

Technology and brotherhood at the new frontier

The Russian oil industry is growing its production capacity by leaps and bounds, and is expected to quickly regain past levels. Now it seeks markets in both the East and the West.

DICK GHISELIN, Drilling and Production Editor



Deutag Rig on location, Noyabr'sk, Western
Siberia. (Photograph by Rostislav Foursa)

Anyone who studies the Russian oil industry will be impressed by the transformation that has taken place over the last 5 years. At that time, the industry was in chaos, dealing with a global economic crash, just when it was trying to get on its feet. Today, however, Russian oil companies operate out of modern new offices with vision and purpose, and not as much western presence as you might imagine.

Although there is no question the new face of Russia is open to commerce, tourism and industry, there has been no giant influx of westerners moving into Russia with their companies, their equipment and their business culture. Rather, it is obvious that the most successful operators and service companies are overwhelmingly "Russian." It is true that the west has had a major influence in helping the Russian industry reach exponential growth, but it has done so more by playing the part of a friendly mentor, suggesting ideas and techniques to help the industry grow itself.

The pace of western investment has picked up, as several Russian oil companies have new "best friends." BP has a large involvement with Sidanko and TNK, and Yukos is reportedly being romanced by none other than twin sisters, now joined at the hip, ChevronTexaco, who allegedly are offering to take a US \$4 billion equity stake in the company, a rumor that was hotly denied by Yukos' Chairman Mikhail Khodorkovsky.

Inside Russia, strategic mergers and joint agreements are being brokered. The recently-approved Yukos/Sibneft merger is a study in complementarity. Yukos is blessed with clean sandstones, shallow, low-temperature, low pressure, sweet high gravity crude with low viscosity, favorable mobility ratios and low GOR. "I figure Mother Nature loves us," remarked Joe Mach, Sr. VP of Production for Yukos and one of a handful of westerners employed by the company. "We have virtually no technical problems," he said. "It's just like apples lying out there on the ground. It only takes know-how to increase production."

Dr. Iskander Diyashev, chief engineer for Sibneft and a Texas Aggie, looked perfectly natural in his cowboy boots as he opined, "Yukos and Sibneft are very complementary. Areas of similarity include production growth, profitability and investment efficiency. Our methods may differ, but the results are basically the same. As our companies move into the merger, already synergy is taking place and a set of 'best practices' is emerging."

Technology vs. Technique

Although Sibneft and Yukos have similar goals, their approaches are quite different.

Yukos, blessed with few if any technical problems, is concentrating on growing production from wells in inventory, whereas Sibneft must overcome stiff technical challenges to coax more oil out of the ground. For example, today almost 25% of Sibneft's production comes from about 100 wells (70 horizontal wells and 30 horizontal sidetracks). The significance of that number is realized when one learns that Sibneft counts approximately 4,000 active wells in their inventory. The impact of technology on Sibneft's success is tangible. In Western Siberia, one field was developed with vertical wells that averaged between 500 b/d and 1,000 b/d (up to 2,000 b/d after stimulation). Not bad, until they drilled their first horizontal well into the same reservoir. It came in at almost 4,000 b/d. And the best wells in the same **Sugmutscoe** field came in at almost 9,000 b/d.

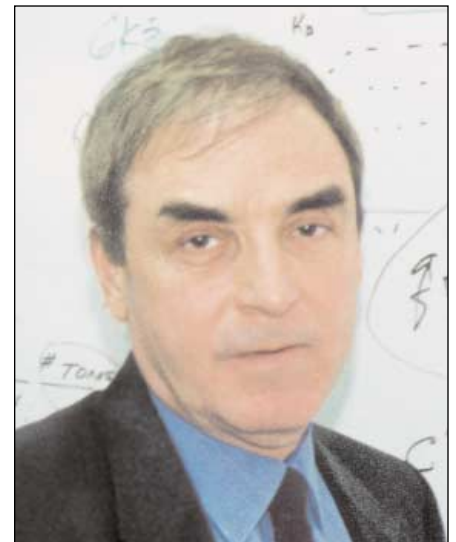
In several fields, Sibneft is faced with thin strata, with oil zones only 6-ft to 15-ft (1.8-m to 4.5-m) thick on top of water. They want to drill multilateral horizontal drainholes through the sweet spots of their reservoirs, and with GeoSteering technology they are doing it. But technology can be expensive, so Sibneft is working hard to improve efficiency. High on Diyashev's wish list is an immersive visualization center, or two. "It's the best way to communicate clearly with each member of the team, whether they're in Siberia or Moscow, and the person's brain is totally involved," he said. Improved decision-making will be the expected benefit of planned visualization enters at Sibneft's headquarters and at the company's brand new office in Noyabr'sk, Western Siberia.

