

DNR White Paper on Shale Task Force Activities

Introduction

As part of its ongoing effort to improve the State's permitting process, the Alaska Department of Natural Resources (DNR) Division of Oil and Gas is analyzing new and emerging resource development activities in Alaska, including North Slope source-reservoired (shale) oil resource projects. Permitting these activities, with a faster anticipated pace compared to earlier Alaskan conventional oil developments of the same scale, potentially presents some new challenges for Alaska. Information from other shale plays indicates that successful development is dependent on reliable scheduling, understanding costs and resource capacity, and basic resource economics. Development of an Alaskan play, already hindered by remoteness, arctic climate, and minimal infrastructure, will require teamwork of all stakeholders. Representatives from state agencies potentially affected by a full-scale shale resource development make up the Shale Task Force. The Task Forces' activities include advance preparation by state regulators on the team that will protect the environment and provide a timely and predictable process for project applicants. This summary was created by DNR's Shale Task Force to inform the Alaska Legislature and the public about what we have learned thus far and what we are doing to improve the permitting process for North Slope source-reservoired oil resource projects.

Source-Reservoired Resource Activities in Alaska

In simple terms, oil and gas is produced in organic-rich source rocks that are typically shales at specific temperatures and pressures. Known source rocks on the North Slope are the Kingak, Shublik, and Hue Shale/GRZ formations. These formations provided oil and gas to the Prudhoe and Kuparuk fields. Actual production directly from these shale formations has not been practical in the past. The rock has almost no capability to naturally flow fluids in economic volumes. Over the last decade, new technology that allows horizontal wells to be efficiently fractured has allowed certain source rock developments to be viable. This is not true for all source rocks because successfully developed formations require specific rock and in-situ fluid properties for successful hydraulic fracturing and production. Full-scale development typically takes place after studying the rocks to confirm their properties, and after pilot production tests confirm the economic viability of the project.

There is currently a single project proposed in Alaska to develop a source-reservoired resource. Great Bear Petroleum is currently seeking permits for exploration and evaluation wells along the Dalton Highway. Their success in the last two Central North Slope lease sales has secured leases that straddle an approximately twenty mile section of the highway approximately thirty miles south of Prudhoe Bay. In the last lease sale, another operator, Royale secured leases circled by Great Bear leases to the west of the highway, but their plans are currently unknown.

Until the actual productivity of the formations in the Alaskan play is known, the potential benefit to the state is not known. North Dakota and Texas analogs indicate that average rates for these types of wells can be 50-100 BOPD, and approximately 1200 wells are needed to produce 100,000 BOPD. There is potential for these wells to produce for years at these stabilized rates. October 2011 production data

from the North Dakota Industrial Commission website indicates 488,000 BOPD production rate for the state from 6000 wells in its Bakken development with future growth to 1,000,000 BOPD expected. In both Texas and North Dakota, benefits to the states with the investment of oil and gas development have been staggering. A December 22, 2011 article by Business Week entitled "Eagle ford Drilling Rush May Boost Texas Tax Revenues 15-Fold" stated that "States collected \$3.7 billion in taxes tied to extracting resources in the third quarter, a 76 percent increase from the same period in 2010, the U.S. Census Bureau reported today. Texas's collections increased 62 percent to \$807.6 million, second behind Alaska's 1.26 billion, the bureau said." Key to realizing this success has been the ability of operators to develop their leases methodically and in a timely manner in a regime of stable costs. Permitting development activities in a timely manner is paramount.

Issues of Concern for Shale Development in Alaska:

- Lack of infrastructure
- Abundance of wetlands in source rock locations
- Potential for an area equivalent to the current Prudhoe Bay footprint to be developed in one-third of the time
- Potential impacts on subsistence and habitat with increased access
- Water and gravel sources
- Need to realize the lowest operating costs possible in an isolated development, regardless of project scale

Comparative Advantages for Shale Development in Alaska:

- Multiple geologic formations for potential development exist in the same area
- Existing oil and gas workforce with experience
- Fresh water aquifers are not known to exist in the current area of development
- Area is sparsely populated without private land ownership issues
- Well design does not differ from most current development wells in the area
- Utilization of TAPS

Regulatory Issues

Analogues in the Lower 48 states indicate that if a source-reservoired resource play is developed, it is potentially only a two to three year time frame from the first exploration to full scale development. For example, the Eagle Ford Shale had its first oil well drilled in 2008, producing 100 barrels of oil per day, and is producing 100,000 barrels of oil per day in 2011. With initial success, "exploration" wells are not required after that point. Development by initial and subsequent operators on the broader play would be differentiated only by completion differences in the reservoir sections due to preferences of various operators. This translates to a much faster development and drilling pace than is found in conventional reservoir developments. Permitting challenges of the North Slope are expected to focus on access, wetlands, and subsistence issues. Current lower 48 analogues do not impact wetlands like a North Slope installation would as they are in areas that, for the most part, are not considered wetlands; neither do the analogues face significant challenges related to subsistence activities.

