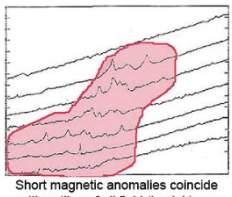
'DIRECT DETECTION' OF HYDROCARBONS (OIL & GAS)

FOR RAPID, LOW-COST, OIL & GAS EXPLORATION

Potential Energy LLC is a Palo Alto, California company formed to apply the use of high-resolution magnetometers in airborne and marine environments for ***'direct-detection'*** of hydrocarbons (oil & gas). The application is based upon the detection of small, characteristic magnetic anomalies commonly observed for decades over oil fields, but never understood as to its significance and thus discarded as noise. See map at right with such anomalies indicating the oilfield (in pink).



Short magnetic anomalies coincide with outline of oil field (in pink)

The ability to use remote-sensing to discern the presence of hydrocarbons is the 'missing piece' in the ever-more expensive exploration & production phase of oil field development. Since such technology shows those areas underlain by oil & gas, it indicates where to apply accurate, but high-cost, 3D seismic. It also lowers the risk of drilling, as it indicates—in advance--the confirmed presence of oil & gas. It may also result in finding certain kinds of reservoirs heretofore not characterized by acoustic means (i.e., seismic surveys).

In the current market of low oil prices, it makes possible a rapid, low-cost, yet, very effective means of finding the oil. In the longer-term, it enables the deployment of certain automated means of mapping, to produce a valuable database of oil & gas locations in the principal offshore oil basins of the world such as Gulf of Mexico; offshore Africa, Brazil, Australia; South China Sea; North Sea; Arctic Ocean.

The source of these magnetic indications are natural gas plumes which overlie most oil fields. These plumes consist mostly of methane which is food for bacteria, which, in turn, have an organic magnetic compass (called a magnetosome) which produce magnetic nanoparticles detectable by magnetometers.

We propose to deploy airborne and marine magnetometers to map these plumes. Magnetometers with sufficient resolution (picoTesla cesium) were recently developed. Surveys over land and shallow sea (shelf), will use aircraft with wingtip magnetometers on carbon-fiber aircraft (magnetically cleanest platform ever flown); for marine areas, deep-towed magnetometers from ships and fleets of patent-pending, satellite-connected, self-propelled, buoys to cover entire basins. See **Executive Summary**

We shall utilize magnetics as a '*transducer for geochemical detection*.' In doing so, we shall conduct surveys that utilize what we know about these plume anomalies, map their locations and analyze certain innate characteristics. Data reduction & interpretation involves proprietary analysis & mathematical inversion of the anomalies to map, in 3D, certain critical characteristics of the plumes for geological and reservoir information and interpretation of the seismic survey data.

Our method of ***direct-detection of hydrocarbons*** will allow us to achieve the following.

- Identify oil & gas directly, on land and in the ocean, by virtue of magnetic effects of the gas plumes which overlie most oil deposits. As correlative information with seismic, increase confidence of the presence of hydrocarbons
- Reducing cost of seismic by only doing seismic in hydrocarbon zones or 3D in such areas.
- Reduce risk & investment for drilling by high-grading drill-site locations.
- Using self-propelled, programmable buoys with deep-towed magnetometer to map petroleum deposits automatically (patents filed) in most of the world's major offshore oil basins: Gulf of Mexico, offshore Brazil, coasts of Africa & West Australia, South China Sea, East China Sea, North Sea and Arctic Ocean.
- Low-cost, remote means of assessing commercial value of prospects for lease sales and offers to buy into other working areas where one oil company might know the potential better than the current owner.
- Probability of finding other types of oil-bearing structures, stratigraphic & other, on land or the ocean that does not depend upon acoustics, i.e., seismic, to define them, perhaps some that heretofore could not be identified, or possibly map, directly, such as sub-salt deposits..
- Fly 'shelf' (depth <1,000') areas over all the continents for direct hydrocarbon mapping
- In the U.S. and 40 other countries with shale gas programs, identify 'sweet spots' drill locations where the good wells are located (naturally-fracked). And, possibly, render economic, the largest single shale oil deposit in the U.S., the Monterey Shale in California

Multiple patents have been filed for various aspects of these procedures.

Please contact: Dr. Sheldon Breiner, Executive Chairman, **Potential Energy, LLC**
Mobile 650-255-1121 (California, USA) or sheldon@breiner.com