Meanwhile at Yukos, Mach and his production team are tackling the task of improving production from their existing inventory. "Our assets are still way underproduced," he said. "Even after outstanding year-on-year results, we're probably only producing 25% of capacity today." Mach was referring to double-digit growth of 17.4% in 2000, 14.9% in 2001 and 24.5% in 2002. At the same time, he showed a step decline in Yukos' producing well count, from almost 14,000 wells in 2000 to less than 9,000 today. "We have grown our production by stimulating those wells with highest potential, and shutting in the 'thief wells,'" he said. Mach's approach is elegant in its simplicity. Each of his 15 oil and gas production units (NGDUs) is charged with maintaining a list of candidate wells for production enhancement and waterflood. Every day, they modify the list, and select candidate wells with the highest potential, called the performance gap "We actually

killed a well making 12,000 bo/d because we determined we could enhance it to reach 20,000 bo/d," he said. "When we looked at our list there were no other wells with the potential to make +8,000 b/d incremental production so the choice was easy." For the same cost, Mach's team was able to enhance a good well rather than investing in a broken one.

Although the concept may be simple and easy to grasp, implementing it is not. "If this was easy, it would have been done long ago," said Mach. "Technology, without know-how, is a disaster." Yukos uses a system of production patterns to determine the best moves to make. Each area is divided into patterns, making a mosaic consisting of hundreds of production "units," all with no-flow boundaries. Managing the entire area is impossible, according to Mach, so he assigns patterns to production managers and holds that person responsible for optimizing them. Getting everyone to sing from the same hymnal was challenging. Yukos established a state-of-the-art training facility, called the FDP (Field Development Planning) Center, to train hundreds of production engineers and managers. More than a school, the FDP Center acts as an electronic mentor for the graduate after he returns to the field. The facility acts as a Production Center of Excellence that any employee can contact or visit for help on local problems.

Production enhancement is a field-wide exercise. Using sophisticated simulators, Yukos decides which wells to produce, which to inject and which to shut-in. "Over and over, we found that many wells were just



Joe Mach teaches practical production methods at Yukos' FDP Center. (Photo courtesy of Yukos)



Sibneft's Dr. Iskander Diyashev: "Texas A&M is a great university!" (Photograph by Susan Ganz)

development plan was launched. The original plan called for 57 vertical wells (50 producers and 7 injectors) producing a total of 12,580 b/d (2,000 cu m/d) of oil. The development period was estimated at 19 years. Using only two steered horizontal wells, both producers, the field produced 31,450 b/d (5,000 cu m/d), and the development period is expected to last 7.6 years. Saving is estimated at \$400 million. Mach points out, "We can still drill more wells here later if needed, we haven't wasted the money like we would have had we drilled the 57 wells."

Service partners play a key role

"Technology from western service companies has been a major contributor to Sibneft's success," Diyashev said. Sibneft and Yukos have master service agreements with several western service providers. But service companies are finding out that Russia is not an easy touch. "Here's the difference," Mach said. "In America you can drill a 13,124 ft (4,000 m) well and place the bit inside a 6-in. circle. In Russia you can drill a similar well and place the bit inside this building. Depending on the situation, that might be close enough. I was pleasantly surprised to see a lot of fit-for-purpose technology over here."

The most successful western service companies are applying their technology judiciously, recommending just what is needed to accomplish the task at hand, and not trying to overwhelm the market with

