LANDMARK WATER STUDY REVISITED

BY DAN LARSON

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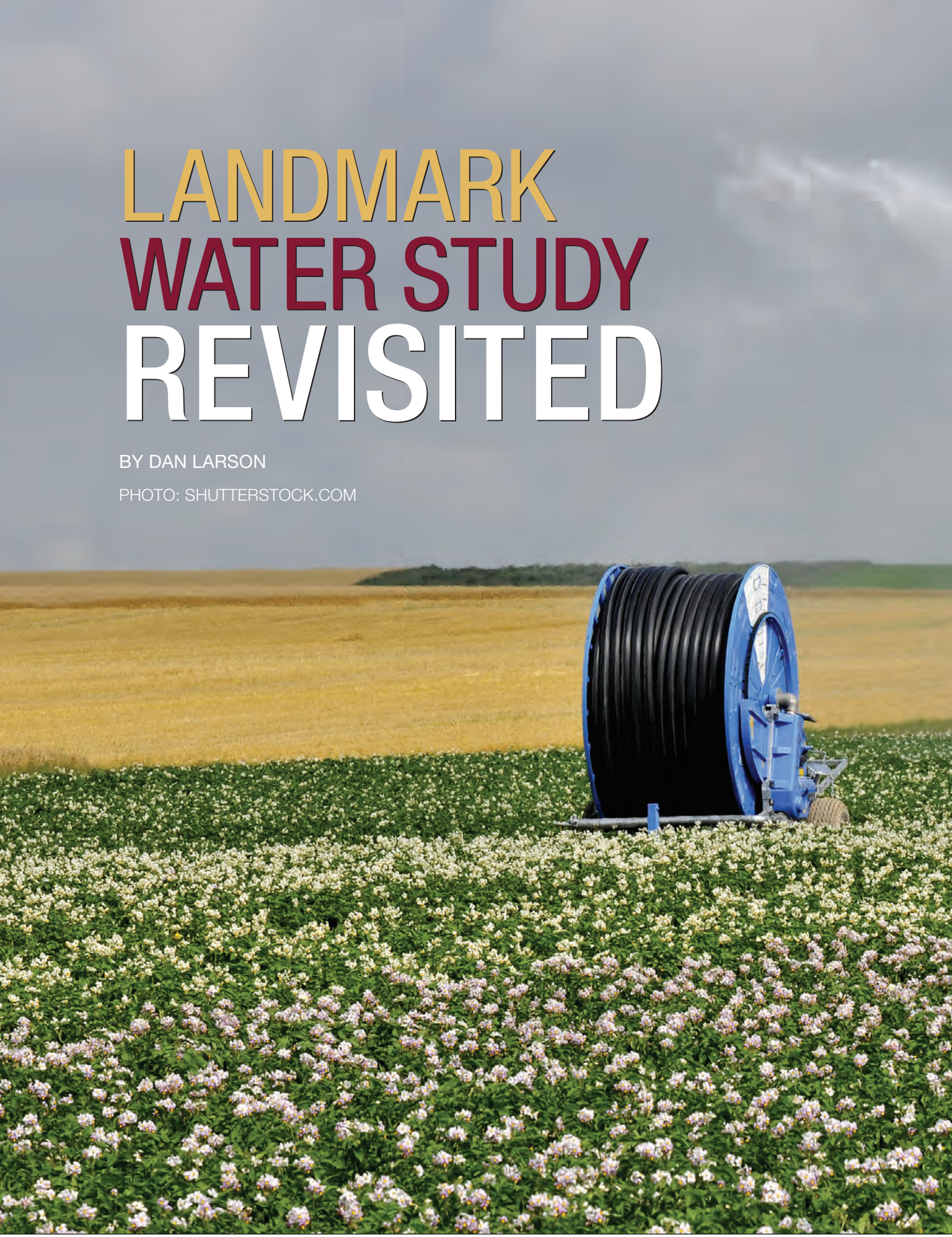

Joint project to update 2014 Texas produced water research will assess and reconcile state and federal regulatory frameworks to possibly include surface discharge for non-food crops

Realizing the promise that expanded reuse of treated produced water holds will require a concerted, sustained effort by the water management industry to validate its capabilities and to inform political leaders, regulators and the public of its safety and value, declared two industry executives.

