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MLA-SEM analysis of well cuttings – a new tool for inter and intra-well correlations

D.H.C. Wilton, Earth Sciences, Memorial University, A1B 3X5 dwilton@mun.ca

D. Norris, Nalcor Energy

Cuttings material, mainly sandstone material, was analysed by the Mineral Liberation Analysis-Scanning Electron Microscope (MLA-SEM) technique from seven legacy wells offshore Labrador (176 samples), two offshore Northeast Newfoundland (48 samples) wells, and one offshore Grand Banks well (12 samples). The MLA-SEM consists of a fast SEM and associated MLA software which allows for the quantitative mapping of mineral phases in a given sample.

The fundamental results from the project were documentation of groups of samples within a given well with such similar mineralogical (and physical) characteristics that Mineralogical Associations (MAs) could be defined over a specific interval. An MA is essentially a group of samples with a matrix of common mineral compositions which uniquely define the interval from which they were derived. Whether these MA intervals represent definable lithological units that can be correlated between wells requires more work.

The MLA-SEM data also indicated that samples from a unit logged as the Snorri Member, Bjarni Formation, in all offshore Labrador wells from this study (except Gilbert F-53) are mineralogically dissimilar. The groups of “Snorri” samples from each well, however, are generally similar and correlative. The mineralogies are so unlike between the wells, that it appears the sandstones sampled in the wells were either not from the same unit, or there are significant facies variations across the Labrador basins. With more detailed sampling, cross well correlations might be possible for this unit.

The MLA-SEM mineralogical data derived from the Snorri Member samples also allowed for comparison of three important parameters from the sample material in each well. Including: (1) differences in source(s) of the constituent detrital material, (2) variations in depositional environments (e.g., redox conditions), and (3) contrasts in carbonate cement composition which may in part be linked to diagenetic reactions and pore fluid compositions.

MLA-SEM analyses can provide accurate and quantitative analyses of mineral grains in offshore well cuttings. Such automation removes any inherent biases associated with human observation of the material.