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New Reserves in an Old Field, the Niobrara / Codell Resource Plays in the Wattenberg Field, Denver Basin, Colorado

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ABSTRACT

The Niobrara is one of seven horizons that are productive in the giant Wattenberg Field area (GWA) of Colorado. GWA covers approximately 3200 square miles. The field was discovered in 1970 (J Sandstone) and first Niobrara production was established in 1975 from vertical completions. Horizontal Niobrara drilling began in the field in 2009.

Wattenberg straddles the Denver Basin synclinal axis and is regarded as a basin-center (continuous) petroleum accumulation. The Niobrara is overpressured and drilling depths are 6500 to 7000 ft. The Wattenberg area is a “hot spot” or positive geothermal anomaly. Geothermal gradients range from 16 – 18°F/1000 ft on the edges of the field to about 28 to 29°F/1000ft in high gas-oil ratio areas.

The Niobrara consists of four limestone (chalk) units and three intervening marl intervals. The lower limestone is named the Fort Hays Member and the overlying units are grouped together as the Smoky Hill Member. The chalk units are referred to in descending order as the A, B, C, and Fort Hays. Erosional unconformities exist at the top and base of the Niobrara. The upper unconformity removes the upper chalk bed in some areas of the Wattenberg Field. The A, B, and C chalks are the current focus of horizontal drilling by operators in the field. Recent completions have also targeted the basal Fort Hays Member and the underlying Codell Sandstone.

Recent horizontal completions (2009-P) have initial production of approximately 100 to 700 BOPD with a GOR of 500 to 3000 cu ft per barrel. Estimated ultimate recovery per well is greater than 300,000 BOE. The Wattenberg area has a resource estimate from the Niobrara of 3-4 billion barrels equivalent. The combined technologies of horizontal drilling and multistage fracture stimulation have brought significant new life into this 50 year old field.