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Abstract

The Strategic Petroleum Reserve (SPR) Bryan Mound site has a history of well deformation in the caprock, most notably around the 700 to 900 ft (213 to 274 m) depth range. This deformation appears to be caused by casing compression which is most commonly observed at casing collars. In a typical well collar joint, a small increase in inner diameter is observed at the threaded casing connection. Collar compression is characterized by a decrease in the well inner diameter resulting in a restriction at the collar. This is likely the result of one section of casing being pushed inside an adjacent casing section at the collar joint.

A review of Multi-Arm Caliper (MAC) logs for each well at the Bryan Mound site has been conducted, with a focus on identifying wells that experience collar restrictions and characterizing the resulting deformation. Collar restrictions have been identified in 24 of the 47 Bryan Mound wells. An analysis of additional relevant datasets follows the well-by-well MAC analysis. This includes a spatial analysis of the deformation locations, well temperature logging data, pulsed eddy current (PEC) logs, and proximity of SPR Bryan Mound wells to historic sulfur mining wells.

Wells at Bryan Mound experiencing collar restrictions have been identified, in addition to wells that have mid-casing concerns within the areas of interest. All collar restrictions that have been identified at the Bryan Mound site have been found within the caprock. There is a history of sulfur mining within the caprock, which has undoubtedly left lasting impacts on the geology of the Bryan Mound dome in the areas in which mining took place. Elevated temperatures in the caprock, resulting from sulfur mining, are still present today. At this time, it appears that differences in the presence of collar restrictions between wells are likely the result of individual well responses to localized variations in the Bryan Mound geology.

Key words: Caverns for Liquid Storage, Corrosion, U.S. Strategic Petroleum Reserve, Well Casing, Well Integrity, Well Logging