

The restoration project

In the first eight years of the new millennium, the US watched domestic crude oil production continue on a downward spiral at a rate of 2% annually – a predictable trend since the 1970s. With about half the production still limited to Alaska, Texas and the Gulf of Mexico, dependency on foreign oil imports increased – another trend with obvious economic consequences. In the six short years following, however, the country has gone from foreign-oil dependency to surpassing Saudi Arabia as the world's leading producer of oil and natural gas liquids, thanks to significant advances in hydraulic fracturing technology and the rising availability of shale gas. Soaring across the country in places like North Dakota, Colorado, Pennsylvania, West Virginia, Ohio, and Oklahoma, shale development is playing a pivotal role in the country's economic recovery. With this surplus, utilities are encouraged to switch from coal to cleaner-burning natural gas and, thus, initiating dramatic expansion of oil and gas pipeline construction. Experts predict that the US can expect the construction of some 23 000 miles of pipeline between 2014 and 2020.

For many invested in this rapidly evolving industry, this is good news; for those regarding the future of affected public and private lands, there is cause for concern. With the new “energy revolution,” real challenges arise, particularly with infrastructure and restoration. When an energy company replaces or constructs new pipeline, whether six or 600 miles, the extraction of natural gas and delivery

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discusses the infrastructure
and restoration-related
challenges that arise
with the new energy
revolution.

to end-users invariably results in additional miles of land and road disruptions, both public and private, which can, in turn, result in disputes and delays.

Protective measures

Depending on its length and its intended path, a pipeline project can move through towns, agricultural fields, natural habitats and vital transportation thoroughfares. Gaining the right of way or easement to use a section of a landowner's property presents one of the biggest challenges in pipeline construction, as landowners are ultimately most concerned with proper restoration of their properties, as well as potential future repercussions from land disruptions. It is not uncommon for a pipeline construction company to broker individual agreements with every landowner along the proposed route.

While most companies use best management practices, such as topsoil segregation, erosion control, irrigation restoration and other protective measures to give landowners active use of their land for farming and recreation activities after construction is completed, circumstances have created a real need for developing quality, cost-effective solutions and products that improve the industry by achieving environmental goals of both the pipeline companies and the affected communities.

A pipeline construction project works similar to a relay race, with each segment requiring highly specialised and qualified crews. As one crew completes its work, the baton is passed to another crew, each with a unique set of responsibilities and tasks of equal importance and necessity. This includes surveying land, staking right-of-way boundaries, clearing vegetation, installing temporary erosion-control measures, removing topsoil, excavating trenches, lowering pipe into the ground, backfilling, post-construction hydrostatic testing in accordance with federal regulations and, finally, restoration measures that are maintained until the area is restored to its original condition or, in some cases, improved. Pipeline construction must also comply with stringent regulations from the Federal Energy Regulatory Commission (FERC), which weighs in heavily on proposed routes and price rates. These decisions are primarily based on environmental and ecological concerns and the greater good of the consumer.

Diminishing unfavourable impact from site development and restoring the right-of-way to its original condition requires not only experienced and skilled construction crews, but also pipeline restoration and erosion-control experts. With most construction

projects, protecting a site from erosion and restoring the area to its original condition is a chief concern among developers and project managers. Shortsighted planning can result in further disruptions and additional project costs over longer periods of time. Industry experts agree that the most important measure of erosion control is minimising the period of time between right-of-way clearing and final restoration. Inadequate erosion-control methods, especially on pipelines constructed in steep, hilly regions, create the potential to introduce large amounts of sediment and silt into streams or wetlands. This challenge can be amplified by slope, soil, and extreme weather conditions, such as storms and harsh temperatures. Climate conditions, especially in the Midwest and Eastern US where growing seasons are shorter and weather conditions are unpredictable, present additional constraints in pipeline construction and the need for quick solutions in the final phase of restoration and re-vegetation.

