geoconvention
Calgary • Canada • May 11-13 2026

The Holbrook Basin – Mega Helium Source or Teaser Play

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Summary (The Holbrook Basin located in east-central Arizona and very central-western edge of New Mexico lies on the southeastern edge of the Colorado Plateau. The eastern half of the Colorado Plateau is rich in helium and has been historically the focus for exploration and exploitation of the element. There are five helium producing fields, three of which have produced helium since1961 to the present day, and they are the St. Johns, Pinto Dome, Mustang Dome, Navajos Springs, and Navajo Springs East. These fields produce helium from anticlines, or a complex series of horst and graben structures at less than 1,600 ft. The main helium producing reservoir at the Pinta-Mustang-Navajo fields is the Permian age Coconino age fluvial sandstone. The St. John's Field produces from Supai Fm arkosic sandstones and fractured Precambrian basement. Additional reservoirs that have helium potential are the Triassic age Shinarump sandstone and the Permian age Ft. Apache and Big A Butte sandstones. The Pinto-Mustang-Navajo fields are presently undergoing recompletion and additional drilling of ten development wells. The St. Johns Field lies on the southeastern edge of the Holbrook Basin and has 33 TCF of carbon dioxide in place with 1% helium. The St. Johns Field started producing helium in 2024. A year later the helium percentage had significantly declined causing the field to be shut in. From 2020 to 2023 the basin underwent extensive exploration by a number of companies drilled several wells with some flowing over 2 MMCFGPD with 2% or more helium. Many of these wells did not sustain their flow rates. One operator requested permission from the State of Arizona to fracture stimulate various wells but was denied. The fluvial Coconino and Shinarump sandstone reservoirs have variable clay content, variable grain size and discontinuous reservoirs. Since 2024 exploration the activity has stopped. The basin is rich in helium. But several impediments are present such as 1) no hydrocarbons present to reduce power costs, 2) lack of infrastructure, 3) potential of damaging portable groundwater by using fracture stimulations. 4) negative regulatory environment and 5) general production issues. Some of these issues can be resolved by 1) having more experience petroleum operators involved, 2) educating the regulators and landowners, and 3) shooting 3D seismic to delineate the reservoirs and structural controls more effectively.

Theory / Method / Workflow

Results, Observations, Conclusions

Novel/Additive Information

Acknowledgements