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Task force assesses shale oil needs

State agencies assess possible development scenarios and permitting needs if Alaska shale oil exploration proves successful

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With Great Bear Petroleum moving toward drilling its first Alaska shale oil test well, investigating the possibility of producing oil direct from the prolific North Slope oil source rocks, the State of Alaska is taking an active interest in smoothing the route towards shale oil development, should shale oil production prove viable in the state.

400-mile fairway

The state views the region of highest Alaska shale oil potential as lying along a 400-mile-long fairway, running east from the Chukchi Sea coast into and across the area where Great Bear has its leases, to the south of the producing oil fields in the central North Slope, Greg Hobbs, a petroleum engineer with Alaska's Division of Oil and Gas, told Petroleum News March 30. That fairway is similar in size to the region occupied by the successful Eagle Ford shale oil and gas play in Texas, Hobbs said.

But, although the U.S. Geological Survey has estimated the possibility of anywhere up to 2 billion barrels of shale oil resources in northern Alaska, USGS has also said that until someone actually demonstrates that oil will flow from a North Slope source rock there remains the possibility of zero Alaska shale oil production.

On the other hand, with some of the most promising shale oil possibilities occurring in state land, with known high-quality oil originating from North Slope sources, and with the

possibility of exploiting three different source rock intervals at single locations, the North Slope would seem to have a few things going for it when it comes to unconventional oil.

So what happens if shale oil development takes off?

Rapid development?

Experience in Texas has shown that shale oil can move into production mode as soon as three years from the drilling of the first successful proof-of-concept well, and the state wants to make sure that it is in a position to efficiently handle shale oil development in Alaska if the need arises, Hobbs said.

A task force consisting of eight to 10 people from state agencies has been meeting to evaluate what might be involved in North Slope shale oil development, Hobbs said. Currently the Alaska Department of Natural Resources, the Alaska Department of Fish & Game and the Alaska Department of Environmental Conservation have representatives on the task force, while the task force has also maintained contacts with the Alaska Department of Transportation & Public Facilities, and with the Alaska Oil and Gas Conservation Commission, Hobbs said.

The development of shale oil resources in Alaska would be of great benefit to the state in terms of its contribution to state revenues, especially given the current decline in Alaska oil production. So the state is anxious to see development move ahead but is also figuring out how to achieve the necessary environmental conservation and protection.

And, from an environmental and permitting perspective, the state sees four main issues that could prove challenging for Alaska shale oil development: the potential impacts on surface subsistence resources; the existence of wetlands in the areas of potential development; possible air quality issues; and the potential need for supplies of fresh water, Hobbs said.

The task force has held a meeting with representatives from the North Slope Borough and several federal agencies, to initiate a dialogue with these organizations over what might be involved in Alaska shale oil development. People at this meeting endorsed the state's views of the challenges facing development and also urged a need to recognize the potential impact of the infrastructure required to support the development activities, Hobbs said.

Intense drilling

Commercial success in a shale oil play hinges on development and production costs; oil productivity; and the price of oil, Hobbs said. And a key to the productivity part of this three-variable equation is the ability to drill many wells.

“The production of an oil shale play is maintained by the drilling,” Hobbs said.

Essentially, although a shale oil well may initially produce oil at a high rate, perhaps at 1,000

barrels per day or more, production tends to decline rapidly, typically stabilizing at a more long-term rate of perhaps 100 to 200 barrels per day. In the Bakken play in North Dakota, for example, total production from the play is currently running at about 488,000 barrels per day from 6,000 wells, indicating an average daily well production of just 80 barrels, Hobbs said.

The need for a continuous drilling program to sustain production on Alaska's North Slope may require the packaging of permits, enabling multiple drilling operations to be permitted in batches, rather than individually, without losing the regulatory authority and oversight from the various agencies involved.

"Given the fact that it is very much an assembly line type development, could a group of (drilling) pads be permitted together? Could an air quality permit cover a series of operations?" Hobbs questioned, commenting that this is one of the permitting issues that the task force is examining.

However, Hobbs does not think that the type of single-well drilling pad used in the Bakken, for example, would be practical in the tundra of northern Alaska, given the intense amount of drilling required.

"In my opinion it would be cost-prohibitive to try to do a development in Alaska like they're doing in the Lower 48," Hobbs said. "They're not contending with wetlands there."

Alaska model

Instead, Hobbs has proposed a multi-well pad scheme for possible North Slope shale oil development. This model is entirely hypothetical and may not represent what a developer would actually do, Hobbs emphasized. However, the model can provide some insights into what might be involved, and how the permitting of a development might be carried out, he said.

Hobbs envisages a series of 840-foot by 420-foot gravel pads, perhaps connected by a gravel road, extending east-west through a shale oil development area from the existing North Slope Haul road. Each pad would accommodate 12 wellheads, with each well running at a steep angle down to the oil source before splitting into two horizontal, lateral well bores. The result would be 24 lateral wells penetrating subsurface source rock in an area centered under the pad and extending four miles in an east-west direction and three miles in a north-south direction.

To access the entire extent of subsurface source rock across a leased area, the pads would be four miles apart in an east-west direction, with similar east-west lines of pads developed at three-mile intervals, north and south.

One pad per year

Hobbs' concept involves a single rig drilling all of the wells for a single pad during a single year. While that drilling is in progress, the next pad and its associated gravel road would be

constructed, ready for drilling in the following year. Thus, year-by-year, the development would move out across the area of the shale oil play, along a development corridor.

The wells would probably go to depths of around 10,000 feet, with 10,000-foot horizontal laterals, similar to deviated and horizontal wells already drilled on the North Slope, Hobbs said.

“I don’t see a whole lot of difference in well design,” he said.

And, although shale oil production depends on the hydraulic fracturing of the oil source rock, companies operating in Alaska already have extensive experience in using “fracking” techniques — about 25 percent of the oil wells that have been drilled in Alaska have used hydraulic fracturing to improve productivity, Hobbs said.

With this type of development, it would potentially be possible to use relatively lightweight, truckable production facilities, with a high capacity facility moved to serve pads that have come newly online and which have the high initial production rates characteristic of shale oil development. The more mature pads could perhaps be hooked up to smaller, lower capacity systems, Hobbs said.