

Questar in the Pinedale Anticline, Wyoming

The Pinedale Anticline

The Pinedale area is an overpressurized, low permeability “tight” gas sand play, with production depths from 8,000 to 14,500 feet. Braided streams, with channels 10 to 20 feet deep and hundreds of feet wide, deposited approximately 5,000 feet of fluvial clastic sedimentary rocks in a broad alluvial plain. This led to the formation of lenticular reservoirs of tight gas sands (think an array of massive potato chips).

These reservoirs lie in the Lance and Mesaverde Group – Ericson Formation of the Greater Green River Basin in the Pinedale area. The Jonah Field, adjacent to the Pinedale Anticline, also produces gas from similar tight gas sands.

The very low rock permeability within the reservoir requires that additional techniques (hydraulic fracturing) be used to open artificial (induced) fractures to facilitate the movement of the natural gas to the production wells. In addition, the lenticular nature of the reservoir requires that multiple wells be drilled to penetrate as many of the lenses (potato chips) as possible.

History

The California Company drilled the first test well on the Pinedale Anticline in 1939. However, gas production was too low and the nearest pipeline was too far away to warrant further development. A number of other attempts were made in the 1940s and 1950s, and while the results were encouraging, the low flow of gas from the “tight” sands prevented economic development.

With the advent of new fracturing techniques in the 1990s, it became possible for the permeability of these reservoirs to be increased, thus permitting production of the natural gas. In

addition, technological advances in directional drilling permitted multiple wells (up to 16) to be drilled from a single pad, thus reducing some costs and minimizing the environmental impact of development (Fig. 1).

The Pinedale and Jonah fields are considered among the most significant new natural gas resources in the U.S., and it has been estimated that the reserves from the Pinedale Anticline alone could exceed 20 trillion cubic feet.

Questar’s Operations

Questar, an independent oil and gas company, drilled its first natural gas well in 1922. In 2004, its total proven reserves were 1,434 billion cubic feet of gas equivalent (bcfe) for a 13.9 years production life. With a total production of 103 bcfe in 2004, the company’s total assets were \$3.646 billion and an annual net income of \$229 million.

Questar’s wells in the Pinedale Anticline are drilled to depths between 8,000 and 18,000 feet. The company has proven gas reserves in the Pinedale Anticline of 738 bcfe, and it is reported that the discovery and development costs are approximately \$0.90 per thousand per cubic feet (mcf) of produced gas. In 2004, Questar had 470 locations based on 20-acre spacing, with depths between 9,500 and 14,500 feet.

Environmental Issues

Extraordinary efforts are being made by all major companies drilling in the Pinedale Anticline and the Jonah Field to minimize the environmental impact of the drilling and production operations. While the latest state-of-the-art technology is being utilized, and unprecedented efforts are underway to communicate with all of the concerned constituencies, there remains considerable resistance to the development in the area.

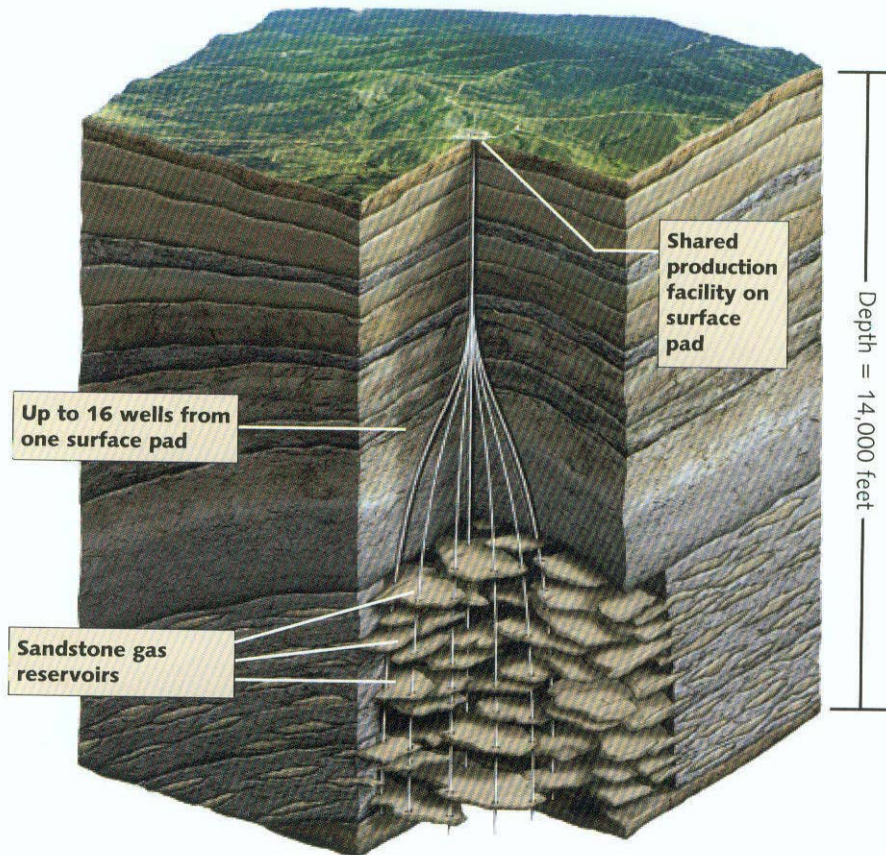


Figure 1
Example of directional drilling from a single pad. *Questar*

By most all accounts, Questar has made every effort to minimize the environmental impacts of its operations. In a traditional drilling program, each well would require a drilling pad occupying 2-4 acres. This approach would also require an extensive network of access roads and storage facilities. Equipment and service trucks, as well as the workers' vehicles, would be constantly traveling to each of the sites. Much of this impact will be reduced or eliminated through the use of directional drilling, in which up to 16 wells will be drilled from each pad. The land disturbance will be reduced by two-thirds, and storage tanks and truck traffic will be essentially eliminated through the use of pipelines.

Directional drilling will cost Questar an estimated extra \$500,000 per well, but much of this will be recouped through the cost savings realized by the more centralized operations.

Even more dramatic savings will be realized if Questar is permitted to drill throughout the year. Originally, the leasing terms restricted drilling from November to May in order to prevent major disruptions to the wildlife of the area. However, the Bureau of Land Management recently authorized Questar to drill year-round in a few selected areas. These operations will be closely monitored to determine their impact on the wildlife, particularly the migration of mule deer herds through the area.

The implementation of the year-round drilling program, along with a requested increase in the underground spacing of wells from 40 to 20 acres could enable to Questar to reduce the time required for the drilling program from 18 years to only 9 years and would provide increased financial stability for the surrounding communities.

The development of the Pinedale Anticline is clearly taking center stage in the nation's efforts to address energy issues. This was evidenced by the recent article in National Geographic (July 2005) which, according to some, highlighted the potential environmental impacts without providing sufficient editorial balance by addressing the extensive environmental mitigation steps being taken. So it would seem that in spite of Questar's good intentions and use of advanced technologies, development of the Pinedale Anticline will remain a contentious issue.

References:

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