Reducing the Environmental Impact of Gas Shale Development: Advanced Analytical Methods for Air and Stray Gas Emissions and Produced Brine Characterization

RPSEA
Research Partnership to Secure Energy for America

PROJECT FACT SHEET

Program
2011 Unconventional Resources Program

Project Number
11122-45

Start Date
June 2013

Duration
36 Months

RPSEA Share
$3,501,605

Cost Share
$901,777

Prime Contractor
GSI Environmental Inc.

Participants
Texas A&M GPRI; Texas A&M IRNR; Texas A&M TEES; Accutest, Cabot; Isotech Labs; M-I SWACO; AACOG; EFD Roundtable; HARC; GWPC; The University of Oklahoma; Dr. Shikha Sharma; Echelon; Universal Geoscience Consulting Inc.; ODNR; PaDEP; Texas RRC; TCEQ; NYSDEC; New York State Research Development Authority

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Reports and Publications

None

Research Objectives

This project addresses three of the most important potential environmental risks associated with hydraulic fracturing operations for development of shale gas resources:

- Air Emissions of volatile contaminants from flowback water impoundments;
- Stray Gas Impacts of methane and other hydrocarbons on groundwater resources; and
- Flowback/Produced Water management, reuse, treatment, and disposal.

Our goal is to provide scientific support and guidance on best management practices to characterize these hydraulic fracturing waste streams. Environmental monitoring and waste characterization methods developed during the project will provide more confidence in identifying and managing potential risks, facilitate the safe and cost-effective development of this energy resource, and address mounting concerns expressed by legislators, regulatory agencies, and the general public.

Approach

GSI Environmental Inc. and its teaming partners at Texas A&M University have assembled a multi-disciplinary team of scientists, researchers, industry representatives, and regulators to evaluate current sampling and testing technologies and develop improved decision-making protocols for:

- Air Emissions: Evaluation of sampling and analytical methods and modeling procedures to accurately characterize volatile organic emissions from ponds and other impoundments.
- Stray Gas Impacts: Compilation of baseline dissolved gas and geochemistry in water wells, testing of dissolved gas sampling methods, and analysis of temporal variation of dissolved gas.
- Flowback/Produced Water: Field testing of on-site analytical methods for rapid characterization of produced water to optimize management, reuse, treatment, and disposal.

Air emissions from produced water ponds

Potential stray gas impacts to water wells

On-site characterization of produced water

Accomplishments

This coordinated research effort develops accurate and cost-effective characterization methods for air emissions, stray gas impacts, and produced water in a single research program and provides a forum for dialogue and cooperation among stakeholders of shale gas development. Knowledge gained from this program will be disseminated though public education programs at academic institutions, operating practices of our industry partners, and management guidelines by the regulatory community.

Significant Findings

Comprehensive assessment of the nature and magnitude of environmental impacts associated with shale gas exploration is currently in its infancy and limited coordination between stakeholders has been achieved. There remains a need for a consistent approach for the characterization of hydraulic fracturing waste streams that combines input from stakeholders to improve data quality, enables comparative analysis, and facilitates accurate assessment of environmental risk factors.

Future Plans

A critical component of the project is the Technical Advisory Steering Committee (TASC), composed of individuals from industry, academia, and government agencies. Through a coordinated effort, TASC members will aid in the development of sampling and analytical methodology that will help industry and regulators make informed decisions on the environmental impacts of hydraulic fracturing.