One such effort is underway with a new, in-depth look at the costs, potential advantages and regulatory framework to facilitate and encourage greater reuse of treated produced water in Texas, a state often seen as a bellwether for rational state oil and gas policies.

The new study is a follow-on to a landmark 2014 white paper titled: "Sustainable Water Management in the Texas Oil and Gas Industry." That research was sponsored by the Atlantic Council's Energy and Environment Program and authored by Blythe Lyons and John Tintera.

The new report is co-sponsored by the Independent Petroleum Association of America and the Texas Alliance of Energy Producers. *Shale Play Water Management* discussed the project with executives of the two organizations on the opportunity that is already knocking to grow the use of treated produced water. Also discussed was the outlook for realistic state and federal oil and gas water policies.

"There are several very useful consequences of taking treated produced water and making it available to other users," said Lee Fuller, vice president at the Independent Petroleum Association of America.

"We have seen great strides made in the shale basins for taking produced water, treating it and reusing it for hydraulic fracturing. This is especially true in areas with aggressive drilling programs like the Permian where water is less available, and in the Marcellus where disposal is more expensive," Fuller observed. "We are now thinking of water as an asset rather than a byproduct."

EQUITY INTEREST

That way of thinking is being realized daily in Texas, said the head of one of the state's leading oil and gas trade associations.

"In most of Texas today, technology and infrastructure make it as easy to hire a company to take your produced water, recycle it and sell it to another operator, as it is to hire a bulldozer," said John Tintera, president of the Texas Alliance of Energy Producers.

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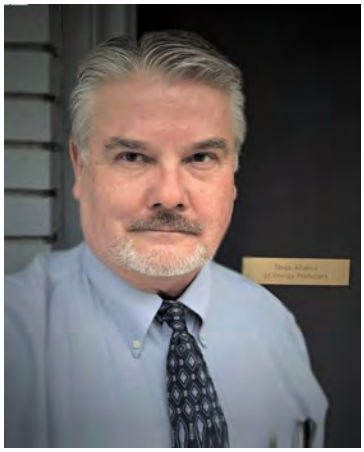


Water management services allow the oil and gas companies to focus on oil and gas. – **John Tintera, TAEP**

"Every day, we see examples of how companies are turning what was a waste product into an asset," he said.

Likewise, when a path is clearly marked for operators to apply proven, existing techniques to an available resource and the regulatory framework protects the environment without unnecessary bottlenecks, the capital needed to grow will follow, Tintera observed.

"Water midstream is a reality now," Tintera said. "We see private equity financiers express great interest in acquiring and investing in midstream companies in Texas."

"For their part, operators have expanded their portfolios. Many now offer full oilfield water services, from collection, transportation and treatment, to disposal," he said. "These services allow the oil and gas companies to focus on oil and gas and not have to become water management companies."

MARKING THE BOUNDARIES

The next step is to clearly define the boundaries of discussion. Produced water is not water as many think of it. Water, according to Dictionary dot com is "a transparent, odorless, tasteless liquid; a compound of hydrogen and oxygen, H_2O, freezing at 32°F and boiling at 212°F." Produced water, as the name suggests, is water that is produced with oil or natural gas from a well and contains oil and methane and a variety of other substances, ranging from salts and metals to organics. When it is treated, some or most of the other substances are removed so the water can be reused for another purpose, such as for frac fluid.

A key measurement of water quality is the level of total dissolved solids (TDS), indicating the combined total of organic and inorganic substances. According to The Berkey, a water filter manufacturer, TDS "includes anything present in water other than the pure H_20 molecules, primarily minerals, salts and organic matter."

In drinking water, the company states, total dissolved solids can come from natural water sources, sewage, urban run-off, industrial wastewater, water treatment process chemicals, and even the hardware or piping in public water distribution systems.

IPAA
INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA

More than a century of laws and regulations covering water rights and uses has resulted in a specific use for the term "beneficial" to define water that is used for a commercial purpose such as agriculture or industrial processes. As a result, treated produced water reused in the oilfield should not be referred to as reused for a beneficial purpose. Under Texas regulations, operators can treat produced water for reuse in the oilfield as a use by right, meaning no additional permitting is needed.

