

For Immediate Release  
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## Micro sensor motes successfully travel through a Canadian heavy oil reservoir

What was once believed to be impossible became a reality on November 16<sup>th</sup>: micro sensor motes were successfully sent into a Canadian heavy oil reservoir through an injection well and retrieved via a production well.

This exciting result is from a field trial conducted by the PI Innovation Centre – a joint venture of the Canadian Petroleum Technology Research Centre (PTRC) and its Dutch-based partner INCAS<sup>3</sup> – in collaboration with Canadian Natural Resources Limited (CNRL), which provided field access. The successful experiment is the first step towards mapping the structure of heavy oil reservoirs with micro sensor technology.

### Heavy oil recovery challenges

Using existing recovery methods such as CHOPS (Cold Heavy Oil Production with Sand), heavy oil reservoirs in the Saskatchewan-Alberta border region of Canada see only a five-to-eight percent recovery rate. In CHOPS production, a sand and oil mixture is extracted from the heavy oil field; the produced sand that comes up with the oil leads to the creation of empty spaces or ‘wormholes’ in the reservoir. These ‘wormholes’ form a potentially immense network of channels in unconsolidated sandstone preventing pressurization of the reservoir and, thus, influencing the efficiency of oil production. If the Canadian oil industry can better characterize these reservoirs, extraction methods can be improved, which could lead to a substantial increase in yields up to 20% while lessening deleterious effects on both the environment and extraction efficiencies such as excess water production.

The challenge is to better understand the structure of these reservoirs. If this network of wormholes exists, sensors should provide information about details as to their number, diameter, direction and location. For this purpose INCAS<sup>3</sup> is developing sensor motes that can be injected into heavy oil reservoirs, collect relevant data, and return to the surface. The main issues to overcome are the size of the sensors, the extreme conditions they face, communication with the sensors from the surface, and retrieving the sensors out of the reservoir.

### Unprecedented success in first field test

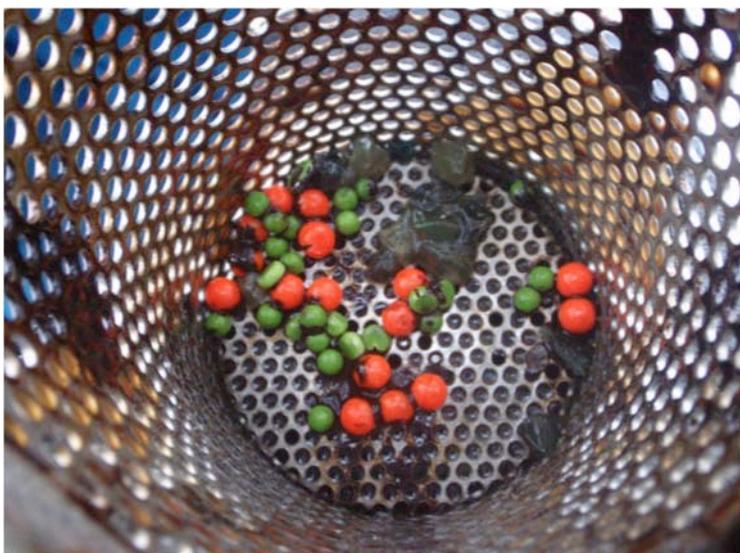
November 12<sup>th</sup> to 16<sup>th</sup> saw the first proof of principle. The initial results indicate that between 10% and 20% of the injected sensor motes – those with a diameter of 7 mm or less – successfully passed through the reservoir. John van Pol, Managing Director of INCAS<sup>3</sup>, is positive about the results.

“The fact that the sensor motes traveled through the reservoir is a promising start for this innovative research,” he noted.

Dr. Malcolm Wilson, CEO of the PTRC, commented on the importance of this first field success to the future of heavy oil recovery.

“With the kinds of recovery rates we experience in CHOPS production,” said Wilson, “to actually be able to see and better understand these wormholes will enable us to develop improved recovery techniques.”

The next step is to closely analyze the obtained results. The PI Innovation Centre, a not-for-profit company founded by the PTRC and INCAS<sup>3</sup> to develop and deploy micro sensor technology to the oil industry, will set up a research program to move to the next phase of trials, namely establishing good communication between the sensors and surface.



Sensor nodes from 5 to 7 mm that came out of the oil reservoir.

**About the PTRC-INCAS<sup>3</sup> Innovation Centre (PI Innovation Centre)**

The PI-Innovation Centre was founded in 2012 by the PTRC and INCAS<sup>3</sup> to take Dutch micro sensor technology to the oil patch in Canada, adapting and adjusting the technology to face the unique environmental and economic challenges facing the resource. PI is jointly operated by the two founding organizations.

**About PTRC**

The PTRC is a not-for-profit research and development company founded in 1998 that directs world-leading scientific and engineering research into hydrocarbon energy production and carbon storage. Located in Regina Saskatchewan, the PTRC uses R&D to advance and support the recovery of western Canada’s rich but often difficult to access and monetize oil resources. Its Business-Led Network of Centres of Excellence in enhanced oil recovery (STEPS network) is expanding its research from heavy oil to tight and conventional oil as well as extra-heavy resources like oil sands.

**About INCAS<sup>3</sup>**

INCAS<sup>3</sup> is an independent, private, non-profit research institute dedicated to solving challenging industrial and social technological problems by combining academic and engineering excellence. All research is performed by doctoral students, postdoctoral researchers and senior scientists in collaboration with a team of skilled engineers from the headquarters in Assen, The Netherlands, as well as within internationally renowned partner

## PRESS RELEASE



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