AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

AquaPRS™ PFAS Removal System
Process Description

The AquaPRS™ Treatment process presents a unique arrangement to maximize contact between the PFAS and the AASI micro-sorbent material. The process consists of three basic parts as shown in Figure 1 below, which include the following:

- **Adsorption Process**: The contaminated water is mixed and comes into contact with the micro-sorbent and the adsorption of PFAS occurs.
- **Separation Process**: The micro-sorbent and any solids are removed from the water to produce a high quality micro-filtered effluent
- **Waste Minimization**: The spent micro-sorbent and solids are concentrated up to 25% to 30% by weight, minimizing both the liquid and solid waste with PFAS.

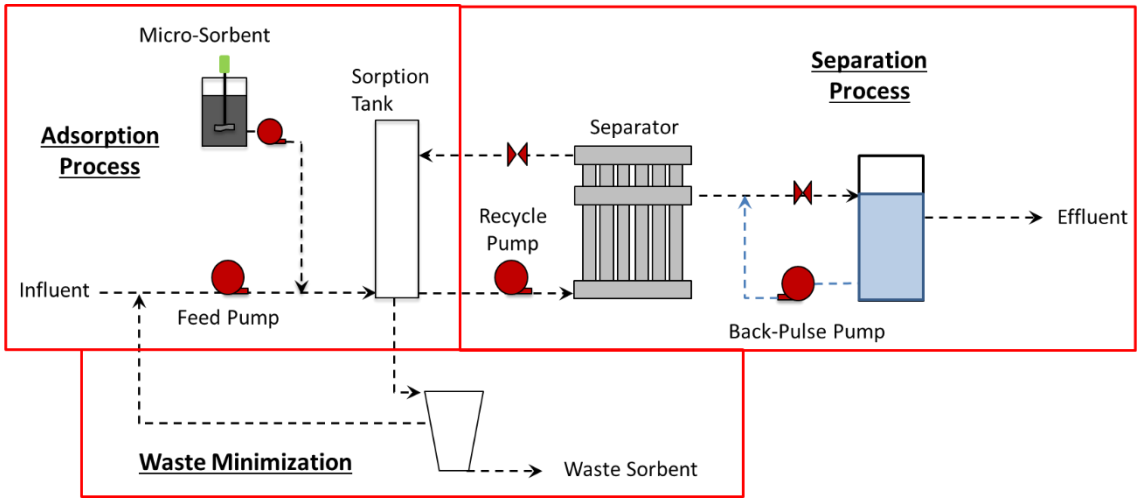

Figure 1: AquaPRS Three (3) Process Steps

As shown in Figure 2, the treatment process is initially loaded with micro-sorbent and feed water to the operating water level to achieve the desired micro-sorbent slurry concentration between 1 g/L to 40 g/L. The sorbent loading can range from bi-weekly to several months depending on the PFAS concentration, species and amounts of other co-contaminants in the feed water. The loading process takes about 15 to 30 minutes.

