

Helium Extraction in Arizona – Aquifer Protection Permit – December 2018

History

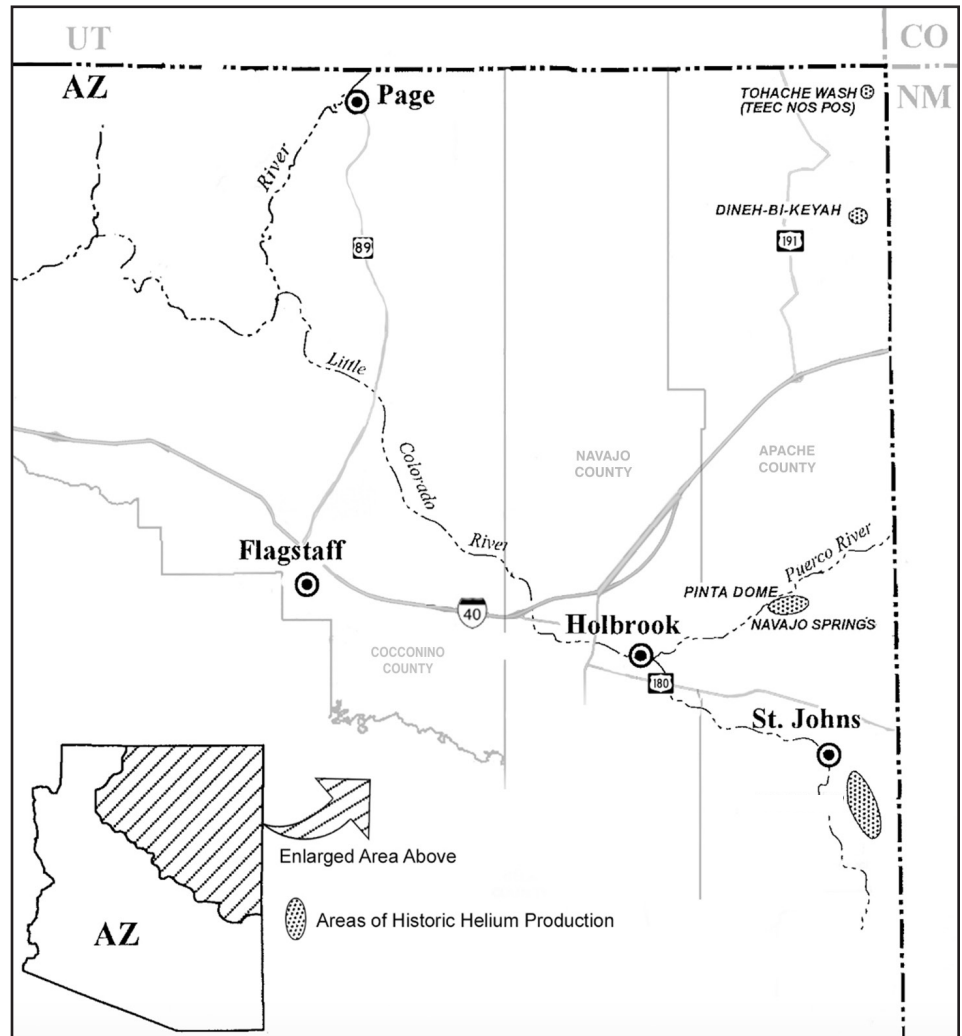
Helium gas extraction in northeastern Arizona originally started in the late 1950s and continued into the early 1970s until stopped because of reservoir depletion and/or lower market prices. Recently, there has been renewed interest in exploring for additional helium reserves in the state. Known economic helium deposits have been located in the Holbrook Basin and Four Corners area.

The Holbrook Basin has never produced commercial quantities of hydrocarbons (petroleum or natural gas). Trapped gases in the areas known for helium extraction are approximately 92% nitrogen and 8% helium. These gases are inert and non-flammable.

When is an ADEQ permit necessary?

ADEQ issues an Aquifer Protection Permit (APP) to protect Arizona’s aquifers for their use as drinking water supplies. Some helium extraction requires well stimulation that could potentially discharge into an aquifer; this requires an APP. Well stimulation is a process where fluids are injected into a well with the objective of increasing the flow of an underground helium reservoir for extraction. Currently, very few extractions need or use this process. In some areas, the porosity of the underlying geology allows for gas production without well stimulation; this wouldn’t require an APP.

There are two main types of stimulation activities that are permitted in Arizona, as described to the right. Stimulations vary in size and duration depending on the type, and there is an effort to extract as much of the fluids as possible. State laws prohibit the unpermitted discharge of any recovered fluids back into wells or ground. Each permit application is reviewed on a case-by-case basis.



Types of Stimulation Currently Permitted in Arizona

Acid stimulation

- Acid solution is used to “etch” channels in the rock to dissolve fine materials that impede gas flow.
- Stimulation activities can vary from 30 minutes to several hours.

Proppant stimulation

- A mixture of mostly sand and water is pumped at a high enough rate and pressure to fracture and prop open the nearby rock. This process is also known as hydraulic fracturing.
- Stimulation activities are generally 45 to 60 minutes in duration using approximately 21,500 gallons of water.

Each permitted well requires ADEQ authorization prior to any stimulation activities taking place. The Operator needs to be specific about where they propose stimulation, what stimulation activity they are using and when they are doing so. After well stimulation, the Operator is also required to report how much pressure, rate and fluids were used to the Arizona Oil and Gas Conservation Commission (AOGCC).

If and when helium extraction is complete, written notice of well closure is required and all closure conditions of the APP must be met. In addition, the Operator is required to post a bond sufficient to cover the costs of closure with the State, of which the value is periodically reviewed and adjusted as needed.

ADEQ periodically inspects permitted operations to ensure compliance.

How does this differ from oil and natural gas extraction?

Helium well stimulation in Arizona differs greatly in scale from oil and natural gas extraction in other areas of the country (See Table 1).

Applicable regulatory programs and roles

All wells drilled for any type of oil, natural gas and/or helium exploration and extraction on private or state-owned land in Arizona must be approved through the AOGCC.

All wells drilled for oil, natural gas and/or helium exploration and extraction on Bureau of Land Management (BLM) managed lands, both surface lands and/or federal subsurface mineral estate, must be approved through the BLM.

Any wells that require injection, including stimulation, require an APP from ADEQ, in addition to approval through the AOGCC or the BLM, depending on land ownership.

Table 1: Example of Typical Measurements for Well Stimulation Processes

	Oil or Natural Gas Extraction	Helium Extraction in Arizona*	Point of Comparison
Depth of Wells	5,000 to 15,000 ft.	750 to 950 ft.	The Coconino Aquifer is over 950 feet deep in the area where the current APP is issued, which does not allow drilling or injection into the aquifer
Stimulation Pressure used	10,000+ psi	250 to 975 psi	Household power washers generally range from 1500 to 3000 psi
Liquid Quantity Used	2,000,000+ gallons per well	4300 to 21,500 gallons per well	Residential swimming pools generally hold 10,000 to 30,000 gallons of water

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*Approximations based on the only current APP related to helium extraction and issued to Ranger Development LLC

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