

Application of Alternative Correlation Techniques (Chemostratigraphy) in the Terra Nova Field, Offshore Newfoundland and Labrador, Canada

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The Terra Nova Field has produced almost 180 MM Bbls since January 2002 and has been under gas and waterflood depletion schemes that have involved the drilling and completion of over 30 deviated subsea wells targeting the Late Jurassic Jeanne d'Arc Formation. Despite comprehensive data acquisition from wells that are designed and planned from a recently processed 3-D seismic volume, the present depth (~-3200m SS), post-depositional faulting, and nature of the braided fluvial setting has presented challenges in predicting and characterizing reservoir sand fairway extent. Integration of production and injection history has shown that various means of static data that are used for correlation can be equivocal, given the lack of an appropriate Field-wide datum.

To augment or complement the seismic, sequence, traditional lithostratigraphic, and biostratigraphic approaches used in mapping, the Operator has examined ditch cuttings of several wells using major and trace element geochemistry. The use of these data has been both regional in nature (i.e., to determine whether there are different areas of reservoir rock provenance and fault block-specific (to determine if shale beds between wells are correlative).

Several examples of how chemostratigraphy can: (a) identify otherwise undetectable surfaces such as a Nb-rich marker that may be a reliable datum; (b) validate the unconformable contact with basement (Rankin Formation); and, (c) provide for a "fingerprint" of particular claystones that can be used for local inter well correlations will be shown.

As with any measurement, the judgmental and methodological integration of the results with other disciplines (i.e., petrography, heavy mineral studies) is still evolving; further analysis and appreciation of the geologic controls on the geochemical variations may require more sampling of other wells within the Jeanne d'Arc basin.