

Hydraulic Fracturing ("Fracking") in Alaska

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Ground Truth Trekking

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The controversial "massive" (or high-volume) fracking has little current application in Alaska's conventional petroleum fields, but could be used to develop Alaska's smaller unconventional petroleum fields. (/Issues/AlaskaOilandGas/unconventional-petroleum-shale-oil-gas-alaska-great-bear-north-slope-hydraulic-fracturing.html) It is currently being explored as an option by Great Bear LLC for the Great Bear oil field (http://www.petroleumnews.com/pntruncate/827149061.shtml) south of Prudhoe Bay, and Caelus Energy plans to deploy at its Nuna project (http://www.alaskajournal.com/Alaska-Journal-of-Commerce/April-Issue-1-2015/Caelus-plans-fracking-technology-with-a-twist-at-Nuna/) on the North Slope. It is also being explored (http://www.adn.com/article/20120818/changes-come-inlets-gas-oil-outlook) (or possibly employed) in western Cook Inlet, probably to liberate tight gas. Massive fracking could potentially be used anyplace in Alaska where unconventional petroleum is found.

Successful fracking on the Great Bear could fill unused capacity in the trans-Alaska pipeline, augment state oil production, (http://dog.dnr.alaska.gov/) and provide additional jobs. Bolstering state oil production would directly pay into the

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Permanent Fund at a higher rate than other Alaskan resource extractions industries, such as fishing and mining. Fracking in Cook Inlet (http://www.adn.com/article/20120818/changes-come-inlets-gas-oil-outlook) could increase gas production in Southern Alaska, which may face a future natural gas shortage.



ALPINE OIL FIELD RIG — A drilling rig on the Alpine oil field near Prudhoe Bay, on the North Slope. Alpine is a conventional oil field operated by ConocoPhillips. Photo Credit: Paxson Woelber - Arguk Expedition. — Get Photo (/photos/alpine-oil-field-rig/)

Risks associated with fracking include water contamination, oil and chemical spills, the heightened explosivity (http://online.wsj.com/news/articles/SB10001424052702304834704579401353579548592) of shale oil, and the economic vulnerability of unconventional oil development to low oil prices. The environmental risk of massive fracking on the North Slope would likely depend heavily on operation-specific factors, such as the skill of the drillers, local geology, specific practices used, and wastewater handling.

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Alaska’s existing petroleum fields are predominantly “conventional” deposits in porous marine sedimentary rocks, through which oil and gas move easily. Small-scale hydraulic fracturing (a.k.a. “fracking” or “hydrofracking”) has long been used on these deposits.

This article does not address in detail the controversy and hazards (real or percieved) of fracking. For that, see our article on the **Benefits and Risks of Massive Fracking. (/Issues/AlaskaOilandGas/benefits-risks-massive-hydraulic-fracturing-United-States.html)**

The Two Kinds of Fracking

Fracking consists of two very different practices: small-scale fracking and massive fracking.

Both involve pumping fluid (typically water with chemical additives) underground at extreme pressure to shatter rock at a targeted location deep underground.

Small-Scale Fracking

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** ** This type of fracking is traditionally used to rectify reductions in rock permeability around the wellbore that are caused by drilling. Small-scale fracking is used in the porous rocks that host conventional oil reserves and typically targets the area within a few meters around the well.

This technique has been practiced since 1949 (http://www.spe.org/jpt/print/archives/2010/12/10Hydraulic.pdf) , and of the 1.2 million wells (http://energyindepth.org/just-the-facts/) fracked in the U.S. since that time, most have been small-scale fracks. Approximately 20% (http://www.eenews.net/stories/1059974249) of Alaska's conventional wells have been fracked using small-scale fracking.

Massive (aka High-Volume, Large-Scale) Fracking

** ** Massive fracking is intended to increase petroleum flow into the well through otherwise impermeable rock formations. Once the rock is fractured, it is more permeable to oil, gas, and other fluids. Oil and gas migrate more readily into the well, where they are extracted.

Massive fracking has proliferated only since the early 2000s, when U.S. advancements in horizontal drilling enabled the exploitation of shale oil in combination with horizontal drilling. It has enabled the exploitation of oil shale, making the United States the world leader (http://www.theguardian.com/business/2013/oct/04/us-oil-natural-gas-production-russia-saudi-arabia) in natural gas production.

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_ Water Use Differences_

** ** Compared to small-scale fracking, massive fracking uses very large quantities of water. The EPA reports that massively fracking a single horizontal well may take 2-5 million gallons (http://epa.gov/tp/pdf/hydraulic-fracturing-fact-sheet.pdf) of water, the equivalent of four to ten Olympic swimming pools.

Alaska's Frackable Oil & Gas

Alaska's unconventional petroleum resource (/Issues/AlaskaOilandGas/unconventional-petroleum-shale-oil-gas-alaska-great-bear-north-slope-hydraulic-fracturing.html) is at an early stage of exploration. The Great Bear petroleum field, a large deposit of oil shale (http://en.wikipedia.org/wiki/Oil_shale) just south of Prudhoe Bay, is a major candidate for massive fracking in Alaska, along with oil shale deposits in the Cook Inlet basin.

