

*Cable vs. cableless***Nodal Seismic Passes Frigid Siberia Tests**

By LOUISE S. DURHAM, EXPLORER Correspondent

Seismic data acquisition on land has a reputation for being a challenging undertaking, especially for crews working with the long-popular cable acquisition systems.

Survey locales vary considerably, including jungles, mountainous terrain and specific environmentally protected areas. Who wants to lug copious amounts of heavy cables and equipment into such places?

Once there, deploying this type of instrumentation is a whole other problem, as it's known to create a major footprint – sometimes a damaging one.

Frequent troubleshooting required with these cable systems is probably the most outstanding problem. This can require crew members to make numerous time-consuming return trips into the area, enlarging the footprint and decreasing productivity, which equates to considerable added expense.

Consequently, companies large and small are increasingly looking to cable-free nodal systems as the preferred technology. Among the many advantages they offer is a total lack of the need for troubleshooting. This translates into faster shooting, increased productivity and lower cost overall, along with decreased potential for those sometimes-disastrous health, safety and environmental incidents.

Several nodal seismic systems are available carrying varying designations, such as cableless, cable-free, no cable. These include FairfieldNodal ZLand®, INOVA FireFly®, Sercel UNITE and OYO GSR.

Still, this industry has long been known for its cautious pace in adopting new technology, and nodal seismic systems are no different. Even today, after several years of node availability, the oft-expressed demand from potential clients is “prove it, and do so on my turf.”

“Clients want a demo set in their own backyard to be convinced to use it,” said Keith Matthews, systems division sales director at FairfieldNodal. “Then they'll believe it.”

This is particularly understandable when working across the frigid region of Siberia, where the company recently arranged two field



Photos courtesy of FairfieldNodal

Putting cableless technology to the test: Old Russian military truck – carrying 206 ZLand seismic nodes and five people – sits behind a node buried up to the neck at the Russkoye oilfield.

demos using ZLand, which has the distinction of having absolutely no cables of any kind.

For comparison purposes under Arctic conditions, the nodal implementations were performed alongside a 428 cable system, which is commonly used by the companies in the region.

First Steps in Boguchany

The initial demo occurred in Boguchany in the Krasnoyarski region in central Siberia. It was conducted by Boguchanskaya Geophysical Expedition (BGE), a division of Geotech Holding, Russia.

A total of 202 nodes continuously recorded seismic data for four-plus days in snow-covered forests where temperatures dropped as low as -22 C.

Enclosed in a high impact case, these small, self-contained battery-equipped autonomous units tip the weight scale at 4.8 pounds; they measure six inches high, five inches in diameter and have a five-inch

ground-coupling spike.

At Boguchany, the nodes worked with an electromagnetic impulse energy source (KEM-4), proving that the combination could dramatically increase production in densely forested areas under extreme temperature conditions.

The nodes were spaced 50 meters apart on a 2-D line, alongside a 428-cable layout. Trees reached as high as 17 meters, and the snow was as much as 80 centimeters deep. Even though buried 10-to-50 centimeters in the snow, the nodes all functioned perfectly.

Rapid deployment, superior coupling in the snow and high quality data prompted BGE chief geophysicist Victor Bogdan to sum up the results succinctly:

“It is amazing how similar the seismic records are from the land nodal system with single phone receiver versus cable system with 12 geophones per string ...” he said.

“This system is a must for difficult areas such as mountains, heavy forest, rivers and other remote

locations,” added Ivan Korbaleev, acquisition manager and impulse energy source expert.

On To Russkoye

The successful Boguchany program was followed by the demo at the Russkoye oilfield in western Siberia. The data acquisition there was performed by a division of “Yamalgeophysica-Vostok,” OAO “Integra Geophysica.”

The heavy oil Russkoye field reportedly is one of the largest fields in Russia. Integra's client there is TNK-BP.

During the eight-day Russkoye demo, the lowest daily air temperatures ranged between -1.2 C and -22.5 C.

For this program, 206 nodes were deployed adjacent to cable geophone strings, and each node was located next to the Station Marker. The 2-D land line was 5,125

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meters long, crossing roads, a river and frozen lake in a flat tundra environment.

Over the course of the five-day shoot, ZLand and 428 XL recorded 3,083 shot points.

