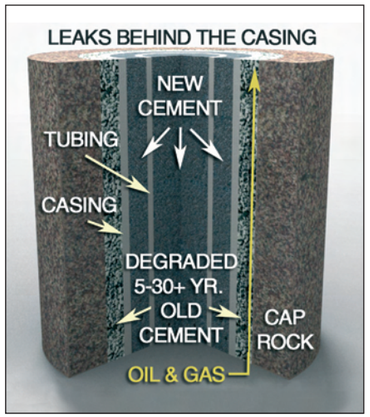
Poor rig-less abandonment jeopardises future production

By Bruce Tunget & Clint Smith, directors, Oilfield Innovations Ltd

Modern technology is only capable of recovering 10% to 50% of the original hydrocarbons from an oil and/or gas deposit. Consequently, abandoning a well comprises sealing in the remaining 50% to 90% of the hydrocarbons within the containing cap rock for later extraction by our grandchildren and our grandchildren's grandchildren, who will have access to more advanced technology.

For example, the North Sea Argyll Field was discovered in 1971 and produced 72.6 million-bbls from 1975 to 1992 when it was abandoned. Argyll was then redeveloped and produced an additional 5.2 million-bbls from 2003 to 2005 when it was abandoned again. Now, it is being redeveloped yet again with new technology estimated to recover 21-33 million-bbls.

Well abandonment comprises replacing the cap rock that originally trapped hydrocarbons like those in Argyll for millions of years, wherein oil and gas companies use cement around the production tubing and casing to seal the hole they drilled through the cap rock, as shown in illustration below.
If, during well abandonment, oil and gas companies do not adequately seal the hole they placed in the cap rock, the 50% to 90% of the original hydrocarbon deposit will, over time, escape to other permeable ground water formations where it becomes too widely dispersed to recover and is lost forever.



Historically, drilling rigs and pulling units have removed tubing from subterranean wells so that oil and gas companies could log and confirm the integrity of the cement behind the casing they placed through the cap rock before finally cementing the internal portion of the casing.

Unfortunately, the price of drilling rigs and pulling units have sky rocketed and oil and gas companies have increased the practice of using conventional rig-less abandonment, whereby the production tubing is left in place and, thus, prevents sonic measurement of the cement between the casing and cap rock since sonic signals cannot be accurately interpreted through the combined tubing and casing walls due to eccentric deflection of the signals. The failure to confirm good cement bonding within an abandoned well jeopardises future extraction of the remaining 50% to 90% of hydrocarbons in place because they may leak through degraded cementation, as shown below.

Due to skilled workforce shortages in the oil and gas industry, the present worldwide financial crisis, and the high costs associated with oil and gas, the use of rig-less well abandonment has increased significantly and the failure of companies to confirm the integrity of cement between the cap rock holding hydrocarbons in place and the casing has largely gone unnoticed.

Fortunately, a small Scottish company called Oilfield Innovations Limited has created a rig-less method capable of providing the same logging and abandonment capabilities as those provided by drilling rigs and pulling units at a fraction of the cost and which is not only safer, but more environmentally friendly also.

Traditionally, pulling the production tubing from a well was necessary to engage logging tools to the casing so as to measure the bonding of cement behind the casing, which may deteriorate after many years of thermal and physical production related stresses. Logging tools have always been small enough to fit through the tubing, but the tubing wall prevented them from engaging the casing and transmitting acoustic measurement signals accurately.

Oilfield Innovations has devised a safer and lower cost rig-less method that reverses the process of pulling the tubing by instead severing and crushing it so that logging tools can exit the severed uncrushed portion to contact the casing and log the cement bond behind the casing.

Once the cement is logged, conventional rig-less abandonment methods like cement squeezes may be used to cost-effectively repair damaged cement behind the casing and then place cement within the casing and tubing to keep the 50% to 90% of remaining hydrocarbons trapped under the cap rock for later generations to extract using more advanced technologies.

It makes little sense to bring normally occurring radioactive materials, which are attached to production tubing, into our environment by pulling the tubing when it can be crushed and left downhole instead. Also, why incur the cost and safety risk of using a drilling rig or pulling unit with forty (40) to sixty (60) people working around potentially hazardous hydrocarbon wells when you need only a wireline rig with four (4) to six (6) people using Oilfield Innovations' method? Furthermore, why expel the larger carbon footprint exhaust fumes from a drilling rig and/or tubing pulling unit when you can use a significantly smaller, more environmentally friendly and less expensive wireline rig?

Will conventional rig-less well abandonment jeopardise our future by wasting the 50% to 90% of original in place hydrocarbons that are not currently economically producible with modern technology? Not if oil and gas companies remove the tubing by either pulling it or crushing it so that logs can verify cement behind the casing. Oilfield Innovations' new rig-less well abandonment method can use field proven tooling to protect future production in a safer and more environmentally friendly manner at a fraction of the cost of conventional methods. ■

Any persons or companies interested in this new method of well abandonment should contact: bruce@oilfieldinnovations.com or clint@oilfieldinnovations.com