Development of a Low-Cost Method of Treating Flow-Back Water from Hydraulic Fracturing

The Chemical Engineering Department at Southwest Research Institute® (SwRI®) is developing a technique and process for efficient clean-up of produced water from drilling operations.

This method uses optimized biochar for the effective removal of particles, total dissolved solids, and hydrocarbons from flow-back water and related streams.

Production oven for biochar from comminuted wood chips

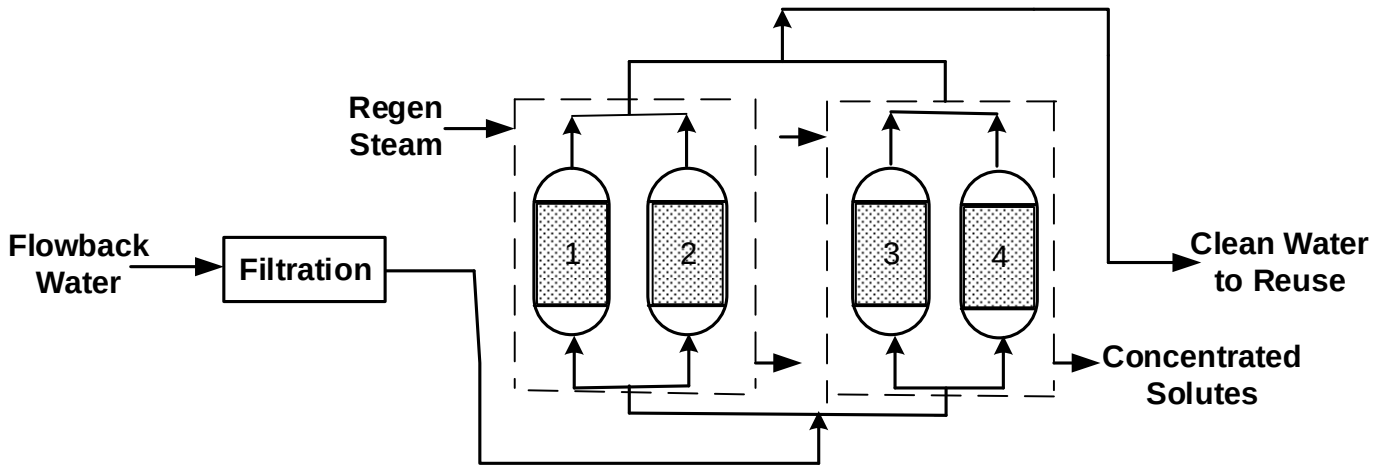
Approach

Hydraulic fracturing wastewater is difficult to treat due to high concentrations of dissolved inorganic solids and organic hydrocarbons. Current technologies are expensive to treat these contaminants. Utilizing a low cost biochar as adsorbent produced from forestry and agricultural wastes can significantly reduce the cost for the treatment of hydraulic fracturing wastewater. This study focused on the removal of Na, Ca, Mg, Sr, K, Cl-, and CO_3^{2-}, which are commonly found in shale produced water and returned production fluids.

Sorbent bed evaluation under continuous flow

Some Features and Benefits

- Stand alone or combine with existing process as pretreatment or polishing step
- Low cost operation
- Easy to be adapted to existing treatment plant
- Use conventional or optimized biochar
- Convenient bed regeneration
- Regular channels of waste disposal
- Inexpensive sorbent
- Omnivorous sorption
- Materials and large-scale equipment are commercially available
- Substantially reduce the overall costs and environmental impacts for shale gas and oil production



Biochar Sorbent Beds Under Swing-Bed Operation Mode

SwRI measured the capacities and selectivity of various biochars produced in the laboratory under regulated conditions to identify the optimum conditions for production of the char and for treating the flow-back water. As a stand-alone process or an adjunct to an operating system, the new method will improve outflow water and reduce waste volumes. Further development will be based on industrial interest and participation.

Southwest Research Institute is an independent, nonprofit, applied engineering and physical sciences research and development organization using multidisciplinary approaches to problem solving. The Institute occupies 1,200 acres in San Antonio, Texas, and provides more than 2 million square feet of laboratories, test facilities, workshops, and offices for more than 3,000 employees who perform contract work for industry and government clients.

This work was performed by the Chemical Engineering Department of SwRI in a parallel project with modeling work at UTSA through a cooperation called the UTSA-SwRI Connect Program.

We welcome your inquiries. For additional information, please contact:

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