b]
trichloroethene[d]	µg/l	30[a]	tentative guideline value[b]
2,4,6-trichlorophenol	µg/l	10[a,c]	odour threshold concentration, 0.1 µg/l
trihalomethanes		no guideline value set	see chloroform

[a] These guideline values were computed from a conservative hypothetical mathematical model which cannot be experimentally verified and values should therefore be interpreted differently. Uncertainties involved may amount to two orders of magnitude (i.e., from 0.1 to 10 times the number).

[b] When the available carcinogenicity data did not support a guideline value, but the compounds were judged to be of importance in drinking water and guidance was considered essential, a tentative guideline value was set on the basis of the available health-related data.

[c] May be detectable by taste and odour at lower concentrations.

[d] These compounds were previously known as 1,1-dichloroethylene, tetrachloroethylene, and trichloroethylene, respectively.

Table 4. Aesthetic quality

Constituent or characteristic	Unit	Guideline value	Remarks
aluminium	mg/l	0.2	
chloride	mg/l	250	
chlorobenzenes and chlorophenols	—	no guideline value set	these compounds may affect taste and odour
colour	true colour units (TCU)	15	
copper	mg/l	1.0	
detergents	—	no guideline value set	there should not be any foaming or taste and odour problems
hardness	mg/l (as $CaCO_3$)	500	
hydrogen sulfide	—	not detectable by consumers	
iron	mg/l	0.3	
manganese	mg/l	0.1	
oxygen—dissolved	—	no guideline value set	
pH	—	6.5–8.5	
sodium	mg/l	200	
solids—total dissolved	mg/l	1000	
sulfate	mg/l	400	
taste and odour	—	inoffensive to most consumers	
temperature	—	no guideline value set	
turbidity	nephelometric turbidity units (NTU)	5	preferably <1 for disinfection efficiency
zinc	mg/l	5.0	

Table 5. Radioactive constituents

Constituent	Unit	Guideline value	Remarks
gross alpha activity	Bq/l	0.1	(*a*) If the levels are exceeded more detailed radionuclide analysis may be necessary. (*b*) Higher levels do not necessarily imply that the water is unsuitable for human consumption
gross beta activity	Bq/l	1	

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Gray D., Keen J., & Reynolds J.	1987 UN HANDPUMP PROJECT REPORT DISPOSES OF MANY MYTHS	UNDP/World Bank Hand pump project	World Water, May 1987	Preliminary report on the findings of the hand pump testing programme.
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Huisman L.L.	1978 DEVELOPMENTS OF VILLAGE-SCALE SLOW SAND FILTRATION	University of Technology, Delft	Progess in Water Technology (Oxford) Vol. 11:Iss.1/2	A standard reference on the subject - Huisman covers most elements of the process including an introduction to bacteriological action.
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