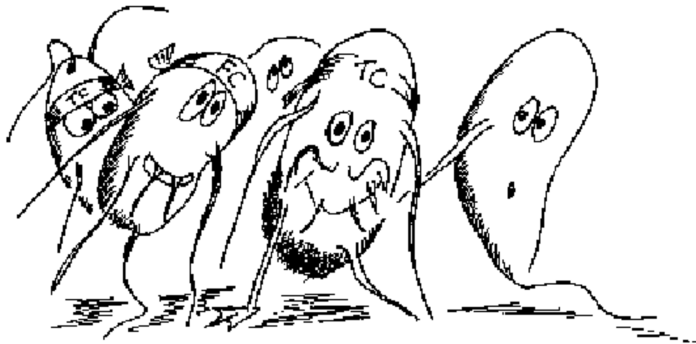


IRON-RELATED BACTERIA

Iron-Related Bacteria & Biofouling in Water Bores



Bacterial activity in a bore influences the pattern and amount of biofouling. Research has shown that there is a decrease in the bacterial population with depth. There can also be significant differences in water quality bacteriologically with time in an aquifer. The changes in bacterial populations reflect changes in the hydrochemistry eg. Dissolved oxygen, iron and nutrients.

THE OCCURRENCE OF BIOFOULING CAN BE DIVIDED INTO ZONES:

ZONE 1 Near the bottom of the screen. Iron deposits rarely form in this area; it is likely that bacterial activity is low leading to minimal biofouling.

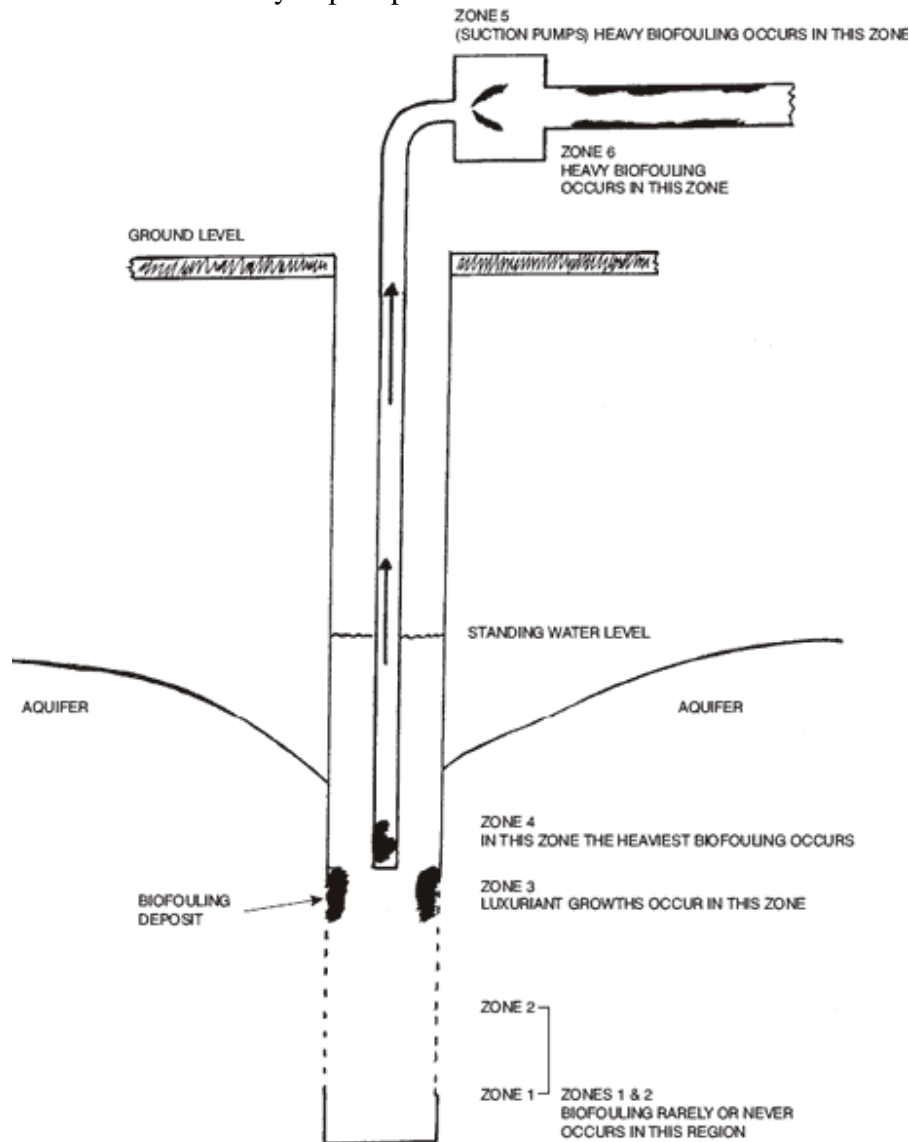
ZONE 2 Centre of the screen. Iron deposits rarely form in this area. Particle fouling accumulations may occur.

ZONE 3 Top section of the screen. Biofouling deposits occur. Luxuriant bacterial growth is supported here, as all water must flow through this zone.

ZONE 4 Pump suction inlet. The heaviest biofouling occurs here. Many systems are operated so that there is minimal distance between the pumping water level and the pump inlet. Often the pump inlet is close to the top of the screen so that Zones 3 & 4 coincide. Around Zone 4 there is often increased oxygenation from atmospheric diffusion into the pumping water. Turbulence and oxygenation increase the potential for bacterial activity. Around the submersible pump motor biofouling is also significant, due to an increase in bacterial activity because of the heat of the motor.

ZONE 5 Surface pump impellers. In suction lift pumps with the impellers on the surface significant deposits can form even though the hydrodynamic forces are high. (Zone 5 does not exist in a submersible pumping system.)

ZONE 6 Discharge side of the pump including column. There is always biofouling in this zone. The water in the bore is generally under disequilibrium conditions due to incomplete mixing of the water from different depths. After the water has passed over the pump impellers it is better mixed and more likely to precipitate iron.



Gallionella, *Sphaerotilus*, *Leptothrix* and *Siderocapsa* spp. will form a biofilm by precipitating iron and manganese. *Thiobacillus* sp. is a sulphur-reducing bacterium, which can cause a 'rotten egg' smell in the water. There are also various forms of fermentative and fungi matter which can form into organic acids