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An Update on the U.S. Geological Survey's Assessment of Undiscovered Continuous Resources in the Midland and Delaware Basins of the Permian Basin Province of Texas and New Mexico

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The U.S. Geological Survey (USGS) is assessing undiscovered, technically recoverable continuous oil and gas resources in the Midland and Delaware Basins of the Permian Basin Province of west Texas and southeast New Mexico. The USGS has completed the assessment of continuous oil in the Wolfcamp shale and the Spraberry Formation of the Midland Basin. The Wolfcamp shale was divided into six continuous assessment units (AU), and the Spraberry Formation was divided into two continuous AUs and one conventional AU based on geologic and production data. The estimated mean resource is 20 billion barrels of oil (BBO) in the Wolfcamp shale and 4 BBO in the Spraberry Formation, making this assessment the largest continuous oil assessment the USGS has completed to date.

The current focus of the USGS Permian Basin Province assessment has shifted to the Delaware Basin, where continuous oil and gas resources in the Wolfcamp shale and the overlying Bone Spring Formation (including the Avalon shale) are being assessed. For decades, vertical wells that primarily target the Wolfcamp shale and Bone Spring Formation have comingled production as part of the "Wolfbone" play. Recent horizontal drilling has focused on targeting individual oil or gas saturated intervals in the Wolfcamp shale and Bone Spring Formation. Key issues being addressed as part of this assessment include determining thermal maturity trends in the Wolfcamp shale and Bone Spring Formation throughout the basin, evaluating landing zones in horizontal wells for production extent and

estimated ultimate recovery calculations, and defining AU boundaries for these units based on geologic data.