

LUCA technologies confirms real-time methane generation

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May provide opportunity to convert finite oil resource to long-term production of natural gas

Luca Technologies LLC today announced that its researchers have confirmed the presence of a resident, methane-generating community of microorganisms ("microbial consortium") in substrate samples taken from the 110,000 acre Monument Butte oilfield located in North Eastern Utah. This site represents the latest in a series of active "Geobioreactors™" that Luca Technologies has identified since its first demonstration of this phenomenon in the Powder River Basin coalfields of Wyoming. Geobioreactors are sites where microbial conversion of underground hydrocarbon deposits (oil, oil shales, and coal) to methane is ongoing. Such Geobioreactors may offer the potential of turning currently finite energy reserves into methane "farms" capable of long-term, sustainable energy generation.

"The hydrocarbon resources available in the Monument Butte oilfield are very large, making the possibility of shifting from oil production to the ongoing farming of clean, natural gas an attractive consideration," said Robert Pfeiffer, president and chief executive officer of Luca Technologies. He noted that the Monument Butte site was one of six oil fields across the United States that Luca has been studying. The company has demonstrated two of those sites to be robust, methane-generating Geobioreactors, and two to be less actively generating methane. Three additional sites are not currently active but may have the potential to be turned into active Geobioreactors through cross-

inoculation with microbial consortia from active sites.

Luca scientists have also begun to isolate and identify particular members of the Monument Butte microbial consortium. Through partial DNA sequence analysis, the company has identified Clostridia and Thermatoga as two of the key members of this consortium. Clostridia form a broad genus of bacteria known for their diverse metabolic pathways. Clostridia frequently thrive in anaerobic environments and many species are known for their heat tolerance. Thermatoga microorganisms are known to play a role in the anaerobic oxidation of hydrocarbons to alcohols, organic acids and carbon dioxide. Thermatoga also thrive in high temperature environments, such as those found in sub-surface oil wells.

"Oil within the Monument Butte field has a waxy composition that may facilitate the strong real-time methane generation we see at this site," commented Mr. Pfeiffer. "If so, then areas with large accumulations of waxy oil – for example, the Daqing Field in Northeast China -- could prove to be important sites for the bioconversion of residual oil to methane and the restoration of these 'spent' sites to economic energy production."

Potential for Methane "Farming"

It has long been known that certain microorganisms are "methanogens" – microbes that generate methane by metabolizing organic materials including various hydrocarbons. While it has also been generally accepted that many of the known methane deposits were produced by such organisms, most of this production was thought to have occurred millions of years ago, when the hydrocarbon deposits were less mature and closer to the surface of the earth.

Luca scientists, employing the tools of modern biotechnology and

genomics, have now shown that living methane generating, microbial consortia are present and actively forming methane within some of these hydrocarbon substrates. In addition to demonstrating that methane formation by these microbes can be stimulated by the introduction of nutrients or suppressed by heat sterilization or the introduction of oxygen, Luca has shown that radio-labeled CO₂ (carbon dioxide) introduced to these substrate samples is converted to radio-labeled methane. This demonstrates that the methane formation is the result of a biological process occurring today.

Luca is actively working to characterize Geobioreactors and the microbial consortia that populate them, as well as to understand the metabolic processes by which those consortia generate methane. The company expects to evaluate specific Geobioreactors and their potential for conversion to methane "farms," both through partnerships with active Operators in the oil and gas industry and potentially on its own. If successfully developed, Luca believes this approach has the potential to turn current finite energy resources into even more valuable resources for the long-term production of clean, sustainable energy.

Source: Kureczka/Martin Associates

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