Federal Regulation

At this time, it is believed that the U.S. Army Corps of Engineers would be the lead federal agency for development of the Environmental Impact Statement (EIS) for a full-scale development because of their authority over wetland impacts of a North Slope development. Additional federal involvement includes the Coast Guard (authority over navigable waterways), the US Fish and Wildlife Service (authority over threatened and endangered terrestrial species and migratory birds), National Marine Fisheries Service (authority to protect threatened and endangered marine mammals), and the Environmental Protection Agency (authority over water and air quality). The EPA has given jurisdictional primacy to DEC on Clean Air Act and Clean Water Act matters but would review the process.

In preparation for the environmental impact statement (EIS) that would be required for a full development, the Department of Natural Resources, Division of Oil and Gas has requested funding to gather existing data and determine the potential data gaps that would be required for an EIS. It is proposed that when data requirements are known, the State would collect baseline data and make it available to all potential operators, using contract support as necessary. This would ensure that all data is consistent, and would eliminate duplication effort by multiple operators collecting the same data at significant costs. This data is expected to support the EIS and evaluate potential needs for air quality monitoring to support permitting needs. Typically, air quality monitoring must begin about two years before permits are final.

State Regulation & Local Governments

Oversight of this project from a State standpoint would involve the Department of Natural Resources (DNR), Alaska Oil and Gas Conservation Commission (AOGCC), Department of Transportation & Public Facilities (DOTPF), Department of Fish and Game (DF&G), and the Department of Environmental Conservation (DEC). Statutory and regulatory authority over such a development would rest primarily with the permitting requirements of these various agencies. The North Slope Borough would also be an integral part of the land use permitting process.

History of Hydraulic Fracturing in Alaska

There are no current changes proposed to regulations or statutes as a result of this development. The AOGCC is in the process of reviewing Alaska regulations that oversee hydraulic fracturing to determine if any revisions are required. For the last 50 years, gas wells have been hydraulically fractured in the Cook Inlet of Alaska. Many wells were hydraulically fractured in Prudhoe Bay during the 1990-1991 Iraq war to boost domestic oil production. Data from the AOGCC indicates that approximately twenty-five percent of all oil and gas wells drilled in Alaska have been hydraulically fractured. The most recent fracture stimulation activities have occurred in the Oooguruk Field operated by Pioneer Natural Resources. Without stimulation, the Oooguruk wells would not produce in economic quantities, and the field would not have been developed. The extensive history of fracturing in Alaska has led to regulatory oversight that has proven sufficient, and driven zero discharge policies with which all current North

Slope exploration and development operations are completely compliant. Further, the North Slope of Alaska has geologic intervals that have proven adequate for disposal of waste fluids with none of the seismic issues anecdotally linked to waste disposal in the Lower 48.

The tools for regulating this type of development, from a State perspective, appear to be sufficient, given the opportunity to develop processes to address: 1) water recycling; 2) securing adequate water supplies; and 3) securing adequate gravel supplies.

Shale Task Force Activities to Date

The Task Force and its efforts have been made possible through the volunteer efforts of representatives of all aforementioned state agencies to progress its work.

The Shale Task Force has been in existence since September 2011. In early December, the task force and invitees attended a presentation on well drilling, construction, and completion for deep shale zones like those found on the North Slope. The presentation provided fundamental understanding of the drilling and completion process with animations as well as various sources for information for those that attended.

Based on that information, State permits and timing requirements have been developed for a hypothetical scenario using Eagle Ford Shale development data as an analog. As agency representatives examined their permits and processes, they preliminarily reviewed the State's ability to adequately permit a shale development. Issues in the Lower 48 appear to be best controlled with robust oversight of well construction and operation, a function that has been successfully performed by the AOGCC for 50 years, and the equally robust oversight of waste disposal, successfully performed by both the DEC and AOGCC in Alaska.

Current and Future Activities:

At a November House Resources committee hearing, a request was made for a review of staffing requirements for a potential development. This activity is currently underway within the team.

The task force is now engaging federal permitting agencies and will present our development scenario and estimates of State permitting requirements. From this cooperative effort, we intend to get early feedback on likely federal permitting requirements, standard issues, and data gaps. We also will ask for any insights they may have from counterparts working on similar developments in the lower 48.

The future focus of the task force is to study permitting efficiencies within the State to identify opportunities for the "assembly line" type development that has been successful in our lower 48 analogs. This effort will address the anticipated pace of a successful development.

Supporting the logistics of a development is also on the agenda. The potential for developing full-scale or shared satellite service areas is being considered, as well as early scoping of gravel and water sources to support the development.

The issues of regulating gas disposition and fracturing are in the jurisdiction of the AOGCC. These appear at this time to be adequately regulated to prevent excessive gas and condensate venting and well integrity issues.

Conclusion

At this time, the State has a team of agency representatives who are familiar with the development requirements of source-reservoired resources. Our intention is to be as prepared as possible for the scale, pace, and logistical requirements of such a development.