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ISKUSTVA ZA ODRŽAVANJE KVALITETA VODE U DISTIBUTIVNIM SISTEMIMA VODOVODA U HOLANDIJI

EXPERIENCES IN MAINTAINING DRINKING WATER QUALITY IN DISTRIBUTION SYSTEMS IN NETHERLANDS

ABSTRAKT

Stanovništvo Holandije ima retku privilegiju da pije vodu, snabdevenu kroz sisteme za distribuciju, koja nije hlorisana. To je rezultat generalnog poboljšanja metoda za prečišćavanje i dezinfekciju pitke vode koja trenutno koristi pretežno UV zrake. Gde je neophodno, ozon se koristi u svrhu oksidacije ali hlor se u normalnim uslovima neće koristiti ni u primarnoj dezinfekciji (tj. u toku prečišćavanja), niti za održavanje minimalnih koncentracija u vodovodnoj mreži. Ovim člankom se daje pregled holandske strategije proizvodnje i distribucije pitke vode, kao i monitoringa njenog kvaliteta, koji se zasniva na redovnoj kontroli i zaštiti izvorišta, stalnom razvoju metoda prečišćavanja, rezultujući u biološki stabilnoj vodi, i prevenciji zagadjenja kroz distributivnu mrežu što se ostvaruje redovnim osmatranjem i brzom reakcijom na kvarove. Odgovarajuće preventivno održavanje vodovodnih mreža takodje doprinosi rezultatu kojim su 16 miliona stanovnika i poprilična industrija snabdevani od nešto manje od 5000 radnika u vodovodnom sektoru: 24 sata dnevno i 7 dana u nedelji, uz sasvim prihvatljivu cenu vode u nivou od 1.5 Evra po kubnom metru.

Ključne reči: vodosnabdevanje Holandije, UV zračenje, prečišćavanje, podzemne i površinske vode

ABSTRACT

Population in the Netherlands have a rare privilege to drink water supplied from distribution networks that is not chlorinated. This is a result of overall improvement of treatment and disinfection methods currently applied by UV. Where necessary, ozone will be used for oxidation purposes but chlorine is used in normal circumstances neither for primary disinfection nor to maintain residual disinfectant in the distribution networks. This paper gives an overview of the Dutch strategy of drinking water production, distribution and monitoring of its quality, which is based on regular monitoring and protection of drinking water sources, continuous development of treatment technologies, resulting in biologically stable water, and prevention of ingress of contamination during the distribution, also by monitoring and prompt reaction to any failure. Appropriate preventive maintenance of distribution networks also contributes to a result in which 16 million people and sizeable industry in this country are supplied by slightly less than 5000 employees in the water sector: 24 hours a day and 7 days per week, at quite affordable price in the order of 1.5 Euro per cubic metre.

Key words: Dutch water supply system, UV radiation, treatment, ground and surface waters

1. UVOD

Istorijat vodosnabdevanja u Holandiji nije mnogo duži nego u Srbiji ali se ono razvijalo znatno brže. Prvi vodovodni sistem je uveden 1853. godine u Amsterdamu (dok je na primer Beograd dobio svoj prvi vodovod 1892. godine). Skoro kompletna zemlja je bila pokrivena vodovodnim sistemima već pred drugi svetski rat, kojima je upravljalo 210 vodovodnih kompanija 1940. godine (Leeflang, 1974). Potom je bilo potrebno nešto oko dve decenije da se nadoknadi ratna šteta, i može se reći da je od sredine šezdesetih godina prošloga veka celokupno stanovništvo snabdeveno pitkom vodom na organizovan način. U poslednjih par decenija, vodovodni sektor karakterišu fuzije vodovodnih kompanija. 2007. godine Holandija je snabdevena od strane 10 vodovoda, kao što pokazuje slika 1 (VEWIN, 2007), koji su svi u državnom vlasnistvu ali funkcionišu po zakonima privatnog poslovanja; ipak, bez mogućnosti ubiranja profita. Najveći

1. INTRODUCTION

History of drinking water supply in the Netherlands is not much longer than in Serbia, but it was developing much faster. First water supply system was introduced in 1853, in Amsterdam (while Belgrade got its first water supply network in 1892). Nearly all the country was covered by water systems already before World War II, and managed by 210 water utilities in 1940 (Leeflang, 1974). Then it took a little over two decades to compensate for war damages, and it can be said that since the mid-nineteen sixties entire population is supplied with drinking water in an organized manner. In recent decades, the water sector is characterized by fusion of water companies. In 2007 Netherlands is supplied by 10 water supply systems, as shown in Figure 1 (VEWIN, 2007), all of which are state-owned but operate under the laws of private business, yet without the possibility of collecting profits. The largest of these water systems (Vitens) supplies

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