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Niobrara Water Use and Reuse

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Niobrara Water Use and Reuse

CONCLUSION

The four counties' issues overlap, yet each has a unique history providing insight into the importance of the Acequia Recognition Law and the acequias' need for stronger, more direct protection and representation in Colorado.

This Conference Note focuses on the panel discussion that related to the overall purpose of the Congreso. I would like to offer acknowledgement of Dr. Devon Pena, an acequia farmer on The San Luis People's Ditch and Professor of Anthropology at the University of Washington. Dr. Pena gave crucial testimony at the senate hearings for H.B. 09-1233, worked tirelessly with Sarah Parmar of Colorado Open Lands to create this first annual Congreso de Acequias, supported the Congreso with a grant made possible by The Acequia Institute, and strengthened the relationship between Colorado's acequias and the New Mexico Acequia Association.

Jonathan Culwell

**THE ROCKY MOUNTAIN ASSOCIATION OF GEOLOGISTS
HORIZONTAL DRILLING AND COMPLETION FALL SYMPOSIUM**

Denver, Colorado

October 23, 2012

NIORARA WATER USE AND REUSE

At the Horizontal Drilling and Completion Fall Symposium in Denver, John Jaffee, the Water Manager for Anadarko Petroleum Corporation's Rocky Mountain Region operations, gave a presentation on the Niobrara Wattenberg Field's water treatment plan. His presentation focused primarily on water use in shale play horizontal slickwater hydraulic fracturing ("fracing") and related water-sourcing challenges.

Jaffee began his presentation by explaining that the same general rules for drilling a vertical well apply to horizontal drilling, except that horizontal wells require more water and larger production casings. Each horizontal well operation requires a total of 48,000 to 120,000 barrels of water, as opposed to 2,400 to 24,000 barrels for each vertical well. Fracing injects highly pressurized frac fluid into the wellbore to create small cracks or fractures in the shale formation. These cracks release hydrocarbons such as oil or gas trapped within the formation. Water is the most effective frac solution solvent because it is inert. Approximately twenty percent of the total water injected into a formation returns to the surface as flowback. Multiple layers of cemented steel casings in the wellbore protect ground water from the migration of injected frac fluid, returned backflows, and hydrocarbons.

Jaffee next addressed water-sourcing issues in Colorado. "Slickwater" refers to fracing solution that contains surfactants, which decrease surface tension, thereby increasing the fracing rate into the formation. Slickwater fracing is a completely consumptive use of water because flowback is briny and contains too many frac fluid contaminants to return the water to the water cycle. In Colorado, different types of water sources implicate different laws, regulations, and water availability. Almost all surface water supplies in Colorado are over-

appropriated. Tributary wellwater withdrawals that affect an over-appropriated stream system require augmentation plans. Designated groundwater basins are rapidly depleting and the State is currently in a drought. For these reasons, while fresh water is preferred, Anadarko entered into a five-year water lease to obtain effluent water from a municipal waste treatment facility.

Jaffee then explained that water transportation issues are also very controversial. Onsite water storage systems are difficult to deliver and manage because each platform requires up to 900 truck trips for water delivery and waste removal. The public criticizes the fracing industry for the cumulative impacts of its noisy, high-volume, big truck traffic because it causes severe road damage, consumes excessive amounts of fuel, and increases carbon emissions. Winter weather only compounds these problems because iced-over roads complicate travel. Stored water freezes and expands, requiring complicated heating mechanisms. Accordingly, Anadarko is exploring alternatives to onsite storage.

Recently, Anadarko installed twenty miles of twenty-four-inch diameter high-density polyethylene pipe through the heart of its operations to deliver water directly to the Wattenberg Field. Anadarko's onsite gathering system supplies water at an effective fracing rate of sixty barrels per minute by employing a pressure-rated mine hose. This change significantly decreased truck traffic and water stored onsite. This system, however, still requires large vessels for post-fracing storage and requires enough horsepower to deliver the water at a sufficient fracing rate along the length of the entire system.

Anadarko is also investigating enclosed ferroceement storage systems. These modular containment units consist of grout walls built around gravel where the porosity of the grout holds the water in place. This method prevents the contaminated water from evaporating, is inexpensive, and has a sand filtration effect.

Jaffee summed up by noting in 2011, Anadarko recycled ninety-five percent of its total flowback water from the Wattenberg Field. Although Jaffe did not spend much of his presentation on water reuse or recycling, he discussed preventative measures Anadarko is taking and investigating to address current water issues in this industry.

Andrea Aguilera-Moreno