EQT pipeline project

For example, in early fall 2013, Equitable Gas Company (EQT, now Peoples Natural Gas), headquartered in Pittsburgh, Pennsylvania, completed a 10 mile pipeline project in the hills of Allegheny County, Pennsylvania. After the construction of the pipeline, when all of the soil-disturbing activities at the site had been completed and the site was ready for final stabilisation, crews needed to act quickly, as they faced what would turn out to be a record-breaking winter for snow and ice, creating an even higher potential risk of erosion than normal. Though the project was completed in early fall, project managers were focusing on options available to protect the post-construction site from erosion and restore vegetation before winter temperatures dropped. The team's main concern was that the arrival of winter would prevent seed from germinating and subject the site to winter rain and snow melt, any one of which would have delayed completion until the spring. This delay would undoubtedly increase labour and equipment costs, prolong disruptions, and delay vegetation establishment.

Project managers working on the EQT pipeline project sought a product that would protect the area from erosion and return the vegetation removed during the construction phase of the project to its original state. They faced the challenge of finding a product that could either prevent erosion and quickly re-establish growth or protect the site throughout a harsh winter if in the fall the potential to establish sufficient growth was impeded by adverse weather conditions. Under these uncontrollable circumstances,



Figure 1. EQT pipeline project in Allegheny County, Pennsylvania on 9/18, before EarthGuard Fiber Matrix was applied.



Figure 2. EQT pipeline project in Allegheny County, Pennsylvania, on 10/15 after EarthGuard Fiber Matrix was applied.



Figure 3. EOT pipeline project in Alleghany County, Pennsylvania on 9/18, before EarthGuard Fiber Matrix was applied



Figure 4. EOT pipeline project in Alleghany County, Pennsylvania, on 10/15 after EarthGuard Fiber Matrix was applied.

it was crucial to select a soil-stabilising emulsion specifically formulated to work on the ionic level with soil chemistry to reduce erosion and sediment run-off.

After careful research, EQT chose a non-toxic, 100% biodegradable emulsion, which conforms to the Pennsylvania Department of Environmental Protection Final 2010 Erosion and Sediment Pollution Control Programme Manual. The chemically engineered emulsion, EarthGuard® Fiber Matrix (FM), was chosen as a cost-effective alternative to rolled erosion-control matting or blankets and other spray-on products. The product, as promised, was effective at low rates, while absorbing the impact of raindrops and providing immediate dust control, erosion control and soil stabilisation until permanent vegetation was established. For the EQT pipeline project, EarthGuard Fibre Matrix proved to be the best suited erosion control and reclamation product to restore the site. Erosion was eliminated in the pipeline's path, while vegetation was restored to its prior condition well before the winter. The EQT project was not only a success but also served as a sustainable model for future restorative work.

The need for critical solutions

Pursuing cheaper, cleaner sources of energy presents environmental challenges that require thoughtful solutions. With tens of thousands of new pipeline miles projected in the years

ahead, almost every citizen in the US will somehow be affected. While the wheels are in motion and rapidly gaining momentum, there is an increasing demand for high quality, cost-effective, environmentally sensitive restoration products that support the industry and meet the needs of a quickly evolving market. Now, more than ever, new solutions are critical.

Since 2000, Yale University and Columbia University have been ranking the environmental performance of 178 countries around the world. Every two years they release the Environmental Performance Index (EPI). The intent of the index is to add to the foundation of empirical support for sound policy making and allow countries to track their own performance and ranking. In the 2014 EPI report, the US – the world's number one producer of crude oil and natural gas liquids – ranked 33, farther down the list than it should, despite progress on reducing emissions from cars in the past few years. Clearly, more work and dedicated efforts to increase our environmental performance is necessary.

The Boy Scouts of America have a rule: "Always leave the campground cleaner than you found it." Perhaps simplistic, but when applied to the rapidly growing energy industry, this fundamental code of conduct has the capacity to not only benefit the future of this country but may also be the impetus to move the US up the list to where it should be: number one. 



Figure 5. EOT pipeline project in Alleghany County, Pennsylvania on 9/18, before EarthGuard Fiber Matrix was applied.



Figure 6. EOT pipeline project in Alleghany County, Pennsylvania, on 10/15 after EarthGuard Fiber Matrix was applied.