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Impact of Wastewater discharge in Wadi Quilt on the Quality of Jericho Springs and Potential Formation of THMs in Drinking Water

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The surface catchment area of Jericho city consist of (Wadi Al Quilt, and Wadi Nuwemeh) is about 176 km2, this strict westwards over the eastern slope of the Mountain Ridge. Semi humid climate dominate over the western part of this catchment, where semi arid dominate the eastern slopes. The catchment area characterized by steep relief with elevations in the range of 700 m a.s.l (above sea level) in the western part and decrease to -250 m b.s.l (below sea level) by the wadi mending in the Jordan River.
Most of urbanization zones concentrate in the western part of the catchment area, where Palestinian communities and Israeli settlements are presence, 119 thousand Palestinian, and about 29 thousand Israeli settlers consumed 6.3 MCM/a for domestic purpose. Its estimated that the generated wastewater is about 80% of the consumed water, which make 5.1 MCM/a. From this volume, only 2.2 MCM/a is treated in Al Bereh wastewater treatment plant, and the 3.4 MCM/a of raw wastewater drain direct either in natural drainage system or infiltrated through the cesspools

Treated wastewater of about 2.2 m3/year, discharge in the catchment area of Wadi Al Quit and infiltrated into the Karstic carbonate Mountain Aquifer. Downstream, two spring groups (Sultan and Quilt) consider as main source of drinking water for Jericho city and Aqbat Jaber Refugee Camp. Dissolved organic carbon (DOC) concentrations for these two groups increase from 1.5 mg/l to 18 mg/L after heavy rainfall event during winter months. Maximum levels of DOC, chloride, and total nitrogen (TN) occur in January and April. These pulses of high concentration imply that the reservoir stores organic compounds originated from wastewater during dry months (from Jun until October). Sodium to Chloride (Na/Cl) ratios suggest that spring water is a matrix of rain and wastewater. Pharmaceutical residual such as Amidotrizoesaure, Iomeprol, Carbamazepin, Iopromid, Iopamidol, Ibuprofen and Loxithalaminsaure are detected in spring water with concentration range between 10 and 50 ng/L.

Drinking water from Aqbat Jaber sand treatment plant contains high DOC level due to a high load of organic matter accumulated during the year and within an overused and tainted sand filter while the free chlorine concentration in the water networks of Jericho city and the Refugee Camp were < 0.5 mg/L (below WHO-standards). Due to hydro-geological connection between Wadi Al Quilt drainage system and the two spring group, treated wastewater for Al Bereh plant should transport through close pipeline down to Jericho, and waste water from Israeli settlement should be treated in order to avoid further health risks. A lack of enough disinfection of free chlorine, in the networks, despite sufficient DOC concentrations, cause total concentration of Trihalomethanes (THM) in the the networks (Jericho and Refugee camp) to be < 100 μg/L. Therefore, it is recommended that drinking water from both sources be treated before chlorination especially during winter months..