WED, SEPT 24; PM SESSION
EAST BAY

Preliminary Lithofacies Interpretation from Formation Micro -Imager (FMI) Logs in the Kinder Morgan Katz Field Unit, North Central Texas

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Kinder Morgan's Katz Oil Field miscible CO_2 flood (Katz Strawn Unit; KSU) is located on the eastern shelf of the Permian Basin and covers portions of northeastern Stonewall, King, Knox, and Haskell counties of northcentral Texas.

Three cores from the Pennsylvanian Strawn Formation in the Katz field and one core from the adjacent Orsborne Field were logged with particular attention given to identifying lithofacies.

Fourteen image logs of varying vintages within the field have recently been analyzed to correlate lithofacies seen in the core and to document new and similar lithofacies above and below core depth coverage.

Direct comparisons between physical core and image logs are available in the field within the same borehole. This primary calibration of core data to image log was used to produce a borehole image lithofacies catalog for the Katz Field Unit (lithofacies A through L). Secondary calibration points also provided correlative information (i.e., cores and image logs with data points separated by < 200 ft). Wireline log data was also incorporated for assisting in lithofacies determination including: spectral gamma ray, compensated neutron-lithodensity, resistivity, microlog, pe, and calculated lithology curves.

Previous core lithofacies analysis detailed six major (primarily) siliciclastic lithofacies including: 1) lenticular- to wavy-bedded mudstone, 2) flaser- to wavy-bedded sandstone, 3) carbonate-rich sandstone, 4) ripple-laminated to trough-cross-stratified sandstone with convolute bedding common, 5) trough cross-stratified sandstone with abundant mud rip-up clasts, mud balls, and siderite nodules, and 6) heavily bioturbated sandstone. These lithofacies were also identified in image logs. Resolution differences between the core and image logs, however, led to the grouping of some core lithofacies in the Katz Field Unit image catalog based on sedimentary features generated in similar depositional environments.

For example, lenticular- to wavy-bedded mudstone and flaser- to wavy-bedded sandstone have been combined into Facies C) flaser- to lenticular- to wavy-bedded sandstone and mudstone. Ripple-laminated to trough cross-stratified sandstone with convoluted bedding common and ripple-laminated to trough cross-stratified sandstone have been combined into Facies E) ripple- laminated to trough cross -stratified sanstone.

Combined lithofacies identified in core and image logs beyond core coverage include the following: A) mudstone to bioturbated mudstone, B) parallel laminated to bioturbated sandstone to shaley sandstone, C) flaser- to lenticular- to wavy-bedded sandstone and mudstone, D) heavily bioturbated sandstone, E) ripple-laminated to trough cross-stratified sandstone, F) ripple-laminated to herringbone cross-stratified sandstone, G) cross-bedded sandstone, H) interbedded sandstone and limestone, I) wavy- to parallel-bedded limestone, J) cross-bedded limestone, K) nodular-brecciated limestone, and L) interbedded limestone and shale.

Accessories commonly associated with lithofacies in both core and FMI include: bioturbation, carbonate bioclasts, carbonate breccias, carbonate cement, plant debris, siderite nodules, slumps and contorted bedding, micro-faults, mud balls, and mud rip-up clasts.

Although ichnofacies play a significant role in the Katz Field Unit, discerning exact ichnogenera within the resolution of the image logs with the exception of a few well-defined examples of *Asterosoma* and *Ophiomorpha* is difficult.

Core and image log lithofacies associations suggest that paleoenvironments of the Katz Field Unit included a bayhead delta, back-barrier estuary embayment, carbonate-rich flood-tidal delta, tidal flat, and upper to middle shoreface.

The integration and interpretation of the Katz Field Unit core data and image log lithofacies help to guide the propagation of lithofacies to a larger area within the unit leading to a clearer understanding of the distribution of lithofacies between wells both horizontally and vertically at depth. This assists in the identification and correlation of lithofacies geometries supporting our current conceptual resevoir model and the identification of potential pay and flow barriers without investing in an extensive coring campaign.