VENTURE

VISION

Marcellus Shale Water Management Solutions

With a decline in natural gas production and an increasing demand, gas exploration today not only requires better reservoir knowledge and superior drilling methods, but also highly targeted completion technologies. Our customers want to improve their use of precious water assets to support not only multi-stage fracturing, but also well completion efficiencies and improved water conservation. Frac water reuse or disposal is becoming of particular interest to both developers and regulators.

Fracing begins with water receiving a mixture of chemicals additives. This includes a friction reducer to reduce water viscosity and improve flowability, a special grade light sand, and cross-linked guar gel to help carry sand down into the well. Following this, the fracing fluid is injected into the gas hole at a high flow rate and pressure increasing

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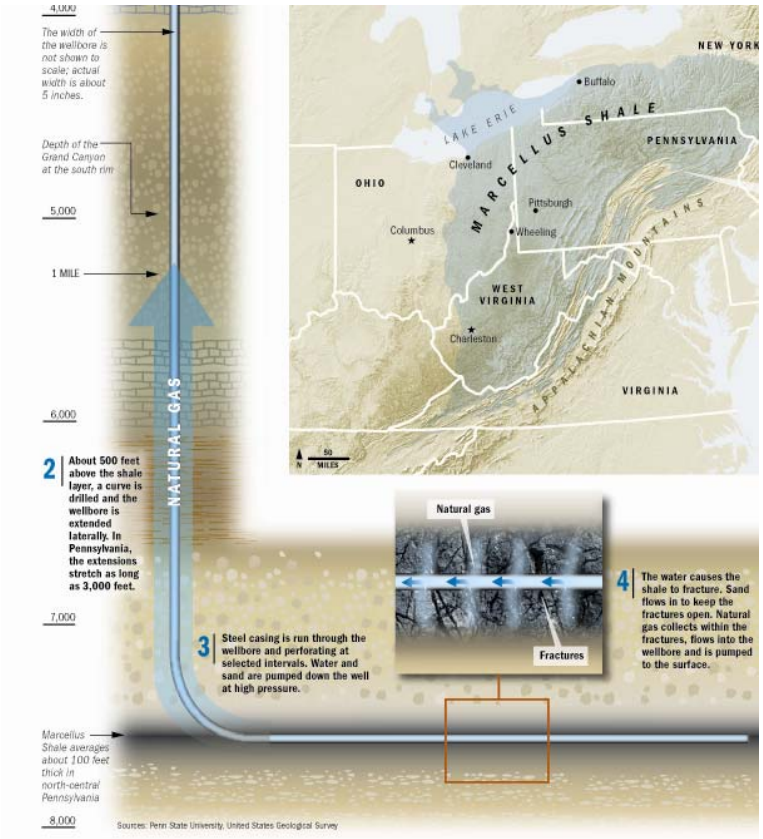
Natural Gas and the Marcellus Shale



This graphic shows the depth and workings of horizontal drilling, used to retrieve natural gas in fractures. Graphic courtesy of The Columbus Dispatch.

Centered in western Pennsylvania stretched over 600 miles of the Appalachian Basin from West Virginia and northeast into the state of New York, the Marcellus Shale is estimated to contain anywhere from 168 trillion to 516 trillion cubic feet of gas. Member of the Devonian black shales and categorized as a dual porosity reservoir, the Marcellus fractures can be drained rapidly while the shale matrix is drained more slowly. The matrix holds much of the gas, according to geologists, making it vital to connect the matrix porosity to the wellbore for the most productive completions.

VISION is published by Venture Engineering & Construction, an engineering company for process industries.

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In this Issue:

Web Site Additions A Valuable Source for Recent News

When hot topics in or concerning the engineering field deserve immediate attention, waiting for the next quarter's edition of Vision is not timely enough Accordingly, Venture added to its Web site, www.VentureEngr.com, the "Publications/Blog" page. Publishing a blog allows the opportunity to reach the industry quickly.

Venture Engineering Blog, a blog devoted to industrial and process engineering issues, was created as a means to connect with current and prospective customers as well anyone studying, working or generally interested in industrial and process markets. In order to assist with notifying its audience the Blog participates in RSS Feed subscriptions.

RSS, a family of Web feed formats, allows quick syndication of content automatically. A reader can subscribe to the feed simply by clicking the . These create XML files that are read by certain programs built into user interfaces in Microsoft Outlook, Windows Vista platform's "Gadgets," and in various Internet browsers, usually under a tab in the same area as "Favorites."

By subscribing, updates are sent directly to the user interface thus making it easy for users to look in one spot for updates to their favorite Web sites. Subscribing to the Venture Blog feed will constantly keep you current with new information available and posted to the blog.