"Beneficial use is a loaded term and comes with different legal definitions in different states," Fuller said. "Even the EPA backed off use of the term in the Clean Water Act."

BABY STEPS

From a policy standpoint, the other caveat when discussing potential uses for treated produced water is to avoid suggesting that it could be cleaned up and offered as potable water fit for human consumption.

When discussing the issue with someone unfamiliar with water treatment technology, it invites trouble to advocate turning treated produced water into something that could possibly flow from a household tap.

"We have to avoid giving environmentalists and other opposition groups that kind of opening," Fuller noted.

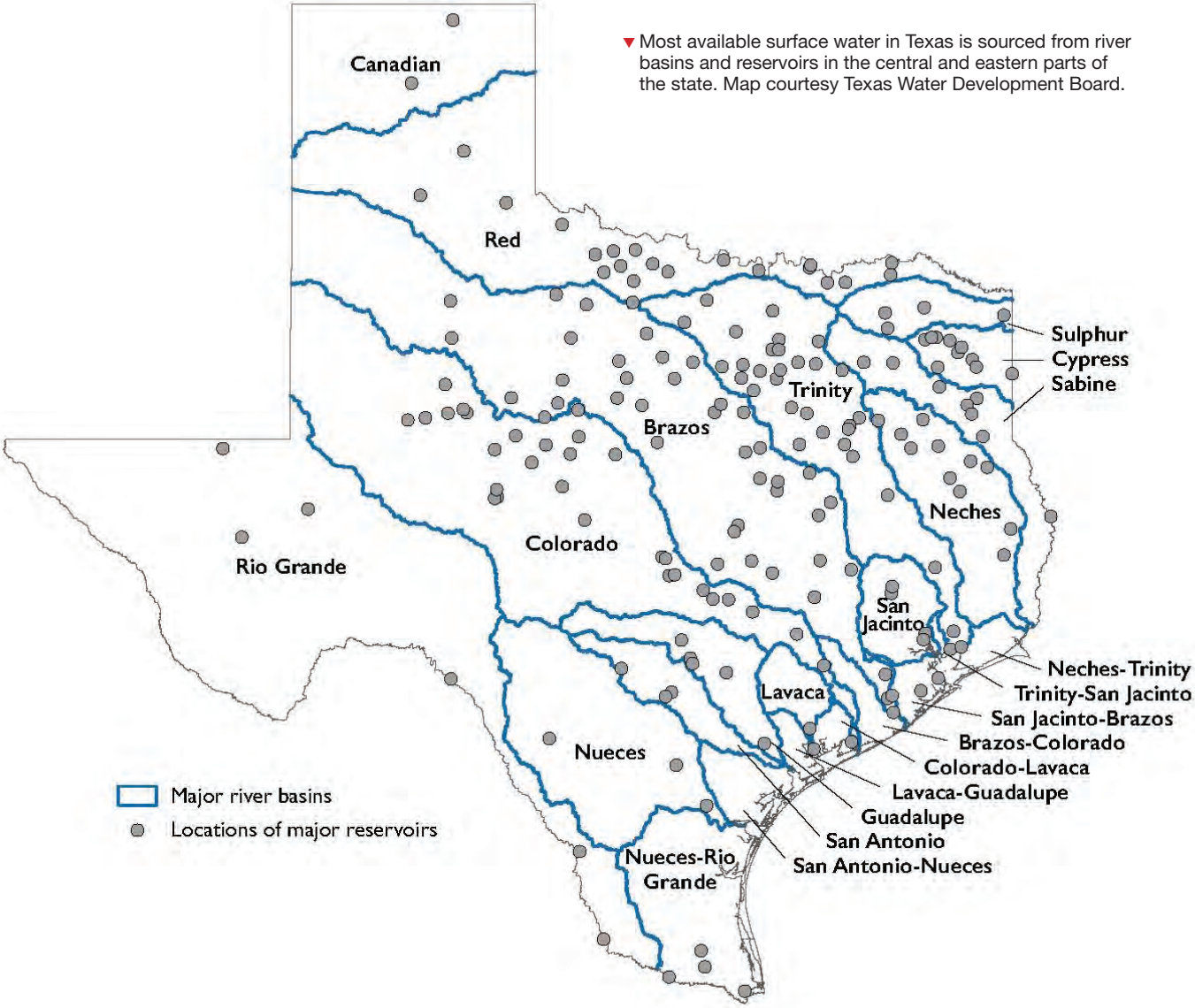
"Oilfield water policy issues have to stay on the side of non-food related reuses," Fuller said. "Suggesting that treated produced water could provide an alternate source for a non-food ag crop, such as cotton, does not trigger the same reaction as would drinking water, or a food crop like corn."

