

## Mitigating Drilling Risk using MGCE & 4G solution

### What is 4G Solution?

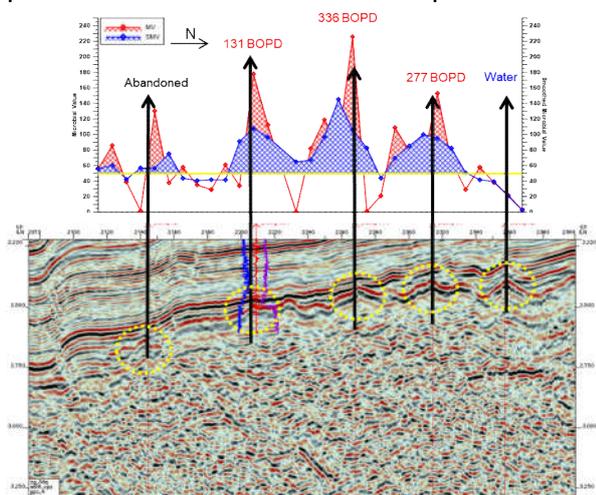
4G stands an integrated solution of 4 disciplines (Geology, Geophysics, Geo-microbiology and Geochemistry) which AE&E is proposing to the Oil and Gas industry to increase exploration success rate.

### Why do we need 4G?

While high resolution 3D seismic often provides excellent trap definition, determination of the contents of the trap using seismic attributes alone, can be inconclusive. MGCE (Microbial Geochemical Exploration) provides another two dimensions of Geo-microbial and Geochemical data which can be integrated into your geological and geophysical workflows, thus providing an effective method of addressing exploration risk. MGCE surveys are particularly beneficial in areas where drilling is expensive, and minimizing risk is imperative. In many cases, proving charge can improve the probability of success by a factor of two to allow making quality decisions.

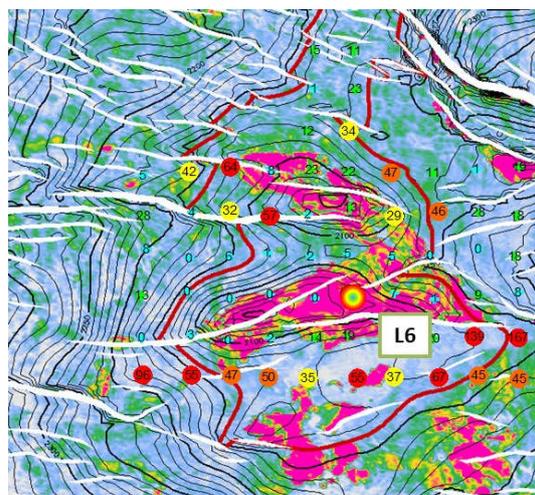
### How we do it?

Through collection of soil samples at the surface or sediment at sea bottom and analysis of specific microbial population and geochemical parameters in such samples, MGCE can provide direct evidence, with integration of G&G data, to test the existence of hydrocarbons accumulation in proven traps, either structural or stratigraphic. Acquisition can be simultaneous with seismic or EM operations to reduce costs and improve efficiency.



#### Case No.1 (Charged VS Not Charged)

3D seismic data identified 5 structural traps with equal prospective potential based on G&G interpretation. MGCE results suggested that only 3 are charged with hydrocarbons (proven by commercial wells with high production rate) and the other 2 of high risk (proven by 1 abandoned well No.1 and 1 water well No. 5). [\* Values above the yellow threshold line stand for anomalies and values below stand for background]



#### Case No.2 (Hydrocarbon VS None Hydrocarbon)

Seismic interpretation identified a structural trap with clear AVO amplitude softening, suggesting a very prospective trap with gas potential. MGCE results indicated high risk with low microbial values. Further drilling results with a gas flow of 95% CO<sub>2</sub> proved the integrated conclusion of risk to be correct. [\* blue and green dots stand for low value background and dots in yellow and red stand for anomaly].

### Why do it?

With an extra small percentage increase of your exploration cost, MGCE can boost the drilling success rate from 30-40% to over 80% with a track record of clients served in China and worldwide. It is therefore a very cost-effective and fast turnaround technology to use in every stage of exploration, including early reconnaissance.



## Who are we?

**Advanced Energy & Environmental Technologies. Inc** (AE&E), headquartered in Beijing, is a major service provider using Microbial Geochemical Technology for oil and gas exploration. As a pioneer to open China's geo-biotechnology service market, AE&E has launched over 97 survey projects both on- and offshore and has gained increasing industry recognition and approval. With over 12 years of industry experience and a multi-disciplinary team of Geology, Geophysics, Geochemistry and Geomicrobiology, AE&E is confident that it can support your exploration efforts.