The evolution of wellhead containment

To avoid leaks, it pays to be proactive

A mechanical and quality control expert who has worked in the oil and gas industry for more than 30 years, Marty Matthews established Adoil Inc. as an on-site training and well-site inspection firm in 1986. In the early 1990s, after receiving numerous requests from lead operators and field foremen to help prevent oil lease spills and ground staining, Matthews set about developing, designing and field testing a product that would meet all of their requested criteria. He developed several plastic prototypes before producing an aluminum model, with transparent lexan in 2001.

"We've now got a product that is well accepted throughout the Western Canadian Basin," Matthews says. "The Titan spill containment system is simple to use and does not require the operator to leave the truck on their daily lease visits, which saves time. The complete unit can be installed in under 30 minutes, without tools and by most non-technical personnel."

The Titan deals with the widespread problem of wellhead seepage (today's high volume of produced water is destructive to rod seals), which often stains the ground before a messy leak can be fixed. An average oil well in Western Canada is checked once every 24 hours, but many wells in remote locations are checked only once every 48 to 72 hours. In less than 24 hours, a small leak that develops can quickly lead to substantial environmental damage and a costly clean-up. On a chronic leaking oilwell, site clean-ups are often repeated several months later.

Traditionally, to address leakage issues, companies may have installed pressure switches to the wellhead stuffing (seal) box. "The problem is that if you have fluid leakage, you now have less pressure, so pressure switches often fail to work. Plus oil, water, wax or brine will generally plug up the switches' small tubing, resulting in no protection at all, and ERCB reports show that can lead to an expensive disaster," says Mathews.

According to Mathews, the Titan spill containment system is a practical, durable solution, much like the anti-freeze overflow containment systems mandatory on vehicles. It fits all wellhead stuffing box types, is compatible with all artificial lift systems and is designed to protect the ground and surface water (e.g. snow/rain runoff) beyond ERCB/EPA compliance. It is also designed to fit all rod lubricators and pressure switches, and to be strong enough to stand up to freezing winters and sweltering summers. The Titan's containment lid is made from polycarbonate, the same material used in hockey visors and airplane windshields, and its basin includes high-strength cast aluminum and corrosion-resistant stainless steel fittings.

These units are also built user-friendly, enabling operators to quickly adjust the stuffing box packing without removal. Titan captures all the fluids, emulsion, and torn seals during a seal replacement so that operators can easily deal with seeped fluid on a scheduled drive-by. (Quick replacement of seals is especially important for workers in extremely cold weather conditions.)

All Titans also have packing failure blowout protection with high-level fluid shutdown capabilities for heavy leaks via a Class 1, Division 1 explosion-proof electronic ESD switch that works in series with a (Presco) line switch. An optional cellular service can also be added to alert the operator/battery if there is a problem at the wellsite.

According to Mathews, more than 9,000 Titans are in service throughout North America, with a long list of customers including major oil producers in Western Canada. "Some producers have mandated the Titan on every one of their wells, new and old," he says.

In particular, the Titan has become popular among many Saskatchewan producers. "We are selling more and more into Saskatchewan all the time," Mathews says. "Saskatchewan is a hotbed. To a great extent, the province's industry is made up of conventional oil. Now with CO_2 injection, oil producers can monitor their wells for possible CO_2 seepage."

The Titan spill containment system is designed specifically to deal with wellhead seepage problems and works by capturing oil and produced water that escapes the wellhead due to repetitive rod motion and common seal wear.

"In the past, in windy conditions, H2S/CO_2 leak detection was impossible at the wellhead – until the Titan came on the market."

Mathews says the Titan has also received excellent reviews from landowner associations in Western Canada, as well as from the Alberta and B.C. governments. (He also points out that recently the B.C. government gave the Titan tax-free status to encourage oilpatch sales in the province.)

The new Super Steam Unit

Adoil's newest product is the Heavy Oil Super Steam (SS) Unit – a safe, economical, easy-to-use environmental wellhead containment unit and blow-out suppression top cap. Specifically for heavy oil producers, the SS is particularly suitable for use in heavy oil wells using rod pumps, for CSS, SAGD, and cold lift recovery. According to Mathews, surface casing and cement seal corrosion can now be eliminated on steamed heavy oil wells via the SS unit's fluid capture design.

One major oil company in the Peace River region has already seen the benefits of using the new Super Steam units. Mathews notes that the company has reported reduced packing failure blow-outs, and the dangerous hot (wind-blown) oil contaminates at pad sites has been suppressed, which eliminates surrounding ground staining and ecological harm. An added benefit for the company has been the protection of expensive onsite instrumentation (sensitive instruments and steam cleaning don't mix).

Plus, the SS units' emphasis on greater operator involvement has led to faster response times – resulting in cleaner pad sites and lower field operating costs.

The Heavy Oil Super Steam Unit can be installed in under two minutes, without tools, is easy to clean, and is built lightweight, strong and corrosion-resistant.

"It pays to be proactive," concludes Mathews. "When producers use our product, all leaks can be dealt with right away, instead of having to do an expensive, reactive clean-up."

Adoil Inc.

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Above: An example of the kind of heavily leaking wellhead that oil companies sometimes have to deal with.

Right: A clean site using Titan spill containment technology, which features packing failure blowout protection with high-level fluid shutdown capabilities for heavy leaks.

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