

Oil resource assessment dramatically lowered

New NPR-A Numbers Slam Expectations

David Brown, American Association of Petroleum Geologists Explorer, 12-1-10

When the U.S. Geological Survey revised its undiscovered resource assessment for the National Petroleum Reserve-Alaska, it took almost 9.7 billion barrels of oil off the table.

That's a big "Oops" – and the implications extend far beyond the borders of NPR-A.

The 23-million-acre reserve in northern Alaska was designated for petroleum drilling and development, primarily for crude oil exploitation. It was established in 1923 as the Naval Petroleum Reserve No. 4, in hopes of providing future naval fuel supplies.

In its 2002 NPR-A resource assessment, the USGS included a mean undiscovered crude oil estimate of 10.56 billion barrels. In its 2010 revision, released in October, that estimate dropped to 896 million barrels.

The mean undiscovered conventional natural gas estimate for NPR-A also declined, but not so severely – from 61,352 Bcf to 52,839 Bcf.

There was a simple story behind the revision.

Drilling in NPR-A has provided a clearer picture of the region's geology, which turned out to be much less favorable for oil than anticipated.

The ramifications are more complex.

Circum-Arctic Implications

NPR-A lies north of the Arctic Circle and was included in the 2008 USGS Circum-Arctic Resource Appraisal.

That appraisal identified Arctic Alaska as the study area's largest potential oil province, with a fully risked mean undiscovered resource of 29.96 billion barrels out of a total Arctic mean estimate of 89.98 billion barrels.

AAPG member Dave Houseknecht, USGS research geologist in Reston, Va., authored the NPR-A revision.

He said geologists were aware of the poorer prospects for Alaskan oil and drew on that knowledge for the Circum-Arctic study.

"Very much of the difference is our knowing in 2008 when we did the (Circum-Arctic) appraisal about this oil-to-gas falloff in NPR-A," he said.

But the 2008 study makes it clear the Circum-Arctic region is highly gas prone, with a mean estimate of 1,669 Tcf of undiscovered gas resource.

"The high estimates for undiscovered oil in Arctic Alaska that were included in the 2008 Circum-Arctic

appraisal, combined with the newly released update of NPR-A, reflect the USGS perspective that a large proportion of the undiscovered oil in the region lies offshore,” Houseknecht said.

TAPS Implications

Estimates of the useful life of the Trans-Alaska Pipeline System have extended as far as 25 years into the future. That optimism is largely based on the potential for future crude oil discoveries in north Alaska.

“The other discoveries have not been able to offset the decline at Prudhoe Bay, so there is starting to be real concern about the longevity of the Trans-Alaska Pipeline,” Houseknecht noted.

No minimum operating line-fill amount has been established for the TAPS line, but the number currently is thought to be somewhere between 200,000 and 300,000 barrels per day.

Kevin Banks, director of the Division of Oil and Gas of the Alaska Department of Natural Resources, said the day-to-day amount of oil carried in the pipeline is also a key issue. The larger that amount, the less the per-barrel cost of transportation.

“We’re concerned about not just longevity, but throughput at any given point,” he said.

Alaska Implications

Needless to say, the slashed resource assessment for NPR-A was not favorable for Alaska, nor was it viewed favorably in the state.

“The state has a stake in development (in NPR-A) for a couple of reasons. First, we are going to share in the rents and bids and any other money paid there,” Banks said.

“We also collect production taxes from any production activity that occurs there,” he added.

Banks compared the state’s tax breaks for NPR-A exploration to an investment that pays off as production takes place.

“The state has already paid millions of dollars in tax credits for wells drilled in the past six to eight years,” he said. “We’ve actually put more money into exploration in NPR-A than the federal government has.”

About 19,000 wells have been drilled to define prospects in Wyoming, while only a handful has been drilled to date in NPR-A, Banks commented. He wondered how any definitive assessment could be based on such a small data set.

“One of the critiques we have of the revision report is that it mentions only about 30 wells have been drilled, and the USGS doesn’t even have access to all the information from those wells,” he said.

Houseknecht counters that the USGS reviewed proprietary data from all wells drilled during the past decade except one – a gas prospect that was not updated in the new assessment.

“The public data was corroborated by proprietary data and the assessment results are consistent with all the data,” he said, “including the proprietary data.”

ANWR Implications

Reduced expectations for significant oil discoveries in NPR-A could renew pressure for opening up the westernmost Arctic National Wildlife Refuge Coastal Plain for evaluation and drilling.

But Banks thinks the recent assessment revision will have the opposite effect.

“My expectation is that this would have a negative impact on exploration in any part of the Alaskan Arctic,” he said.

ANWR was established on Dec. 6, 1960. It is managed by the U.S. Fish and Wildlife Service, which is now in the process of updating its Comprehensive Conservation Plan for the refuge.

The review process could lead to the proposal of additional areas for federal wilderness designation and protection, and Banks said he is concerned that the entire 1002 ANWR Coastal Plain area could be designated a wilderness.

(Houseknecht, when asked how the new NPR-A conclusions impact ANWR, always responds, “Not at all.

“The region mapping and oil-generating modeling that the USGS has done indicate that oil generation did not occur beneath the eastern North Slope – including the ANWR area – until after the northern NPR-A uplift occurred during the Paleocene,” he said. “So there could not have been any influence of the NPR-A uplift on oil resources east of NPR-A.”)

Geological Implications

When the USGS prepared the groundwork for its 2002 NPR-A assessment, a major onshore oil discovery had been made west of the Prudhoe Bay production area.

“At that time, what was revolutionizing the exploration picture on the North Slope was the discovery of the Alpine Field. That was the first time this producible oil charge had been found in economic quantities,” Houseknecht said.

“In proceeding with our assessment, we assumed that a charge across NPR-A would be similar to the Alpine Field,” he added.

Instead, drilling results indicated an abrupt oil-to-gas change just 15-20 miles west of Alpine and poorer reservoir quality than anticipated across the reserve.

Based on sonic logs from exploration wells and other geological evidence, the USGS theorized that Cenozoic uplift and exhumation led to gas expansion, oil degassing and displacement of oil into poorer reservoir rocks.

“What we concluded was that there was a very broad uplift that affected NPR-A during the Cenozoic,” Houseknecht said. “There was a large pulse about 60 million years ago and a smaller pulse about 15 million years ago.”

It became obvious that NPR-A was looking more gas prone with much less prospectivity for oil in assessed formations, he said.

“Our thinking was that as we moved from east to west (away from the Alpine field), we would not have a gas charge in the northern part of the Upper Jurassic play,” Houseknecht explained. “What was really surprising to us as we went through the data was having this gas cap with the condensate in it.”

Industry Implications

Houseknecht said it was apparent fairly soon after the 2002 resource assessment that NPR-A would hold less oil than initially believed.

“I was trying to send a message as early as 2005 there was more gas in the NPR-A based on a few years’ perspective – and ‘Oh, by the way, less oil.’ I think people heard ‘more gas’ but they really didn’t hear ‘less oil,’” he said.

In part, the assessment revision reflects what hasn’t happened in the past decade. Have you heard about the major oil discovery in northeast NPR-A? Neither has anyone else, and the 28 wells drilled in the reserve since 2000 haven’t been hugely promising.

Banks thinks the geological re-evaluation of NPR-A calls for more drilling, as a better way to define the hydrocarbon possibilities.

“What this says to me is that more exploration should take place to narrow the uncertainty,” he said.

Meanwhile, no exploration activity is slated for NPR-A in this drilling season.

“Industry is not walking away from NPR-A,” Houseknecht noted. “They are running away.”