"During deployment, two Russian operators started up each node using the nodal land system's Hand Held Terminals and under our supervision," said Krassimir Nikov, regional sales manager for Russia, CIS & EU at FairfieldNodal. "The operators stamped each node as forcefully as possible into the snow.

"No one walked the line or checked the status of the nodes during the survey," he noted. "All nodes recorded seismic data during this five-day period with no mechanical or electronic failures.

"For pick-up, two young Russian operators with no specialized training for retrieval performed the entire procedure," Nikov said. "On each station, they located the node by the Station Marker, but removal of the nodes was challenging because they had ice contact with the surrounding snow; the operators gave them a solid kick to remove them.

"Because all nodes were buried under the snow, they had excellent coupling, except for one found by the road in a horizontal position, apparently moved by a vehicle," he noted.

The next step entailed transferring all of the data to the recorder in SEG-D format. The data were then formatted in SEG-Y. FairfieldNodal didn't have the right to process the data from ZLand and the 428 system; consequently, the data processing of the two sets was performed by two independent Russian companies – Crew 33 (Alexander Volovnikov) and IGSS, Moscow (Tatyana Grechishnikova).

One hundred percent of all seismic data were recovered from each node in both demos.

At Russkoye, the demo proved that even when the nodes are located next to a strong noise generator, the data quality can be improved significantly by noise attenuation processing as shown by the IGSS processing.

Also, the GPS inside the equipment functioned with no problems despite the snow and trees. It was locked on eight satellites.

Being There

The two Siberian demonstrations could help convince the industry of

'Nodes Are the 21st Century'

Clearly, the two Russian projects involving nodal seismic systems was a giant effort undertaken to help prove the merits of a relatively new technology.

When you're on a roll, it pays to keep going – and the demos were followed up by a seminar focused on land nodes.

The seminar, which was sponsored by FairfieldNodal, was held in St. Petersburg, Russia, June 23-24. The event was organized and managed by SEVMORGEO, which focuses on seismic data acquisition and processing. SEVMORGEO helped to organize the demo program.

The get-together attracted

65 attendees representing a wide range of locales and companies, including Integra, Geotech, Rosneft, SOCAR AZ, IOT and TNK-BP. The audience members represented Houston, Moscow, Delhi, Sakhalin, Baku AZ, Kazakhstan, among many others.

The interest and enthusiasm were palpable, according to Keith Matthews, systems division sales director at FairfieldNodal.

The speaker's roster included a few Russians who presented their thoughts on nodal technology and its value to industry.

"Peter Zelenko, field operations manager, went so far as to say 'this is the way to get us out of the 20th century and into the 21st,'"

Matthews said. "He exclaimed that 'nodes are the 21st century.'"

This line of thought was echoed by Steve Mitchell, vice president of systems and division manager at FairfieldNodal, in his closing remarks at the seminar.

"What you are seeing is the future of seismic," Mitchell emphasized. "We must think toward the future, not toward the past.

"Technology has allowed us to do so many more things and economically place so many more receivers on the ground," he noted. "As an industry we need to utilize that technology and move forward via unique thoughts and ideas; without cables, this can be done."

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Node deployment on the Boguchany line in Siberia.

the reliability and high productivity of nodal seismic data acquisition, even in extreme weather conditions. The capability of the nodes to record data continuously for many successive days without any manual monitoring is highly attractive in this and other environments.

"The land node operations have a lot in common with playing a smart chess game," said Yuri Zaitsev, director of BGE, which implemented the Boguchany survey. "It gives you freedom in choosing the winning moves, freedom in any energy source combinations, freedom

in placing the nodes anywhere onshore, freedom in increasing drastically (the) production."

It could be argued that the effort expended to implement the actual field activity pales somewhat when considering what was required to set up this entire program.

FairfieldNodal shipped 1.75 tons of equipment via air to St. Petersburg, where it was unloaded onto a truck to travel to the Boguchany site and then to Russkoye field before returning to St. Petersburg for the air trip back to Houston.

The truck transported the equipment 3,000 kilometers across Russia in the middle of Siberia in mid-winter in a time span of five days.

But even the best drivers are subject to the mechanical "whims" of a vehicle, and the truck experienced a breakdown.

"Renting another truck in middle Siberia is not that simple – they don't take American Express," Matthews quipped. "It was cash only, so we had cash transferred to the middle of Russia. It was quite an adventure." 