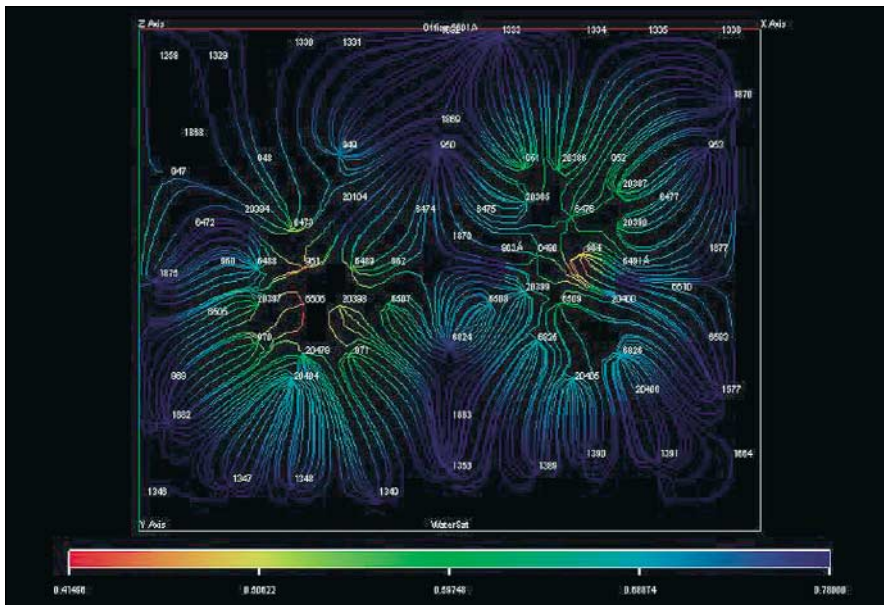
expensive new technology. The economics are different in Russia, where a rig may get \$10,000-\$15,000 per day, as opposed to \$35,000/day for a western rig. According to Schlumberger, the land fleet is estimated at 2,000 rigs of which 835 are active, most were built before 1995 for vertical wells. They have 900 hp duplex mud pumps and draw electrical power off the local grid. There are three western-style rigs operating in Russia today, representing Deutag AG, Pride-Forasol and Parker Brothers. These are heavy-duty land rigs capable of drilling extended reach wells. On the other hand, Russian rigs drill up to 2,300-ft (701-m) horizontal holes very slowly, they really struggle to drill farther out than 3,000 ft (915 m). Western contractors hope to overcome the cost differential with efficiency and drilling top quality wells.

Walking through Schlumberger's Moscow Headquarters, one sees mostly Russian names. "We have 3,000 employees here, 92% Russian," said Adil Mukhitov, marketing manager. "We have hired more than 300 Russian engineers, half of them are working here and the other half are gaining experience in Schlumberger locations all over the world." Indeed, Mukhitov's statistics reflect the company's strategy. Antonio Campo, president of Schlumberger-Europe/CIS said, "The fundamental strategy for success in Russia is quite simple. We will become Russians, or Russian look-alikes, very quickly, and the sooner we achieve this the better." Russians understand very well the principles of fit-for-purpose technology and the key is bringing the right technology at the right time to add value.

