



Iron Bacteria in Surface Water

What are iron bacteria?

Iron bacteria are microorganisms that “feed” on iron. Unlike most bacteria which feed on organic matter, iron bacteria fulfill their energy requirements by oxidizing ferrous iron (Fe^{2+}) into ferric iron (Fe^{3+}). When ferrous iron is converted to ferric iron, it becomes insoluble and precipitates out of water as a rust-colored deposit. This process can occur simply by exposing iron-rich groundwater to the atmosphere. However, if the deposit is slimy, clumpy, or has a petroleum-like sheen, it is probably caused by iron bacteria.

Are bacteria harmful?

Iron bacteria are of no threat to human health. They are found naturally in soils and water. However, the orange slime is often considered an aesthetic problem. The oily sheen created by the decomposing bacteria cells are often mistaken for petroleum sheens. One way to differentiate iron-oxidizing bacteria from oil releases is to trail a small stick or leaf through the film. If the film breaks up into small islands or geometric clusters, it is most likely bacterial in origin. However, if the film swirls together, it is most likely a petroleum discharge.

What causes iron bacteria?

Iron is a common element in Tennessee soils. In fact, iron is one of the most common elements found in nature accounting for at least 5% of the earth’s crust. Consequently, iron-fixing bacteria have always existed in our natural waters. Iron-rich fill material or bedrock can create an iron bacteria problem whenever it is located near water. In general, wherever there is oxygen, water and iron, there is the potential for an iron bacteria problem.

How can we identify iron bacteria?

Orange or brown slime (precipitate) and oily sheens are often the first indicators that these bacteria are present. Microscopically, the bacteria are generally long, filamentous, threadlike organisms. Examples of iron bacteria include *Gallionella*, *Sphaerotilus*, *Leptothrix*, and *Crenothrix*. If field observations are inconsistent with the iron bacteria descriptions in this flyer, please contact TN Dept. of Environment and Conservation for further assistance at 1-888-891-TDEC.

Thank you very much for recognizing the importance of our streams as a valuable natural resource and your help in the protection and improvement of the streams within Metro Nashville/Davidson County.

This publication is a public service of:
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