6306 N. Alpine Rd., Loves Park, IL 61111-7655 p 815.654.2501 f 815.654.2508 **www.aqua-aerobic.com**

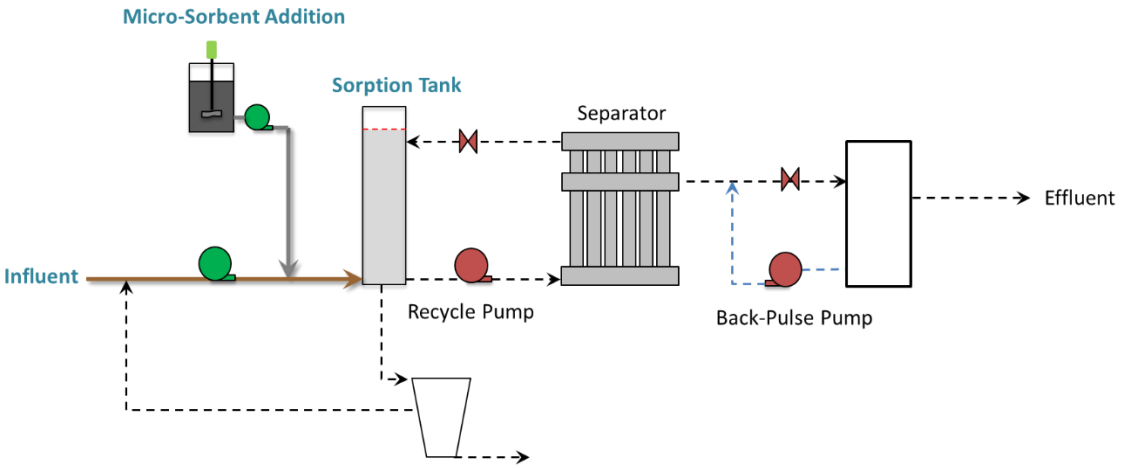

Figure 2: Micro-Sorbent Loading

As shown in Figure 3 (below), Once the sorbent is mixed in the reactor, the feed pump draws source water and delivers it to the sorption reactor. The sorption reactor provides a contact time between 3 to 10 minutes depending on source water quality including but not limited to the concentration of PFAS compounds, Total Organic Fluorine (TOF), Total Organic Precursors (TOP), Total / Dissolved Organic Carbon (TOC / DOC) and other possible co-contaminants. The time can vary based on the AASI sorbent selected to be utilized due to different characteristics of the sorbent materials, types of PFAS compounds targeted for removal and other water characteristics. The recycle pump conveys the sorption reactor water and material thorough the separator and returns it back to the sorption reactor due to a recycle flow rate which can be 2x to 10x the feed flow. At the same time, the separator produces an effluent equal to the influent feed rate into the system and producing high quality micro-filtered effluent.

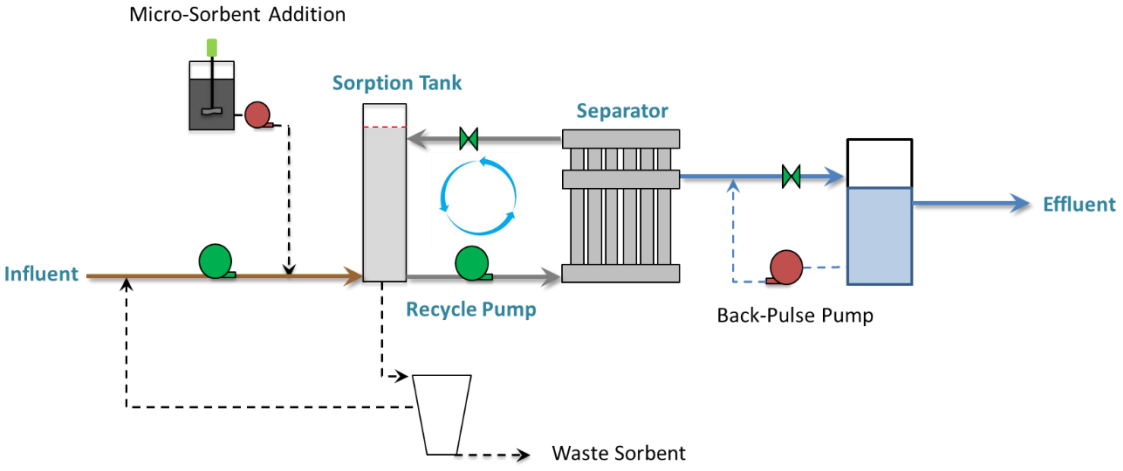

Figure 3: Process Adsorption and Filtration

The separator material of construction which has high hardness permits the mildly abrasive sorbent to continually clean the surface without wear. The sorbent crossflow maintains low feed pressures without

the need for coagulants in most application, but if there is TMP increase coagulant dosing may be required periodically as very low dosages. The system typically operates 2 to 14+ weeks continuously without generating waste.

As shown in Figure 4, periodically, a small quantity of treated filtrate/effluent is pumped back through the separator via a backpulse pump. This action frees any solids and micro-sorbent from the separator surface and the crossflow recycle returns it back to the sorption reactor. The backpulse frequency is typically 20 to 30 seconds in duration and occurs every 15 to 60 minutes. It is important to note the water is not wasted, it is returned to the system and re-filtered.

