Date: 15-November-2017

RE: Apex Spectral - ADF® DHI Dispersion Imaging Offshore Guyana

To whom it may concern,

Over the past year and a half Apex Spectral Technology has performed a series of projects for us using both 2D and 3D seismic data offshore Guyana Deepwater. JHI holds a 40% working interest in the Canje Block which is adjacent and immediately down slope from what is now recognized as the prolific Stabroek Block in the Guyana basin. Exxon has now announced over 2 billion barrels of reserves in Stabroek and is moving quickly to develop Liza and several other discoveries into production by 2020.

Following the Exxon Liza discovery in 2015, we tested the ADF® process on a single 2D seismic line that directly ties the well. Although the Apex dispersion imaging technology only uses seismic data as input (i.e. well logs are not used), the ADF® DHI process impressively imaged the Liza discovery which was corroborated by the AVO analysis of this same data. Subsequently in 2016, Exxon drilled a second and separate AVO anomaly known as the Skipjack well testing a new trend approximately 30 km west of Liza. This attempt resulted in a dry hole with nominal hydrocarbon saturation. After the location and result of the Skipjack well was known, we followed with ADF® processing on the single 2D line that ties that well. Interestingly, the ADF® mapped no dispersion anomaly at the well location and in the sense of a post mortem, clearly predicted a dry hole.   Next, to get ahead of the drill bit and convince ourselves of our ability to make a pre-drill prediction, three months before Turbot spud, we had Apex process a 2D line that comes nearest to the location we thought Exxon would drill as their Turbot prospect. While the line does not directly tie the well, we mapped several large ADF® dispersion anomalies that easily could have tied into the well location. Impressively, the ADF® DHI results correctly indicated the Turbot well would be a major discovery which was announced by Exxon in November 2017. Turbot is currently scheduled for additional appraisal in Q-1 of 2018.

In addition to the 2D seismic projects over these recent wells in the adjacent Exxon Stabroek block, Apex has now completed ADF® processing covering our entire 6,021 Km^2 Canje Block 3D. In the now proven and prolific Upper Cretaceous/Maastrichtian play, calibrated AVO

seems to be working well for the Stabroek partners to look for Liza look alike prospects.   While AVO and ADF® both highlight multiple hub size anomalies within the Maastrichtian interval, ADF® images these anomalies with much more discrete plan view resolution. This has become a key factor in seeing the up dip pinch out traps on individual sand channels that are very subtle in the low dip environment on the basin floor in the Canje Block. Detailed prospect mapping using ADF® also reveals potential sweet spots within the sand channel systems that may represent better overall sand quality and deliverability that is key to commercial success in the deep-water setting.

As the exploration process proceeds, it has been our observation in the Canje Block that due to compaction and decreasing offsets, the AVO characteristics dramatically change in the deeper sand prone sequences found below the Maastrichtian. More easily observed Type III AVO anomalies give way to much more difficult to map Type II and Type IV responses which are derived solely from the reflection amplitudes.   Mapping both the AVO and the ADF® on the 3D gives an excellent corroboration to AVO results observed in the Canje Block in the well-behaved Maastrichtian intervals, but we are finding that since the Apex techniques are independent of amplitude and analyze frequency changes, the ADF® has now become a critical tool for direct detection of hydrocarbons in the deeper targets of the Turonian, Cenomanian, Albian and Neocomian rocks where the AVO results are subtle to non-existent. While these deeper targets have not yet been drilled, our mapping of the ADF® indicates that many new hub class targets will be developed in this basin—both in the Maastrichtian and deeper reservoirs.

Having a tool that appears to have correctly predicted Liza, Skipjack and Turbot, and effectively images our deeper potential of world-class reservoirs materially leverages the value of our asset.

Richard G. "Dick" Boyce

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