TECHNICAL MEMORANDUM

TO: Douglas Minter, UIC Section Chief

FROM: Craig Boomgaard, Geologist, EPA Region 8 UIC Program

DATE: March 31, 2020

SUBJECT: Technical Basis for Addressing MHA Nation Ground Water Concerns: UIC Permit ND22389-11621, McKenzie Federal 35-1 Disposal Injection Well

In light of the Mandan, Hidatsa and Arikara Nation's (MHA Nation or Tribe) ground water-related concerns that the well's injected fluids would migrate under tribal trust lands, the EPA has prepared this document describing its technical evaluation to address these concerns.

Modeling Results

The EPA evaluated the August 15, 2017 analysis by Bureau of Land Management's (BLM) Branch of Fluid Minerals in the Montana/Dakotas State Office entitled "Reconnaissance Study of the Potential Area and Radius of Influence from Saltwater Disposal Wells Within and Near the Fort Berthold Indian Reservation, North Dakota." model, to determine the influence of subsurface hydrogeological factors that may inform the distance that injection fluid travels in the subsurface, as requested by the tribe in their comments. Using the BLM's model and adding injection volumes since the model was run, the EPA determined that the radius of fluid emplacement increased an additional thirteen (13) feet in the last thirty (30) months (see below). The McKenzie Federal 35-1 only receives fluids from the adjacent Zahnow Federal 42-35 well which has produced relatively minimal volumes of brine for disposal into the McKenzie Federal 35-1 on an intermittent basis since injection commenced in 2006. The BLM model uses a more conservative approach by limiting the aquifer thickness specifically to the existing injection perforation interval which consequently increases the radius of fluid emplacement by an order of magnitude.

The distance to ground water underlying tribal trust lands is approximately 950 feet from the McKenzie Federal 35-1 injection well. Over approximately the last thirty (30) months [October 2016 to March 2019] since the BLM's analysis, an additional 43,000 barrels was injected. After adding this injected volume into the BLM's calculations, the EPA has determined that the radial distance of the injected fluid has increased from 109 feet to 122 feet from the Mackenzie Federal 35-1 well as of March 2019, around the same time this well ceased intermittent injection. Additionally, based on this model, it would take 167 years and a total volume of 3,082,922 barrels of injected brine to travel 950 feet assuming injection into this well continued at the rate it has historically.

Conclusion

Based on these calculations and the history of relatively low injection volumes, the EPA has determined it unlikely for injected fluids from the Mackenzie Federal 35-1 to ever migrate into ground water underlying tribal trust lands during the expected operational life of this well. In making this determination, it is important to note that the volume needed to further expand the radius of fluid emplacement increases significantly over time. The EPA will monitor injection volumes into this well on annual basis in light of the volume limit enforced in the Permit to protect ground water quality 950 feet from this well. The EPA will also require the Operator to obtain an aquifer exemption for this radial distance prior to authorizing continued injection under this Permit.