The Great Bear's oil and gas would likely be accessed with horizontal drilling technology and high-volume fracking, very similar to the exploitation of the Bakken (http://en.wikipedia.org/wiki/Bakken_formation) and Eagle Ford (http://en.wikipedia.org/wiki/Eagle_Ford_Formation) shales.

The Great Bear is itself only a section of the broad deposits of oily shale that the U.S. Geological Survey (USGS) believes underlie the North Slope. The USGS estimates these extensive oil shales may contain up to 2 billion barrels (http://energy.usgs.gov/GeneralInfo/EnergyNewsroomAll/TabId/770/

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ArtMID/3941/ArticleID/786/Shale-Gas-and-Shale-Oil-Resource-Potential-of-the-Alaska-North-Slope.aspx) of recoverable unconventional oil. Massive fracking might be used across the North Slope, to exploit these deposits.

No other unconventional petroleum fields as large as the North Slope deposits have been identified in Alaska, and the North Slope shale oil is still modest compared to Prudhoe Bay. BP estimated (http://www.bp.com/content/dam/bp/pdf/bp-worldwide/prudhoe-bay-2013.pdf) in 2012 that there were 12 billion recoverable barrels of conventional crude oil still in the Prudhoe Bay field, and several billion more in nearby satellite fields.

Successful employment of massive fracking on the North Slope could boost North Slope production, which is currently flagging, but this would still only represent an incremental addition to Alaska's recoverable petroleum reserves.

The Cook Inlet area is also a promising arena for massive fracking, since pockets of tight gas are known to exist in oil shale in its geological basin, but they have historically not been economical to drill. Fracking is being considered (http://www.adn.com/article/20120818/changes-come-inlets-gas-oil-outlook) (or may to some extent be employed) in the basin, but details could not be verified for this article. Developments are happening rapidly, as the technique is honed and its use proliferates.

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Natural Gas

Fracking oil shale produces natural gas as well as crude oil, which has led to a natural gas boom in the United States. In Alaska, however, there is no gas-moving equivalent of the Trans-Alaska Pipeline (http://www.alyeska-pipe.com/TAPS), so North Slope gas cannot be efficiently transported market. The Prudhoe Bay conventional oil field already produces large amounts of natural gas, where it is used on-site to power the oil extraction operations, or reinjected underground to stimulate well production.

If the proposed Alaska Natural Gas Pipeline Project (http://www.arcticgas.gov/) is built to move Prudhoe Bay's natural gas south, it would make massive fracking on the Great Bear more economically attractive, by providing access to gas markets. Absent a pipeline, gas produced by the fracking operation would likely be used as on-site fuel or flared. Natural gas is considerably less lucrative than oil, and therefore oil (not gas) would probably carry most of the infrastrure costs necessary for shale oil development in Alaska.

The Economics of Fracking in Alaska

Currently, unconventional oil fields often cost $50 to $80 (http://www.financialsense.com/contributors/joseph-dancy/iea-shale-mirage-future-crude-oil-supply-crunch) per barrel to develop. Because the production is essentialy free once wells are pumping, existing wells can continue to operate even if oil

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prices fall substantially - but low prices strongly discourage the development of new shale oil wells, which are expensive to drill. Therefore, shale oil production is self-limiting at low oil prices, and hydraulic fracturing is very unlikely to lead to long-term cheap oil unless its development costs are massively reduced.



OOLAH VALLEY, GATES OF ARCTIC NATIONAL PARK — Oolah valley exemplifies the open terrain and low tundra of Alaska's far north. Photo Credit: Paxson Woelber - Arguk Expedition. — Get Photo (/photos/oolah-valley-gates-of-arctic-national-park/)

Due to the remote location of Alaska's unconventional petroleum, developing Alaska'soil shale is likely to be relatively costly. Lower oil prices discourageshale oil development, (http://oil-price.net/en/articles/falling-oil-price-slows-us-fracking.php) and the recent surge in U.S. oil production has helped flood the market and drive global oil prices down.

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Some financial commentators have warned that industry-published future production curves are overly optimistic, Production rates (http://oilprice.com/Energy/Natural-Gas/When-will-the-Shale-Bubble-Burst.html) of fracked shale oil wells decline steeply over time, running dry quickly. The rapid exhaustion of shale oil wells has so far beenconsistently offset (http://www.forbes.com/sites/michaellynch/2013/09/02/shale-gas-production-and-high-decline-rates/) by drilling new wells, and the technology is still improving, but critics believe this cannot be maintained.

If drillers must continually move to less and less attractive sites, this may limit the lifespan of the shale oil boom as a whole, but it also may give Alaskan development a boost: As more easily-accessed fields decline in output over the next few years, Alaska's oil shale may become more attractive. The discovery of new, easily-accessed oil shale fields could negate this.

Legislative Developments

Fracking has not historically been an important political issue in Alaska, but the technique could be deployed widely to develop unconventional petroleum on the North Slope.

In response, new state regulations are have been passed (http://www.alaskajournal.com/Alaska-Journal-of-Commerce/April-Issue-2-2014/State-commission-finalizes-tough-new-rules-on-fracking/) that would require disclosure of fluid ingredients,

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regulatory approval, landowner notification, nearby water-well testing, and wellbore integrity compliance for all qualifying fracking operations.

Oil & gas companies have objected that the regulations are overly strict and provide inadequate protection for valuable trade secrets.

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