

Novel technology for the exploration and evaluation of oil and gas deposits at depths up to 7000 meters with credibility of 95%

Keywords: PESE, magnetotelluric, electromagnetic, controlled source, AMT, CSEM, CSAMT, hydrocarbon-bearing formation, oil, gas, exploration, evaluation, geology, prospecting, trial bore, drill

Summary

Our partner has developed a novel technology that enables exploration of new; and evaluation of existing hydrocarbon-bearing formations.

PESE (Point Electromagnetic Scanning of Earth) works on the basis of magnetotelluric methods and represents a versatile, multipotent technology. It is fully developed, available on the market. Our client is looking for partners interested in a joint venture with the aim of initial deposit exploration and validation. Subsequent utilization would be the exploitation or sale/licensing of the deposit.

Challenge to be addressed

In today's world quest for hydrocarbon resources is ever increasing. We still have reserves, but due to economical considerations their exploitation is limited. The described technology helps to overcome these hurdles by expanding our possibilities in exploring new hydrocarbon deposits or by optimizing operation of existing ones.

Innovation and main advantages of the technology

In order to keep competitive advantage in the future, oil producers need to pay more attention on prospecting hydrocarbon deposits. Recent advancements in the field of electromagnetic sounding enabled this technology to evolve, which eventually helps oil companies to cut back on drilling costs and ensure economical exploration to occur.

Background information: Electromagnetic detection of a reservoir is based on the resistivity contrast of the resistive reservoir to its conductive surrounding. Time variant magnetic fields of either natural or artificial origin cause eddy currents within the sediment layers. As these eddy currents are time variant as well they cause a secondary electromagnetic field that can be sensed with magnetic or electric sensors placed on the ground (onshore); or on the sea floor or sea surface (offshore).

PESE technology can be used in three different set up (successive exploration):

-  **Airborne electromagnetic set up:** During the initial phase of exploration, regional remote survey of the territory takes place. This is accomplished by a helicopter carrying a towed bird (surveying device).

- ✚ **AMT (Audio-Magnetotellurics) set up:** The following phase represents surface survey of the selected electromagnetic anomalies (spots of possible hydrocarbon accumulation). AMT is a passive method that makes use of Earth's natural electromagnetic source (magnetic field, sunwind, lightnings). It is non-invasive, reliable and fast enough to further narrow promising areas of the territory.
- ✚ **CSAMT (Controlled-Source Audio-Magnetotellurics) set up:** In the next phase surface survey continues, applying tCSEM (time domain controlled-source electromagnetics -> variant of CSAMT). This is an active method that uses artificial electromagnetic source, and provides deeper sounding and higher resolution of the deposit.

The unique combination allows systematic exploration and validation of hydrocarbon-bearing deposits. In the **exploratory phase** remote surveying saves time and reduces expenses while in the **validation phase** high resolution mapping enables optimal delineation of the deposit. This helps minimize costs associated with trial borings. Beside hydrocarbons the technology is capable detecting various minerals (metal ores, halite, etc). It works onshore, offshore and represents a perfect match in supplementing conventional geophysical (seismic) methods.

According to a peer-reviewed article¹ of the *Oilfield Review*, advanced CSAMT methods have the potential to become new means of future's hydrocarbon exploration.

Potential areas of use

Petroleum industry; exploration and production (E&P) sector: exploration of new; and evaluation of existing hydrocarbon-bearing formations in quest of oil and gas resources.

Benefits

- ✚ Greatly increased likelihood of successful deposit identification
- ✚ Decreased time-frame for exploration
- ✚ Cut back on costs associated with trial borings
- ✚ Provides information to construct multidimensional subsurface models
- ✚ Ability to track mass movement and dynamic changes of the deposit
- ✚ Innovative approach for auditing oil wells/active deposits
- ✚ Environmentally favorable (non-invasive)

Stage of development

The technology is fully developed, available on the market.

Intellectual property status

Secret know-how.

¹ James B. et al.: Electromagnetic Sounding for Hydrocarbons, *Oilfield Review* Spring 2009: 21, no. 1.



Type of collaboration

- Joint venture

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