"We must take care that the debate can move forward without giving environmentalists a hammer to crush it at the outset. We are talking about baby steps," he suggested.

An example of the kneejerk reaction to reuse of treated produced water for anything other than well completions was seen in a Dec. 8 news story written by the non-profit Stateline and published in the *Washington Post*.

The story described comments made earlier by Ken McQueen, director of New Mexico's Department of Energy, Minerals and Natural Resources, who offered that a state program to incentivize reuse of treated produced water and flowback might "help make sure this industry continues to be alive and vibrant."

Among the tribal and environmental representatives quoted as resisting any such state program, Eleanor Bravo, head of Food & Water Watch in New Mexico, said, "we oppose even entertaining the idea of using this on crops."



▼ Most available surface water in Texas is sourced from river basins and reservoirs in the central and eastern parts of the state. Map courtesy Texas Water Development Board.

One of the best arguments for a modernized, sustainable regulatory framework is that treated produced water can significantly reduce demand on existing freshwater and treatable brackish water sources.

"Reusing treated produced water to make more freshwater available for potable supply is the most useful public consequence of reusing treated produced water," Fuller concluded.

SOURCING SWITCH

In the 2014 produced water report, freshwater is defined by the Texas Railroad Commission as containing not more than 3,000 mg/L of TDS and so, ambient water sources must be protected during drilling. The state's Bureau of Economic Geology however, lowers the freshwater threshold to 1,000 mg/L of dissolved solids to be classified as freshwater.

At the time the report was issued, freshwater was more widely used in well completions because friction reducers "function optimally in freshwater." It noted that in 2014 the industry was using an estimated 70,000 acre/ft of freshwater annually with volumes projected to steadily decrease over the next 30 years.

As predicted in the 2014 white paper, operators would increasingly choose non-freshwater sources for hydraulic fracturing for one or more of the following reasons:

- limited availability of high-quality source water;

- high quality and economically available produced or brackish water;
- reduced transportation and logistical costs;
- greater compatibility with fracturing fluid chemistry; and
- high compatibility with reservoir.

As early as 2010, slickwater fracs were recognized as having performance and cost features preferred over gel-fracs. In a Society of Petroleum Engineers paper published that year, three authors cited, among other characteristics, lower chemical additive levels in slickwater fracs help lower the cost of well completions. Also, low-permeability formations tended to resist gel clean-up resulting in lower production.

Finally, the paper noted that the nature of slickwater fracs means more fluid is pumped at much higher pressures, creating more complex fracture networks which, in low-permeability formations results in improved production.

For the past half-decade oil and gas companies, particularly those in arid and semi-arid regions such as the Permian, are completing a greater percentage of wells with slickwater rather than gel-based fluids. Slickwater frac fluids tend to be more tolerant of high levels of dissolved solids, allowing for increased use of brackish and treated produced water, according to industry analysts.

As a result, even with increasing numbers of well completions, from demand on freshwater sources for hydraulic fracturing is less than it would be without greater reuse of treated produced water.

"As development of new oil wells in the Permian has significantly increased in the past two years, we have seen continued expansion of water treatment and recycling, limiting the impact of higher rig counts and frac jobs on freshwater use," Tintera said. "That trend is likely to continue," he added.

An analysis of completion fluid sourcing, including volumes of freshwater, treated produced water and brackish water, will be included in the 2019 update, Tintera noted.

STUDY UPDATE

Work on the 2019 produced water white paper will examine how the "significant change in water use in fracturing has focused more attention on how water is used and reused by industry," according to a statement from TAEP.

