

## *Volatile Organic Chemicals Health Effects*

There are literally thousands of Volatile Organic Chemicals (VOCs), but the EPA only regulates twenty-two of these chemicals. This is because we are introducing new chemicals into the environment at such an alarming rate that we are not fully able to evaluate the risks and benefits of each, so if the EPA does not regulate a VOC it does not mean that it is not harmful.

Volatile organic chemicals can cause a variety of different health effects depending on the chemical. There are two types of health effects you commonly hear about when discussing VOCs; acute and chronic. Acute health effects are based upon a single exposure to a significant amount of the chemical, while chronic effects are based upon exposure to small amounts over a long period of time. We will focus on the chronic effects, as those health effects are the most likely to occur when your drinking water is contaminated. Chronic effects can include cancer, birth defects, organ damage, nervous system disorder and immune systems deficiencies.

It's difficult to determine what health effects will be a result of ingesting chemicals in varying amounts. In many cases, we have come to understand the health effects of some toxic substances the hard way. For example we now have a better understanding of how arsenic affects human health, from the massive poisoning in Bangladesh where thousands have consumed arsenic tainted water. The effects of many VOCs are not thoroughly understood at this time because of a lack of information available. Chemicals that are tested for toxicity require testing on laboratory animals. These tests may not accurately predict how the chemical will affect humans. Periodically, human data from clinical reports and epidemiological studies are available, but the studies are typically done in short time frames making it difficult to predict chronic effects. VOCs also present health risks from skin absorption and inhalation of water vapors; so when treating the water it is important to address the treatment for the whole house.

Many VOCs are viewed as cancer-causing agents. The EPA has established Agency Guidelines for Carcinogen Risk Assessment that includes five classes of carcinogenicity. The first referred to as Group A, which is considered a human carcinogen, based upon sufficient evidence from epidemiological studies. Group B is labeled as a probable carcinogen and is divided into Group B1 and B2. Group B1 is based on limited evidence of carcinogenicity in humans while Group B2 is based upon the combination of sufficient evidence in animal and inadequate data from humans. Group C is listed as a possible human carcinogen with limited animal studies and no human data available. Group D is not classifiable based on lack of animal and human data. Finally Group E is designated for evidence of non-carcinogenicity for humans. No evidence of carcinogenicity in at least two adequate animal tests in different species or a combination of both epidemiological and animal studies determined non-carcinogenicity.

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