Other changes have been on-going in the Venture Web site. On the site are view- and downloadable content under the Publications/Blog page of the Venture Web site. These include the Company brochure, past editions of Vision, and technical briefs written by Venture's Professional Engineers.

Take A Look At What Venture Is Doing

Venture Engineering & Construction is currently working with QuestAir Technologies on multiple contracts. Recently, Venture won a contract for a facility to turn medium BTU gas into a pipeline quality high BTU gas. The process and design engineering is the responsibility of Venture; the design is expected to become a prototype for use in other facilities.

Sulfatreat Skid

Venture is working on several projects with Taggart Global to provide structural detail design for modules in a new coal preparation plant Taggart is building in West Virginia. This preparation plant will physically prepare the coal for use in an adjacent coal-fired electrical generation station. Challenges Venture has overcome include: supporting equipment in an extremely congested area, and interfacing modules with adjoining modules while design and arrangements are in a state of change.

Proud To Be An American

Manager of Engineering Don Olmstead became an official U.S. Citizen on Friday, August 15, 2008.

Venture's Participation in Process Hazards Analyses

Hazard and operability studies (HAZOPs) originated with a critical examination process developed by ICI in the 1960s. The process was refined over time. In 1974, the disaster at the Royal Dutch Shell caprolactam manufacturing operation in Flixborough, England, led to broad acceptance of the HAZOP as a tool to identify hazards and operability problems. The Bhopal disaster in 1984, killing thousands through the release of methyl isocyanate, reinforced the importance of HAZOPing.

Related Regulations

In 1992, OSHA issued the Process Safety Management of Highly Hazardous Chemicals standard (29 CFR 1910.119), which contains requirements for the management of hazards associated with processes using highly hazardous chemicals. In 1996, EPA issued regulations requiring risk management and planning for designated substances. These regulations reinforce the need for HAZOPing, such as when process changes occur, and maintaining current planning documents.

The Flixborough Disaster

This incident was the result of a modification related to maintenance. A temporary bypass line ruptured, releasing an estimated 40 tonnes cyclohexane. The cloud found an ignition source and exploded. All eighteen people in the control room, plus another ten, died. Thirty six people were injured on-site, and fifty three injuries were reported off-site. Casualties would have been higher had the incident not occurred on a weekend, when the main office block was unoccupied.

Approach

HAZOPing occurs after the equipment list and the PIDs have been finalized. HAZOPing is typically conducted in a series of meetings, with a multidisciplinary team. Bringing various backgrounds together in a facilitated setting is conducive to creativity and the brainstorming process. The team explores specific points of the design (nodes) searching for deviations from the design intent. Lead by parameter guide words, the team walks through the process searching for deviations from the design intent and the potential for unexpected outcomes. Typically findings include: additional logic needs for the functional specifications, additional monitoring points, compatibility issues related to materials of construction and potential for contamination of feed stocks, intermediates and products.

Traps

It is tempting to find solutions for problems as they are uncovered. Staying focused on the goal of identifying hazards and operability problems is key. It is the facilitator's responsibility to keep the HAZOP on mission. Issues uncovered by the HAZOP study are delegated and resolved outside of the HAZOP meeting. In some cases, the outcome will be no action required, but others will require further action.

A second important consideration is to minimize interruptions. Cell phones need to be off. Some companies rent facilities off-site to prevent interruptions. For this reason, when Venture facilitates a HAZOP, we recommend that we host the HAZOP in our conference room.

The process can also get derailed by not allocating sufficient meeting time to fully evaluate all the deviations, consequences and safeguards pertaining to each identified process node. Rushing through a node without fully considering all deviations can lead to oversight of critical hazard or operability fault(s).

Follow through is also key. Delegation of tasks, tracking of progress, and verifying completion is necessary to realize the benefits of the HAZOP. One person needs to be appointed to this task. This is where the benefits of a HAZOPing software such as Dyadem's PHA-Pro, become clear.

Conclusions

Today HAZOPing is recognized as a beneficial tool beyond just the industries required to use them. Recently, Venture facilitated or participated in HAZOP studies for three projects:

- An 18 million gal/year biodiesel plant producing biodiesel from multiple feed stocks including soy oil and animal fat
- A 1.5 MGD wastewater treatment plant for a steel mill, that included both Physical, chemical, and biological treatment processes
- A 2.8MM landfill gas to high BTU gas plant.

We also participate in Process Safety Reviews, Pre-Startup Safety Reviews, and other functions. As a multi-disciplinary company serving a variety of process industries, Venture stands ready to assist you in meeting your HAZOPing needs.

