

# MARCELLUS SHALE ENERGY & ENVIRONMENT LABORATORY (MSEEL)

## IMPACT

The MSEEL site is providing a well-documented baseline of reservoir and environmental characterization. Access to multiple Marcellus wells enables researchers to collect samples and data, and to test and demonstrate advanced technologies. The project's phased approach has the flexibility to identify and incorporate new, cost-effective technology and science focused on increasing recovery efficiency and reducing environmental and societal impacts.

# NETL

## NATIONAL ENERGY TECHNOLOGY LABORATORY

## GOAL

The goal of the Marcellus Shale Energy and Environment Laboratory (MSEEL) is to provide a long-term field site to develop and validate new knowledge and technology to improve recovery efficiency and minimize environmental implications of unconventional resource development.

## PERFORMERS

West Virginia University  
Northeast Natural Energy  
The Ohio State University

## COST

**DOE Contribution**  
\$9,604,824  
**Performer Contribution**  
\$4,342,480

## PROJECT DURATION

**Start Date** - October 1, 2014  
**End Date** - September 30, 2019

## PROJECT NUMBER

DE-FE0024297

## BACKGROUND

West Virginia University (WVU) and The Ohio State University (OSU) have formed a consortium of university researchers to develop a program focused on a dedicated field site and laboratory at the Northeast Natural Energy (NNE) production site in the center of the Marcellus Shale unconventional production region of north-central West Virginia.

The MSEEL project provides a long-term field site at NNE's Morgantown Industrial Park (MIP) just outside of Morgantown, West Virginia. The site provides a well-documented baseline of production and environmental characterization from two wells. A dedicated scientific observation well will be used to collect detailed subsurface data and to monitor and test technologies in additional production wells that may be drilled at the site. The MSEEL site is expected to undergo multiple drilling events (separated by periods sufficient to analyze data) over the course of the 5-year project, providing the ideal testing conditions for researchers.

## CURRENT STATUS

The preliminary results of the production logging campaign suggest that the clusters stimulated with finer proppant display more consistent and higher volume production. The data collected through the production "spinner" logging test will be coupled with fiber optics data that measured acoustical information and temperature conditions downhole as well as microseismic data collected during stimulation operations. Collectively, the data will be used to enhance reservoir models and to gain better insights as to fracture growth and propagation.

A special session highlighting the results and lessons learned from the MSEEL project is scheduled for the URTec conference in Austin, Texas July 24-26, 2017.

An MSEEL web application and data portal is available online at <http://mseel.org>

## SELECT ACCOMPLISHMENTS

- On March 13, 2017, WVU and NNE completed the production log testing of the MIP 3H well. This production "spinner test" measured fluid velocity. The data will be used to assess which stimulated zones have contributed the most to overall production of the well. The well was also instrumented with a permanent real-time pressure gauge.
- Utilizing metagenomics, OSU has been able to show that the Marcellus Shale contains unique microbial populations.
- In research to investigate fluid-rock-microbial interactions, WVU researchers observed trends that might be indicative of microbial reactions in the reservoir, induced after introduction of hydraulic fracturing fluids (containing nutrient and carbon sources). These results will be tied to the genomic analysis conducted OSU.
- Continuous monitoring of flow back and produced waters for nearly a year show that total dissolved solids (TDS) have leveled off and that there has been little change in ionic composition. Radionuclides in the drill cuttings have been consistently below WV Department of Protection levels for landfill disposal and well below US Department of Transportation levels for classification as a low level radioactive waste. Findings from the analysis of MSEEL drill cuttings aided WV legislators in establishing new state-wide waste disposal criteria. These criteria are based on the EPA's toxicity characteristic leaching procedure (TCLP). There have been no TLCP exceedances for either organic or inorganic constituents in the MSEEL drill cuttings.
- NNE began drilling two production wells (MIP 3H and 5H) in late June 2015. The 3H well was used to obtain 111 feet of 4-inch whole core through the entire Marcellus Formation as well more than 50 1.5-inch sidewall cores which will be used by researchers to conduct geochemical, microbiological, and geomechanical investigations. This same well was instrumented with fiber optic cable for distributed acoustic and temperature measurements throughout the full lateral length. The dedicated vertical science well, situated between the two horizontal production wells, was drilled and logged, and 147 additional 1-inch sidewall cores were obtained. The science well was instrumented with borehole microseismic and was used to gather valuable information to assist with optimizing lateral well placement and hydraulic fracture design during well stimulation.

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