Mechanical aeration of water in frac pits is an effective, low cost, and low-maintenance way to improve the quality of water for disposal or recycling. Aeration has long been used in both municipal and industrial applications to efficiently remove unwanted water components. Aeration also helps stabilize the pH of corrosive waters for a wide range of flows.

When frac water is injected into a formation, it picks up contaminants naturally present such as calcium bicarbonate, magnesium sulfate, strontium, sodium chloride, iron, and barium. In addition, the returning fluid contains heavy metals, soap, radiation and other components.

When sufficient amounts of dissolved oxygen are introduced into the frac water and allowed adequate contact time, the water changes from an anaerobic to aerobic state. The treatment process then follows two pathways. First, the dissolved oxygen kills anaerobes such as sulfate reducing bacteria (SRB.) In turn, the dissolved oxygen supports the growth of aerobes that will digest any floating or subsurface hydrocarbons, bringing clarity to the water. Second, the dissolved oxygen transforms solids such as iron and manganese to their oxidized states which allows them to be removed or else settle to the bottom of the pit.

Oxygen also is known to oxidize dissolved contaminants such as hydrogen sulfide. It can remove volatile gaseous compounds such as ammonia and carbon dioxide.

Frac water returning from the formation is often rendered unsuitable for reuse due to emulsions and sludges. These byproducts are normally formed by the metabolic activity of ubiquitous sulfate reducing bacteria. SRB’s use sulfate to complete their metabolic cycle resulting in the emulsions and sulfidic sludges mentioned above.

Frac pits quickly become anaerobic, meaning they contain no free oxygen, because of heavy biological oxygen demand brought about by hydrocarbons and treatment chemicals. The oxidative demand in the frac pit can be so high due to sulphides that certain treatment chemicals are oxidized and rendered somewhat ineffective. A high level of dissolved oxygen would reduce this oxidative demand.

The frac pit, being a local, controlled, restricted lagoon provides a suitable environment for the acceleration of physical and biochemical reactions. As such, the frac pit can and should be at the heart of the treatment process for the recycling of frac water. The pit is the logical place to look for improvements in process performance and cost control. By installing efficient, durable aerators in the frac pit, the water can be treated to the point that treatment chemicals can be more effective.

The key to aeration is efficiency and contact time. While many aeration technologies exist, most of them have poor oxygen transfer efficiencies or else require too much contact time to be of practical use. The Toring Turbine is a self-aspirating aerator that has one of the highest transfer efficiencies in today’s market.

VaraCorp
13492 Research Blvd Suite 120
Austin, TX 78750-2254
info@varacorp.com  800.801.6685  www.varacorp.com.