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Paper No. 92-3
Presentation Time: 8:35 AM

CARBON DIOXIDE AND HELIUM GASES IN NEW MEXICO: DISTRIBUTION AND RELATION TO OTHER GASES IN THE RESERVOIR (Invited Presentation)

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Carbon dioxide is a common component of natural gases. In most gases CO_2 is less than 1%, with either hydrocarbons or N_2 being the dominant components. In other less common gases, CO_2 is dominant and may constitute more than 99% of the gas. The major CO_2 reservoir in New Mexico is the Bravo Dome field in the northeast part of the state. This giant field with more than 10 TCF original reserves is formed by a combination structural-stratigraphic trap in the Yeso Fm. (Lower Permian) and has produced 3.5 TCF CO_2. Gases that are mostly CO_2 are also present in the Las Vegas and Raton Basins of north-central New Mexico and under Chupadera Mesa and in the Estancia Basin of central New Mexico and have also been encountered by exploratory wells drilled in west-central New Mexico. The main source of CO_2 appears to have been degassing of Tertiary-age magmas.

Commercial production of helium in New Mexico has been from 8 small oil and gas fields on the Four Corners Platform of northwest New Mexico. Almost 1 BCF He have been produced from reservoirs of Permian, Pennsylvanian, Mississippian and Devonian age. In southeast New Mexico gases with enhanced He content have been produced from Lower Permian Abo red beds with He content increasing in proximity to northeast trending strike-slip faults. Gases with enhanced He content have been encountered in Lower Permian strata under Chupadera Mesa in central New Mexico and in Pennsylvanian strata in the Tucumcari Basin. Although most He in crustal reservoirs has probably been generated by radioactive decay of uranium in granitic rocks, isotopic analysis of Chupadera Mesa He indicates that a portion of the He was derived from juvenile sources in the mantle.

There is an inverse correlation between He content of gases and CO_2 content and hydrocarbon gas content. Most gases with CO_2 more than 5% have He less than 1%. All gases with CO_2 more than 20% have He less than 1%. He content also decreases with increasing BTU value of the gas, a proxy for hydrocarbon content. All gases with heating values more than 1000 BTU/ft^3 have He substantially less than 1%. He increases with N_2 content, an indication of incomplete charge of reservoirs with either hydrocarbons or with CO_2. CO_2 and hydrocarbons appear to dilute the He that has migrated into the reservoirs from either granitic basement or via deep-seated faults that penetrate to the mantle.

Handouts
Broadhead Helium CO2 talk #283632.pptx (5.0 MB)

Session No. 92

T15. Geology and Geochemistry of Carbon Dioxide, Helium, and Other Low-BTU Natural Gas Systems
Monday, 26 September 2016: 8:00 AM-12:00 PM

Room 506 (Colorado Convention Center)

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