

What's old is new

Weight drop seismic comes back, but this time it's high-tech

THERE'S A NEW SEISMIC source technology hitting the ground in northwest Alberta, one based on a technique that's been around for more than 20 years. But the new version of the weight drop method is said to have capabilities far beyond the original, and compares favourably to vibroseis and dynamite.

"We've taken a Kitty Hawk idea and taken it to the space shuttle stage," says Bill Mooney, president of Polaris Explorer. "We applied science to address what was missing."

Through a research and development effort undertaken with assistance from Apache Canada, Polaris came up with the Explorer 860, a buggy that carries a 2,600 pound accelerated weight drop system capable of providing up to 860,000 pounds of force, travelling at about 12 feet per second.

"[The units] have acquired excellent data in the Zama area," says Jim Ross, geology and geophysics manager north for Apache. "It easily works as well as dynamite in the area."

Apache used Polaris' three Explorers last winter, and the company will use them again this winter for the entire season. Ross says the system is quicker and cheaper than conventional methods, cutting program costs by as much as 20 per cent.

"When you're shooting a big project that's a lot of money."

However, he says the savings are offset somewhat because the low cost encourages an increase in survey effort.

"We can do a far more detailed survey with this machine than with a dynamite survey."

The weight drop source can shoot 1,500 to 2,800 energy points per day, providing 200 to 300 per cent of the "fold" of conventional seismic. Fold is a description of the number of times a subsurface point is examined, and Hislop says a seismic program with higher fold results in improved data quality because the system becomes less vulnerable to noise.

The increased fold also allows shallower targets to come in clearer, a benefit

because shallow seismic is generally more difficult and expensive than recording data from deeper points.

"It gives you the benefit of serendipity," Mooney says.

And, the high number of shots provides for a different source to receiver ratio than usual.

"Typically the ratio of sources to receivers is 1:1 or 1:2. We get two or 3:1," Hislop explains. "You have to rethink the way you design a survey because you have something you've never had before—the number of shots. It's allowed us to look at designs that are built as more source dependent."

Unlike conventional weight drop systems, the Explorer is also highly controllable. The system uses hydraulics to raise and lower the weight, and plumbed into the top of the hydraulic cylinder is a nitrogen gas charged accumulator. Pressure in the accumulator can be adjusted, and this pressure controls the force acting on the top of the weight when it is released.

"It's not a dumb weight drop, it's controlled."

The new seismic source also offers benefits in the way of environmental impact. At 2.8 metres wide and 6.35 metres long, the Explorer can manoeuvre through relatively narrow cut lines that do not have to be straight. As well, no shot holes have to be drilled into the ground and although there is some compaction to the surface Polaris says it causes little or no long term damage.

"It's pretty slick," says Hislop.

Equipped with an onboard global positioning system (GPS), the weight drop buggies don't even require conventional flags to identify source points. Instead the points are programmed into the system and the operator just drives until told to stop. This minimizes damage from cows, who like to chew on flags, and eases the clean up process.

Although the majority of the design for the Explorer came from Polaris, Apache played a substantial role in the R&D process. Ross says although a partnership like this is rarer than it used to be, it can provide tremendous value.

"We think it's something that an oil and gas company should do. If we're going to benefit from the machine there should be some involvement from our side."

A larger version of the Explorer is currently being designed, and Polaris president Mooney says smaller versions will likely be built in the future to allow the weight drop method to get into low impact survey lines.

— Deborah Jaremko



Polaris and Apache have come up with the Explorer 860