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QEMSCAN Analysis of the McMurray Formation, Telephone Lake Asset, Northeastern Alberta, Canada

Mark L. Caplan[1], Jonah Resnick[1], Matthew Power[2], Marc Enter[2]
[1]Cenovus Energy Inc.
[2]SGS Canada Inc.

Much research has been conducted on the sedimentology and stratigraphy of the McMurray Formation, but very little published work focuses on inorganic geochemical and mineralogical evaluation of these reservoir sands. Mineralogy can provide valuable supportive information for sedimentological and provenance studies. This data can be used to: 1) determine mineral composition of reservoir sands; 2) aid with correlation of genetically-related sand packages in high net-to-gross regimes (i.e. chemostratigraphic approach); and 3) provide valuable provenance information of the reservoir sand.

The Telephone Lake oil sands asset is one of Cenovus's future growth opportunities. Detailed sedimentological and stratigraphic analyses conducted on the McMurray reservoir indicate that:

- The asset was deposited in an eastern-sourced tributary to the Main McMurray Fairway;
- The reservoir is characterized by a high net-to-gross character and is very thick;
- Main reservoir comprises vertically and laterally amalgamated tidally-influenced meandering channel point bar deposits; and
- Reservoir sands span the lower and middle McMurray members.

Textural and mineralogical evaluation of the McMurray Formation from three wells and 53 samples selected from both sand-rich and mud-rich facies, has revealed a greater understanding of the sand connectivity and provenance. The QEMSCAN technique was used to qualitatively and quantitatively evaluate the lithofacies and recognize geochemically-distinct packages of sediment. Quantitative Evaluation of Minerals by Scanning Electron Microscopy (QEMSCAN) is a Scanning Electron Microscopy-Energy Dispersive X-ray Spectrometry (SEM-EDS) technique run on a polished, epoxy-mounted sample, that provides information on mineralogy and texture. Quantitative analyses were conducted on samples from lower and middle McMurray members, various facies and channel belt sand bodies. Vertical mineral profiles were generated for each well and correlated in a cross-section. Mineral cross-plots and radar plots were generated to identify relationships between different mineral phases within different facies, members and wells. Results of this work will be discussed in this presentation and causes of mineralogical variability will be addressed. The results of this study improve our understanding of reservoir architecture, degree of geobody connectivity and provide an assessment of the diagenetic potential of the reservoir exposed to SAGD steam chamber conditions.