FracCure
Turbine Aeration

Introducing the State-of-the-Art Frac Pit Aerator

Frac pit operators are beginning to recognize the benefits of aeration in a frac pit. Some operators use aeration to keep the pit from going septic while others use aeration as part of remediation/recycling program.

The best method for introducing dissolved oxygen into frac water is by a mechanical device referred to as a self-aspirating aerator.

There are two types of self-aspirating aerators in the marketplace. The aerator offered by FracCure uses a state-of-the-art turbine which combines the physics principles of precession and centrifugal force. It has one of the highest oxygen transfer efficiencies of any aerator in the market regardless of type. Competing self-aspirating aerators, which do not use a turbine, are said to experience motor bearing failure in as little as six months. They also tend to create a current so strong that there is concern that it will unduly scour the pit liner.

CONTACT TIME

When frac water is aerated, the overriding issue is contact time between the dissolved oxygen and the contaminated water. The longer the contact time, the greater the degree of remediation. In pits where the water flow-through rate is extremely high, it is imperative that the aerators of choice are pumping huge amounts of dissolved oxygen into the water. If poor performing aerators are used, as described above, then the efficiency of the whole remediation process falls short. While this lack of efficiency can be overcome somewhat by employing more aerators, these added aerators increase the operating costs and the potential for downtime. In any event using more aerators of poor performance is not a practical solution.

Another issue in frac water remediation is the trade-off between *gross air transfer* into the water,

expressed as liters per second, and *dissolved oxygen transfer efficiency*, expressed as pounds of O_2 per horsepower hour ($lbsO_2$/hphr). The difference between these parameters is not always understood by those company employees assigned to oversee frac water remediation.

Gross air transfer refers to the volume of air being injected into the water, regardless of particle size. A huge paddle wheel aerator, for example, might boast a very large air transfer rate. Such boasting is meaningless since the air bubbles are too large to be of real benefit.

Dissolved oxygen transfer efficiency in $lbsO_2$/hphr is determined by a complicated measurement that attempts to put all aerators on the same scale for comparison. For example, Aerator "A" might put twice the dissolved oxygen into the water as Aerator "B". However, Aerator "A" might have five times the horsepower of Aerator "B", so the comparison is meaningless. By having each class of aerator go through a dissolved oxygen transfer efficiency test, it becomes easier to make side-by-side comparisons.

FracCure's aerator has a gross air transfer rate of up to 16 liters of air per second. Its dissolved oxygen transfer efficiency can range from three to five pounds of oxygen per horsepower hour depending upon the motor size and turbine depth.

While dissolved oxygen alone can be helpful in a frac pit, its role in supporting aerobes is even more critical. Given the (symbiotic) relationship between aerobes and dissolved oxygen, it makes sense to combine these two constituents in frac water remediation. While naturally occurring microbes are of value, the remediation process can be jump started by injecting a blend of carefully selected, cultured, waste-specific microbes into the frac water. This designer blend contains a host of (naturally occurring, non-genetically modified) aerobes, each known to address certain contaminants in the pit water.

The combination of dissolved oxygen and a microbial blend makes even more sense when flow-through rates are high in a given pit. In such cases there is a need to ramp up the remediation process quickly and keep it proceeding at a high rate to offset the short contact time with the water.

Given the increasing scrutiny by regulators and the public alike, and given the growing scarcity and cost of fresh water, it is becoming more imperative than ever that frac water be recycled safely and affordably. A combination of dissolved oxygen and a microbial blend can provide a low cost, low tech means of achieving this goal.