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NEW SEISMIC TECHNOLOGY IN ACQUISITION & PROCESSING RE-OPENS AREAS FOR PRE-TERTIARY EXPLORATION IN EASTERN INDONESIA

Some basins, which have seen substantial exploration but yielded no discoveries, may be worth a second look due to advances in seismic technology made since those exploration programs were initially performed. In some cases the lack of commercial discovery may be due to a focus on tertiary plays leaving the pre-tertiary strata unexamined. Exploration may have been limited to tertiary aged plays due to the inability to properly image potential pre-tertiary plays at depth.

Long offset marine seismic acquisition was developed as exploration moved into deeper water. These offsets were required to image beneath 2000m of water while existing maximum offset was only ~3000m. These developments have proved most useful in re-evaluating shallow water areas as well. These long offsets provide sampling of deeper data which was not possible when maximum offsets were less than 3000m. Due to complex geological structures offsets greater than their depth may be required.

Even though longer offsets became available to sample deeper data, existing conventional technology limited our ability to preserve these offsets while processing it. Much of this longer data would have been stretched during normal moveout (NMO) and subsequently muted before stacking. The ability to use a full Kirchhoff algorithm in pre-stack time migration (PrSTM), or UTMOST™, has eliminated the approximations made in NMO which resulted in severe stretching on longer offsets.

While the Kirchhoff algorithm is capable of improving earlier vintages (e.g. shorter offsets) of data, if the required offsets are lacking, the improvement will be limited. Only the combination of new data acquired with longer offsets and Kirchhoff PrSTM applied in processing may offer adequate seismic imaging in some basins that have been previously explored with no success. Imaging the deeper strata has changed the geological models of some areas dramatically, especially in terms of pre-tertiary potential (Mesozoic or Paleozoic)

The Akimeugah Basin along the south coast of Irian Jaya is a good example of such a basin. Exploration began in the early 1970's and continued into the mid-1980's. None of the six wells drilled through that time yielded a commercial discovery. Only two penetrated pre-tertiary zones. The areas were subsequently relinquished and forgotten.

In the 1990s, large gas discoveries were made beneath Bintuni Bay in Mesozoic reservoirs. This area had seen early success in tertiary reservoirs but the hydrocarbons (retrograde condensate) were of pre-tertiary origin. Attempts to locate further hydrocarbons in pre-tertiary reservoirs were disappointing, mainly due to fundamental imaging problems beneath limestone. That early pre-tertiary success though gave oil exploration companies confidence in attempting older plays. The



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source of these Mesozoic discoveries may actually be of Paleozoic origin which could have analogues in the Akimeugah. Such analogues may now be interpretable due to new seismic data acquired and processed using technology unavailable during earlier exploration