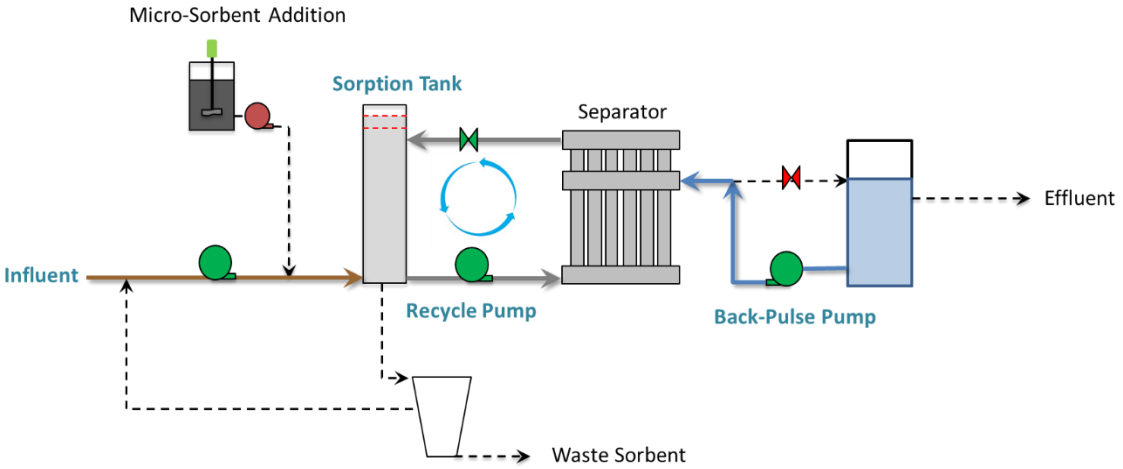

Figure 4: Backpulse of Separator

After the AquaPRS™ process has operated for a period of 2 to 14+ weeks based on water conditions, the operator or a timer can initiate at a select time the sorbent change-out process. The sorbent changeout process is completely automated and requires minimal attention from the operator. As shown in Figure 5, the process involves removing the sorbent from the system and concentrating the sorbent material to minimize the amount of liquid waste. The first step is reducing the volume of water in the system to 50% by producing effluent with no feed flow into the system.

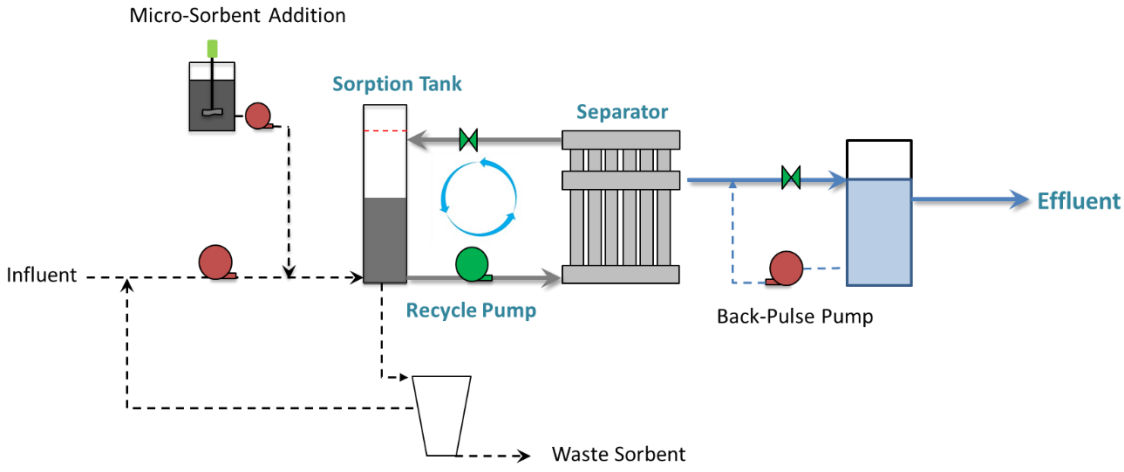

Figure 5: System Concentrating

As shown in Figure 6 below, the liquid, micro-sorbent and solids are drained from the sorption reactor and backpulsed out of the separator system into the sorbent waste settling tank. The waste transfer process takes 15 to 30 minutes only.

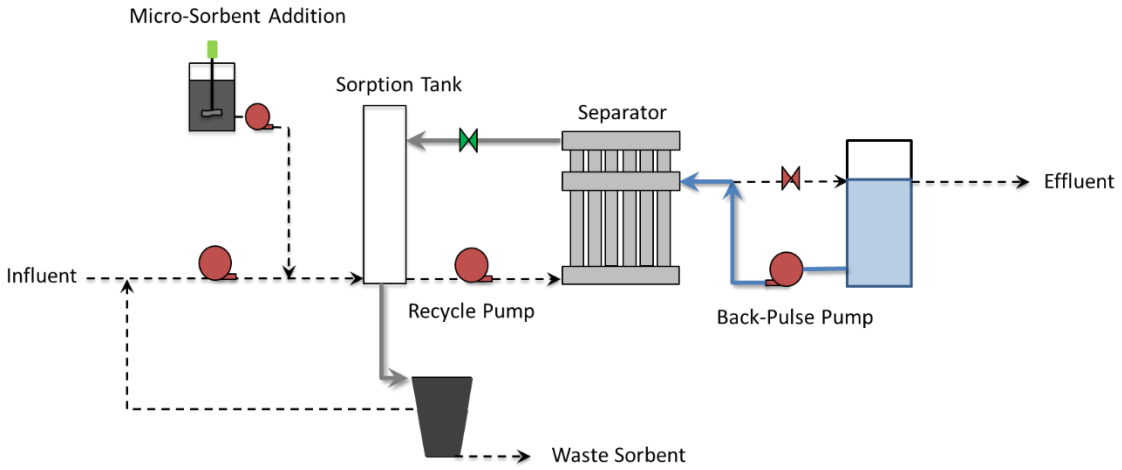

Figure 6: Waste transfer to Settling Tank

After all the liquid and materials have be transferred, the material will be allowed to settle in the tank for 24 to 48 hours before removal. As shown in Figure 7 below, the AquaPRS system is reloaded with new batch of sorbent as described earlier in this description, while the material is settling.