"The intent is to further reinforce the conclusions voiced in the 2014 Produced Water report," Tintera said. "In developing water management policies and regulations, the primary considerations must be local conditions and how to best encourage recycling and reuse without stifling the oil and gas industry."

The IPAA agreed to collaborate on the 2019 Texas water study in order to bring a federal perspective to a regulatory framework that contains both state and federal implications, Fuller said.

"We have the experience to provide a Washington D.C. perspective on EPA's province over effluent limitations and water policy generally," he said. "We can add color to the discussion from that experience."

EPA's jurisdiction over produced water comes under three separate federal laws, Fuller noted. The Clean Water Act (1972) covers direct discharge of water to the surface; the Safe Drinking Water Act (1974) governs underground injection control wells; and the Resource and Conservation and Recovery Act (1976) gives EPA authority over management of hazardous wastes, including produced water.

Each law has its own regulatory department within EPA and results in regulations that often overlap or conflict with state rules, Fuller said.

"The regulatory process needs to be sorted through," Fuller said. "The further you get into it, the more it becomes clear the EPA has become a barrier to progress for water management. The states must be allowed to work out how to make water an asset and an important part of their state's water capabilities."

For its part, the EPA has begun to recognize the importance of allowing states to craft their own water rules. This summer, EPA entered into a memorandum of understanding with New Mexico to produce a study of the interface between federal and state water rules in New Mexico (see SPWM, Sept-Oct. 2018, pg. 40).

In October, EPA announced it would conduct an internal study of its existing effluent guidelines and assess how

federal, state, tribal and stakeholder regulations oversee produced water, which the feds still classify as a waste product with zero discharge.

EPA says its new study is intended to consider "if support exists for potential regulations that may allow for broader discharge of treated oil and gas wastewater to surface waters" under CWA regulations.

EPA acknowledges that produced water volumes continue to increase and that "new approaches to managing produced water are emerging."

"Some states and stakeholders, particularly in water scarce areas of the country, are asking (EPA) what steps would be necessary to treat and renew this water for other purposes," the agency declared.

Key topics to be examined in the EPA study include:

- Produced water management – what works and what doesn't in modern operations;
- Produced water management alternatives - technologies, availability, and economics;
- Barriers to alternatives;
- Concerns for allowing discharge of treated produced water to surface waters or to publicly owned treatment works;
- What is an appropriate level of treatment for produced waters to be discharged to surface or POTWs; and
- Conflicts between state regulations and federal policies for produced water management, including water rights.

Current efforts to normalize federal and state produced water regulations is timely and any delay would be a missed opportunity, Tintera said.

The regulatory framework for produced water in Texas is a model for how states can keep pace with water management technology and public needs, he added.

"Working with regulators and the public, we can have a framework for managing produced water that supports economic prosperity while still rigorously protecting the environment," he concluded. ■


Michelle Lujan Grisham

Increased Water Reuse a Priority for Incoming New Mexico Governor

To increase access to water sources, including recycled non-potable water, New Mexico will support further development and implementation of technologies that increase the safe reuse of oil and gas produced water while protecting public health and safety, according to a far-reaching water policy document from incoming Gov. Michelle Lujan Grisham.

Acknowledging that much of New Mexico has been and will continue under a severe drought, Lujan Grisham declared the state "must rethink how we manage our water supply."

Water management will be an enduring priority under her administration, Lujan Grisham said. A new, strategic 50-year water plan will be developed to ensure all New Mexicans have access to safe reliable water.

Among the practices for creating a sustainable water supply, reclamation and reuse programs will be encouraged. For example, the Lujan Grisham administration will promote increased use of "purple pipes" that deliver recycled, non-potable water for irrigation and environmental restoration to lighten demand on freshwater supplies.

Expanded use of recycled non-potable water will include support for technologies developed by the oil and gas water management industry, the policy paper from the governor-elect declared.

Democrat Lujan Grisham was elected in November, succeeding Susana Martinez, a two-term Republican governor.

The new governor's water policy statement follows a Memorandum of Understanding signed last summer between New Mexico and the EPA to cooperate on a study of existing water policy. Its goal is to consider how revised regulations might encourage greater reuse of produced water (see *SPWM*, Sept/Oct 2018, pg. 40.)