Cost-Effective Treatment of Flowback and Produced Waters via an Integrated Precipitative Supercritical (IPSC) Process

PROJECT FACT SHEET

Program
2011 Unconventional Resources

Project Number
11122-60

Start Date
June 2013

Duration
34 Months

RPSEA Share
$$1,897,109

Cost Share
$500,160

Prime Contractor
The University of Ohio

Participants
Aquionics Inc.; Ohio Gas Association; Parker Hannifin Corporation

Contact Information

Principal Investigator
Jason Trembly
The University of Ohio
trembly@ohio.edu
740-331-4921

Project Manager
Sandy McSurdy
NETL
sandra.mcsurdy@netl.doe.gov
412-386-4533

Kent Perry
RPSEA
kperry@rpsea.org
281-725-1252

Reports and Publications
www.rpsea.org/projects/11122-60

RPSEA
www.rpsea.org

NETL
www.netl.doe.gov

121715

Research Objectives

Water usage of drilling and hydraulic fracturing activities can be intensive and so can be the costs associated with managing waste water produced from unconventional resource operations. The primary objective of this project is to develop and validate the performance and cost-effectiveness of the Integrated Precipitative Supercritical (IPSC) process to convert flowback/produced (F/P) water generated by unconventional shale gas wells into a clean water product for reuse as a hydrofracturing fluid or direct discharge.

Approach

This project is a collaborative research and development project, with Aquionics Inc., Ohio Gas Association, and Parker Hannifin Corporation. Bench-scale tests will be completed to evaluate naturally occurring radioactive materials (NORM) sorbents and an innovative water wastewater treatment reactor design. Integrated pilot-scale tests will be conducted and results will be used to complete techno-economic assessments to further refine process capital costs.

Accomplishments

Researchers have completed laboratory and prototype testing. NORM removal methodologies, including adsorption and precipitation, have been evaluated. Precipitation studies have been completed to evaluate the ability to selectively remove dissolved solids. Ultraviolet (UV) testing was completed to determine dosing required for remediation of aerobic and sulfate-reducing bacteria contained in shale wastewater. Also, supercritical reactor prototype system testing demonstrated deep removal of dissolved solids and hydrocarbons.

Significant Findings

A low-cost mineral sorbent was shown to remove NORM from high salinity wastewater with chloride resistance demonstrating commercial potential. Precipitation testing yielded important results regarding the ability to selectively removal of hazardous components resulting in lower operating costs. Additionally, researchers have developed a new supercritical reactor design which will provide higher throughput with a smaller footprint and better scalability.

Future Plans

Continued laboratory tests will be performed supporting selective NORM removal and dissolved solids removal from produced water.

Acknowledgements

Acknowledgements go to Aquionics Inc. for providing a pilot UV test.