Water Treatment Options Are Available

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permeability of the rock thus helping gas flow to the surface.

As the water cracks the rock formation, sand is deposited. The sand keeps fractures open when pumping of frac water stops. Fraccing typically occurs once when a well is newly drilled, and again after a couple of years when the rate of gas flow begins to decline.

Flow-back water is water used during fraccing that returns to the surface. Anywhere from 25 percent to 100 percent of the flow-back water returns to the surface, and it contains hydrocarbons, salts, dissolved solids, etc. The high salt content makes the water highly corrosive to metals and harmful to land, vegetation, and other living organisms.

Some water continues to flow out of gas wells once they are in production. This water is referred to as produced water. Some wells may indeed have more produced water than flowback water.

Current practice for managing flow-back and produced water is to send it to off-site treatment facilities that can be many miles away. The transportation exhaust emissions, congested traffic flow in the surrounding community and negative effects to roads and highways poses significant cost and environmental impacts. And under current off-site disposal philosophy, this flow-back water is not recycled. Millions of gallons of natural water resources are lost.

This fact is not lost on the regulatory community, as evidenced by the Pennsylvania Department of Environmental Protection's recent restrictions on frac water disposed at Publicly Owned Treatment Works in the upper Monongahela River water shed.

The alternative to off-site disposal is on-site treatment and reuse at the next well site. After determining the most economical on-site treatment solution, Venture designs, using 3D AutoCAD Inventor, mobile skids that can be deployed directly to the well site to improve water recovery, reduce environmental impact, eliminate hauling costs, and drastically reduce off-site treatment costs. Total savings are estimated at 50-60 percent.

Certain on-site treatment technologies have proven capable of recovering between 70- 80 percent of the initial water to a quality that is suitable for immediate reuse in the fraccing process. Further, because the treatment and recycle plant is mobile, it can be moved and reused at multiple well sites, and requires far less time to permit and install since it is not a permanent facility.

A more detailed report can be viewed at www.VentureEngr.com following the Publications / Blog page. There, a downloadable technical brief is available. Also in the Venture Engineering Blog, readers are able to view and post their comments.

A Message from a Group Manager

This edition's guest writer is Manager of Electrical and Instrumentation Engineering Alex Ussia.

I/O Schematics Only a Few Clicks Away...

The goal of any organization is to reduce cost while improving quality. In the engineering services business this means getting the correct information on drawings in an efficient manner. Some ways to achieve this goal are:

1. Through the use of smart software tools which allow data to be entered one time and then shared by several programs,

2. By the use of smart programs that automatically perform repetitive tasks.

For the controls side of engineering, I/O schematics must be created to show the wiring between the control system modules (PLC cards or DCS modules) and the final control devices. These drawings are generally created in these days of CAD by building base templates for each type of card used, copying over as required, and manually editing each drawing to show the correct device, wire numbers, power wiring, terminal numbers, etc. This leaves room for errors in re-typing data as well as consistency issues with the information in the I/O list. It is not unusual to have as many as 500 of these drawings for a large project.

Since it is common to build an I/O or instrument list for each job it makes sense to try and utilize this information as much as possible, entering it once and using many times. This ensures that all documents have the same tagging and description for these items. It also allows pertinent information to be added such as rack/slot/point, address and card type for each device, creating a database instead of just a list. Once this is done the next step can be taken: using an intelligent software package to automatically populate the I/O drawings with this information.

The Venture Engineering I&E group has been using AutoCAD Electrical to do just that. This package allows generation of I/O schematics from a spreadsheet format. This method uses AutoCAD's parametric drawing features to draw the I/O module and rungs, place the control devices, determine the card type and fill in the wire numbers, terminals, and tag information.

Once the data is mapped and the project is configured (this can take time and many iterations to get the desired output), the process is started. This package can progress through multiple drawings and card types, reading data from the spreadsheet to build each drawing.

Drawings are completed rapidly. These drawings do require further manual editing, but 50-90 percent of the drawing can be completed automatically. This translates to time savings and an improvement in drawing information quality and consistency.

VENTURE

Venture News

Welcome New Employees

Matt DeStefano
Zach Maisner
Bryan McCord
Mike Weidner

Employee News

Congratulations!

Bob Gambon, and wife Sandy, are first-time grandparents! Grandson John-Paul Hudak Gambon was born August 14 at 6:15 p.m., 8 lbs. 22".

Happy Birthday

November
Amanda Artzberger
Ed Battle
Travis Buggey
Steve Fleming
Tom Minsinger

December
Dan Hawthorne