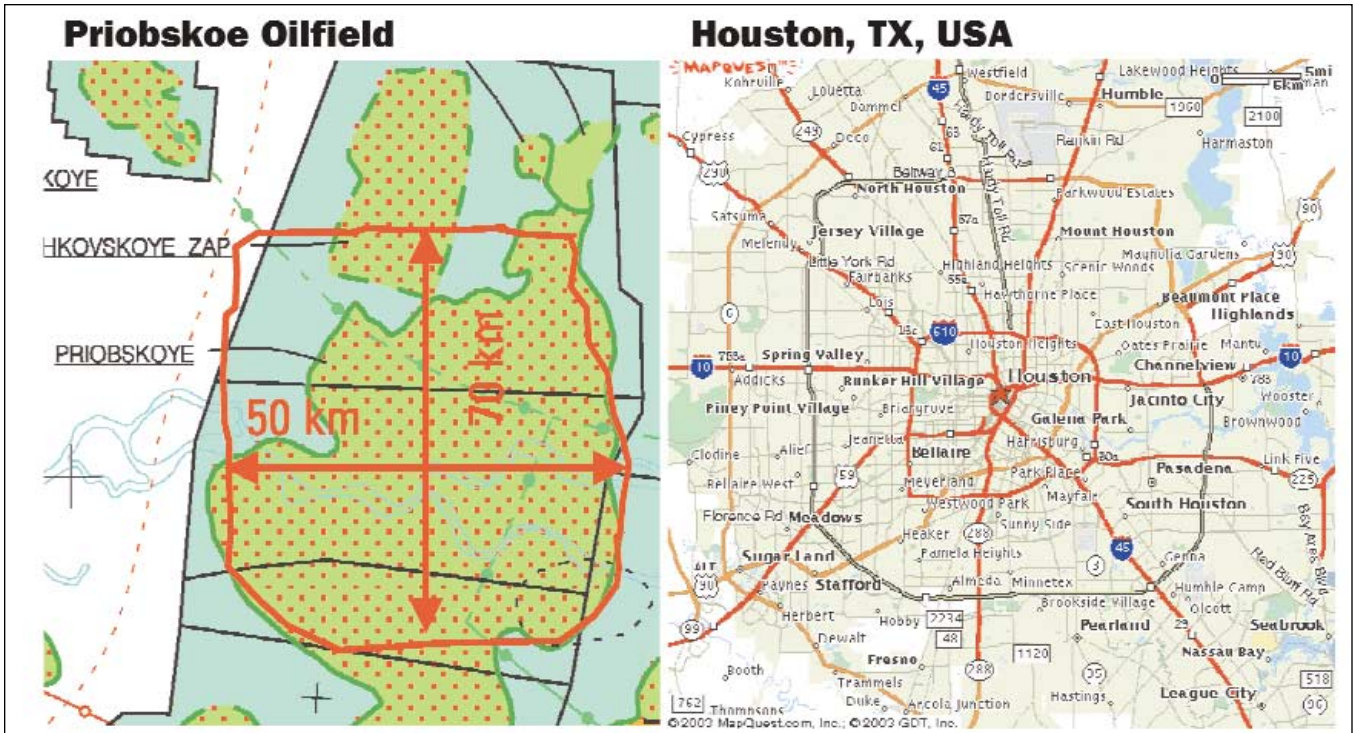
Schlumberger believes in home-grown technology. They have established Schlumberger Moscow Research with offices at the prestigious Moscow State University. Presently they are working on gas production and gas condensate, stimulation using hydraulic fracturing and temperature measurements. Moscow Research is tied in with other Schlumberger research facilities in the United Kingdom, United States and Japan. However, joint industry projects (JIP), common in the west, have not caught on in Russia. The center has 22 employees, 18 of them Russian, and oversees 30 academic collaborations involving 250 Russian scientists under contract. They operate a new fluids laboratory that studies bad wells, bad cement jobs and practices, weak sands and water encroachment, problems common to many Russian oil companies. "The objective is to develop reasonable solutions to practical problems at low cost," Dr. Christian Besson, director, said. "The industry is not yet ready for exotic solutions," he said. "They

circulating water, impairing production and wasting money," Mach said. "Simulations help us choose the right pattern of producers and injectors to optimize production on a field-wide basis."

But Yukos' forté is not all about waterflood. It embarks on advanced field development programs when they make sense. One of the most dramatic examples is the Entelskaya Block, near Nefteyugansk, Western Siberia. Field reserves were calculated at nearly 44 million bbl of oil in 1996 when the



Production pattern on the left shows many "thief" wells that circulate water and rob pressure from producers. Image on the right shows the effect of shutting in bad wells and changing the injection pattern to boost production. (Photo courtesy of Yukos)



Huge Siberian oilfields typify the potential of Russia.

need to be able to apply standard solutions well, consistently and cost effectively.”

Planning for the future

Although today’s pipeline capacity is sufficient to carry current production to market, both government and oil company visionaries recognize that additional capacity must be planned for now. As a result, joint government/industry task forces are looking into building a pipeline to China to take advantage of its huge market, as well as one to Murmansk, from which supertankers can load up and sail to the United States. Other markets being pursued include the German natural gas market. Sakhalin production has a ready-made market to the south in Japan across the narrow Soya Strait.

How big is the prize?

Commercial deposits of oil have been found across the vast reaches of Russia. A wildcat well was drilled last summer in the Bering Sea, and Sakhalin Island continues to attract the drillers. Many Russian fields are whoppers. To illustrate, our hosts kindly supplied a plat of the **Priobskoye** oil field, located in the Khanty-Mansisk Region, Western Siberia. They superimposed a map of Houston that brought everything into startling perspective.

Priobskoye neatly fits into an area 31 miles by 43 miles (50 km by 70 km), just about the area circumscribed by the beltway around America’s fourth largest city.

Channels to market are Russian oil companies’ chief concern. The clothes will have to grow to fit the baby. With Russia’s production capacity forecast to peak at 12 million b/d by 2010, baby brother will become big brother before we know it. **E&P**

Editor’s Note

In the June 1998 issue of Petroleum Engineer International, one of our founding publications, we published an article titled, “A Baby Brother For The Seven Sisters.” In it we predicted that the Russian oil industry was a sleeping giant that was poised to awaken and grow rapidly. And just as baby brothers tend to do, this one will soon tower over its sisters.



Hi-Tech driller mans the console on Deutag rig in Siberia. (Photograph by Rostislav Foursa)