Press Release

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ESTABLISHING THE CREEP PARAMETERS OF NOVEL ALLOYS FOR WELL PLUGGING AND ABANDONMENT

A PARTNERSHIP BETWEEN RAWWATER AND THE UNIVERSITY OF ABERDEEN

An OGIC-funded partnership between oilfield services company Rawwater and the University of Aberdeen, is establishing the creep behaviour of a range of novel alloys for gas and oil well plugging and abandonment.

Having undertaken onshore deployment trials of a Rawwater-developed novel alloy specifically formulated for plugging and abandonment, Rawwater needed to establish the mechanical properties and creep behaviour of the alloy as a simulation under service pressure and temperature conditions. To achieve this, Rawwater partnered with the University of Aberdeen, who determined the alloy's creep parameters at stress and temperature conditions similar to those experienced downhole.

"By working with the University of Aberdeen, we have been able to establish essential creep parameters of the metal plug alloy, such as activation energy, creep rate, strain rate sensitivity and material creep constant," comments Rawwater's Dr Joseph Oluleke. "The extensive test facilities at the University's School of Engineering made this possible in a very tight timeframe, and the results will now provide valuable input data for reliability and long-term performance modelling of various plug designs."

Following the successful completion of the first phase of the project with the University of Aberdeen, further studies have now been proposed to fully characterise the creep behaviour of another Rawwater-developed metal plug alloy which is designed for wellbore environments experiencing higher temperature (140°C – 160°C) and differential pressure (> 5,000 psi) wellbore environments. "We are delighted with the progress achieved so far and very much appreciate the support we have received from the Oil & Gas Innovation Centre (OGIC)," adds Dr Oluleke. "The pairing of Rawwater with the University of Aberdeen has been of great benefit to both parties."

Currently, well plugging and abandonment is completed almost exclusively by the use of cement, which is intended to create a permanent barrier, sealing off the well and enclosing downhole fluids and gases. Some cement plugs, however, have been found to fail over time as a consequence of microcracks, with the resultant permeability leading to leakages and loss of plug integrity. Such leaks not only pose an environmental risk, but also present a financial consequence for operating companies who will be exposed to additional re-abandonment costs should plugs fail.

Recognising the need for an alternative solution to cement plugs, Rawwater is developing metal alloy plugs that are sufficiently strong, formable and impermeable. Metal alloy plugs are capable of operating effectively in shallow to deep wells. Furthermore, the installation of metal alloy plugs can significantly reduce deployment costs compared to cement plugs, as a consequence of reducing deployment time to 1.5 days, and the inevitable saving on vessel costs for offshore wells.

Professor Alfred Akisanya, from the School of Engineering at the University of Aberdeen adds: "The understanding of the creep behaviour of novel alloys for downhole well plugging applications has strengthened the interest of the Principal Investigator in the design and development of oil and gas well technology, tools and components. The project complements other sub-surface well plugging and abandonment as well as decommissioning research activities at the School of Engineering, University of Aberdeen."

About the Rawwater Group

From its technology centre in Warrington, UK, the Rawwater Group provides solutions to the oil & gas industry. The group offers contract research and consultancy in the fields of materials science, well technology and water management, and combines engineering with reservoir microbiology to deliver solutions for facilities design, oilfield souring, biofouling and microbial corrosion.

The Rawwater Group's engineering division is well known for its expertise in the development and application of molten bismuth alloys as a superior alternative to cement for plugging both onshore and offshore oil and gas well abandonments. The division is also creating a range of alloys to provide secure, high integrity, reversible seals and coatings for the sealing or encapsulation of various systems.

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