



ENVIRONMENTALLY FRIENDLY DRILLING SYSTEMS PROGRAM

REAL TIME AIR MONITORING

Measuring Air Emissions from Natural Gas Operations

The **Environmentally Friendly Drilling (EFD)** program, managed by the Houston Advanced Research Center (HARC), integrates advanced technologies into systems that significantly reduce the footprint of petroleum drilling and production in environmentally sensitive areas. The objective is to identify, develop and transfer critical, cost effective, new technologies that can provide policy makers and industry with the ability to develop reserves in a safe and environmentally friendly manner.

The program continues to add participants from environmental organizations, academia, state and federal agencies, government laboratories, and industry. Currently over 100 organizations support this effort including financial assistance. The partnership identifies new technologies and transfers them to areas that must incorporate new practices to address environmental concerns. Regional partners optimize technologies to fit the needs of their locale. Partners routinely come together to discuss progress with the sponsors/advisors. The program was honored with the Environmental Partnership Chairman's Stewardship Award from the Interstate Oil and Gas Compact Commission at their 2009 annual meeting.



Air Monitoring and Pollution Mitigation—The Case for Action

Future restrictions on emissions of air pollutants may pose severe constraints on the oil and gas industry. For example, compliance scenarios that require widespread compressor engine replacement or retrofit to reduce air emissions to unprecedented levels could cost the industry up to \$6 billion. The air quality impacts of oil and gas activities in established shales are already the subject of increasing scrutiny. Considerable media attention has been focused on the industry in the Barnett Shale because of its contribution to smog in the Dallas-Ft. Worth (DFW) ozone non-attainment area, and more recently because of public complaints regarding the health effects of industry emissions of hazardous air pollutants (HAPs) such as benzene. In the Upper Green River Basin of Wyoming, unexpected wintertime ozone exceeding the National Ambient Air Quality Standard (NAAQS) has been observed.



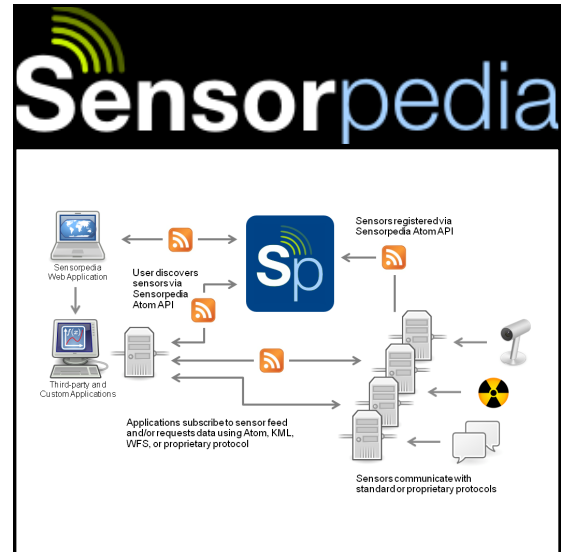
The USEPA is now considering lowering the ozone NAAQS from 75 ppb to 70 ppb or less. This would pose an even greater challenge to shale gas producers, as their emissions may be sufficient to drive the surrounding area into ozone non-attainment, almost irrespective of the contributions of other local sources. **Under these conditions, commercial production cannot be increased without air quality mitigation measures based on accurate monitoring of emissions.**

The USEPA has also promulgated a Maximum Achievable Control Technology (MACT) standard to reduce formaldehyde and other toxic air emissions from stationary reciprocating internal combustion engines, including those used at compressor stations. If HAP emissions are found to be much greater than previously estimated, then more oil and gas facilities may be classified as major HAP sources subject to the MACT. Lastly, the USEPA has issued a draft greenhouse gas (GHG) reporting rule which will require more detailed knowledge about GHG emissions from oil and gas fields.

Description of Project

A majority of the new shale gas resources in the United States and the world will require new low impact technology to reduce energy's environmental footprint. One issue that the energy industry faces is how to minimize adverse impact of its operations in these areas. The objective of this JIP is to monitor air quality of gas shale drilling in a selected area, provide data to key stakeholders, and to ensure that environmental standards for the area are met.

Texas A&M University (College Station) Petroleum Engineering, Texas A&M Kingsville (TAMUK) are joining with Oak Ridge National Laboratory (ORNL) to develop and implement a new type of environmental oversight program. Selected sensors measure the environmental conditions within a certain area, record those conditions remotely, then process and incorporate that information into a networking framework called Sensorpedia, for display in real time. Oversight monitoring will be implemented where field tests are being conducted. An ORNL team provides guidance on the parameters to be included in the proposed demonstration of the Sensorpedia EFD network. The TAMUK team will be responsible for monitoring. ORNL sets the boundaries for the data and advises information prioritization and development of baseline and monitoring data for environmental impacts.



A “branded” EFD server will be established at ORNL with basic features to allow users to start seeing data. It is anticipated that the effort, involving acquisition of a server, development of software for EFD’s requirements, preparation of data and training of users will take about 6 months following selection of the data to be incorporated, starting later in the first year of the project and continuing into the second year.

The project will fund a Sensorpedia network for the capture and analysis of sensor data related to shale gas development. It will be demonstrated that such data can be accessed by any of the stakeholders identified in the Environmental Assessment activity. Data can come from the entire life of the well: baseline activities before site selection and drilling, during drilling to support best management practices, monitoring during production, and during decommissioning.

Deliverables

This project will deliver a prototype environmental oversight package that accepts wide variety of sensor data and through an existing network displays that information in easily understandable manner. The oversight monitoring program is capable of monitoring small or large geographic areas. The project will also document the effectiveness of technology being tested in the Eagle Ford Shale proving ground.

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Environmentally Friendly Drilling Program

For 20 years, we have worked to reduce our environmental footprint. Remarkable progress has been made.

The program has shown we can **reduce the footprint more than 90%** with a further reduction in the impact on the environment if low impact technologies are combined in a system.

From the past...
(multiple well sites)



...to the present drill site pad
6 times smaller and able
to access multiple wells
from **ONE** location



System includes:

- Modular small footprint rigs with reduced emissions.
- Pad drilling of multiple wells from one site.
- New downhole logging and steering tools.
- Closed loop drilling fluid systems.

Managed by the Houston Advanced Research Center (HARC), Texas A & M University, Sam Houston State University and TerraPlatforms LLC
www.efdsystems.com

The project has been co-funded by the DOE National Energy Technology Laboratory, Research Partnership to Secure Energy for America (RPSEA), industry and environmental organizations.

SPONSORS



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ENVIRONMENTAL ORGANIZATIONS



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