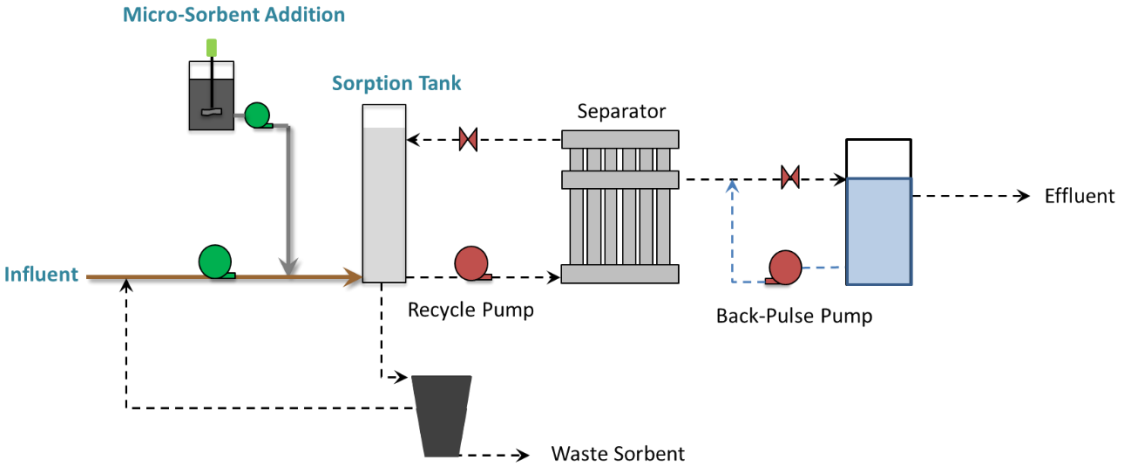

Figure 7: Sorbent Reload and Waste Settling

As shown in Figure 8 below, while AquaPRS™ system is operating and after 24 to 48 hours, supernatant liquid that collects above the settled micro-sorbent and solids is transferred back into the AquaPRS™ system to be retreated minimizing the liquid waste. Then, the concentrated micro-sorbent and solids are transferred to a bulk storage container until it is removed from site to be disposaed in a waste landfill or

destroyed by a thermal destruction process such as incineration, gasification, supercritical water oxidation or similar.

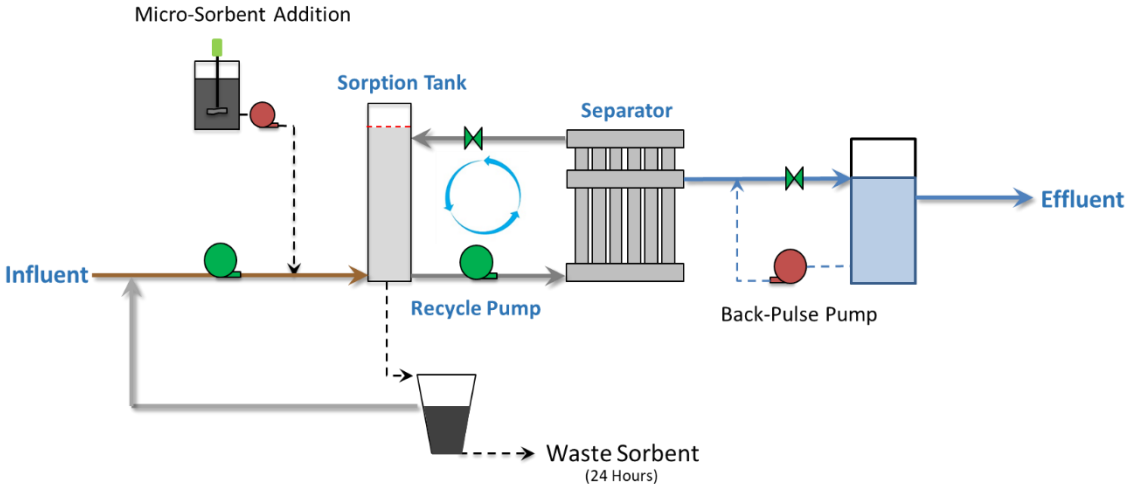

Figure 8: Supernatant Return and Waste Removal