



ENVIRONMENTALLY FRIENDLY DRILLING SYSTEMS PROGRAM

SITE ACCESS

Reducing the impact of accessing well sites

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.



Accessing Drilling and Well Sites

The impact of access roads and drilling pads has been identified by the EFD program as one of the major problems to be managed when conducting oil and gas operations in environmentally sensitive areas. Since 2005 the EFD program has been identifying technology and sponsoring research in reducing surface impact.

Two major projects are underway specifically addressing such technology.

1. The "Disappearing Road Competition" is a yearly nation-wide scholastic competition to create a new concept of moving personnel and materials to and from well sites. From this program comes new ways to move across the landscape in a minimal way.
2. RPSEA's Unconventional Oil & Gas Development (Environmental Issues) is funding a project by Texas A&M University to construct and then perform demonstrations of low impact O&G lease roads designed to reduce the environmental impact of field development in sensitive new desert ecosystems.



Testing of composite mats and recycled drill cuttings as road materials. Recycled drill cuttings supplied by Scott Environmental Services. Composite mats supplied by



Every drilling site needs a road to link it to the outside world. New technology promises to protect sensitive environments from the damage that putting in a conventional road causes. Technologies being studied range from artificial gravel to portable composite mats and planks. All are designed to provide durable surfaces for oil field service vehicles to drive over and to protect the soil under the road. Texas A&M researchers are testing three approaches in field studies at Texas A&M research facilities in West Texas.

One road system consists of a series of interlocking composite mats, each about four feet by eight feet and three inches thick. Similar pads are being used already to support drilling rigs in some areas where the surface soil is particularly soft.

A similar system that the Texas A&M researchers also are testing was designed by engineering students at the University of Wyoming. It's a series of composite planks linked by stainless-steel cables, much like an oversized version of snow fences used to keep winter snow from blowing over highways in northern states.

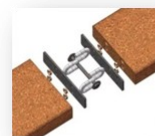
Another approach is to use artificial gravel made up of sludge from on-site pits where drilling mud is held, solid waste and concrete to build the road base. When the road is no longer needed, it's simply plowed up.

Main Components – Rollout Road

- Conformable



- Hinged board segments



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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

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SPONSORS



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ENVIRONMENTAL ORGANIZATIONS



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