

Fall 2017

BASIN BITS

The Official Publication of the Western Dakota Energy Association

The Road to Expanding WDEA's LoadPass Permits



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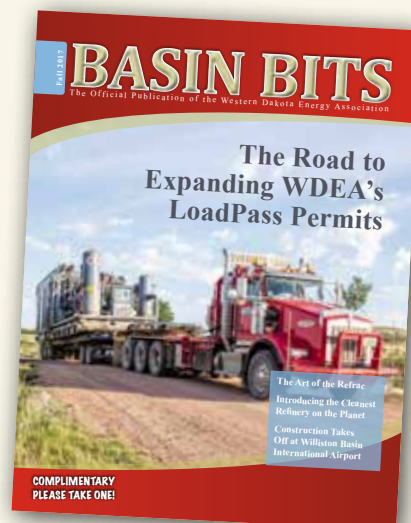
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On the cover: This issue's cover features a Cruz heavy equipment Kenworth truck rolling down the road with an oversize load near Mandaree, ND. The WDEA recently expanded its LoadPass Permits program to make it accessible to other counties throughout the state, including non-oil-producing areas. Read more on page 26. Photo credit: Mike Kopp, Mykuhls Photography, www.beautifulbadlandsnd.com.



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From the Desk of the Western Dakota Energy Association's President



Daryl Dukart
President
Western Dakota Energy Association

Rain, Rain... Please Come Back!

its members throughout this study and aiding the state in determining the actual costs to our communities and the outcome that benefits WDEA members and the state. We have three objectives to address:


1. Determine sustainable/equitable distribution of GPT revenue to local subdivisions throughout the oil-producing counties.
2. Establish GPT baseline and maintain support at this level or higher.
3. Provide for long-term predictability in GPT funding distribution moving forward.

In addition to WDEA, I serve on a few other boards and I have been reflecting on the discussion and direction of what is happening with the refracking of wells and how this will become a game changer for the longevity of wells. As research and science continue to increase production of all Bakken formations, we should also figure out how we create and manufacture more uses for natural gas in our state. Natural gas is one of the key by-products of these newer refrac wells, which could become a limiting factor on how much oil can be produced in North Dakota daily due to the rules and regulations now in place for the flaring of natural gas.

I keep thinking we have an advantage in western North Dakota with the coal plants and available Missouri river water all so close to the state's major gas producing areas to have our state thinking about something like the North Dakota Mill and Grain program for natural gas manufacturing and use.

WDEA's truck permitting department held an informational meeting in Williston in mid-July. There are innovative ways to use the LoadPass Permits program, and a truck routing program with interactive mapping systems is coming soon. The new logo looks great and the fresh LoadPass Permits program developing around that logo is moving forward. After four years of research and study, we are now starting to put the program into action. Thanks to the talented team serving on this special truck permit committee for all their long hours and hard work in making this happen. This program will offer the permit system to other counties within

the state, and I believe we have a permit system in development for trucks that many other states will look at in a few years.

I look forward to seeing you at the annual WDEA meeting in Dickinson on November 1 and 2. 

ABOUT THE WESTERN DAKOTA ENERGY ASSOCIATION

The Western Dakota Energy Association (WDEA) is the trusted and unified voice for the betterment of the citizens of North Dakota and the membership of WDEA.

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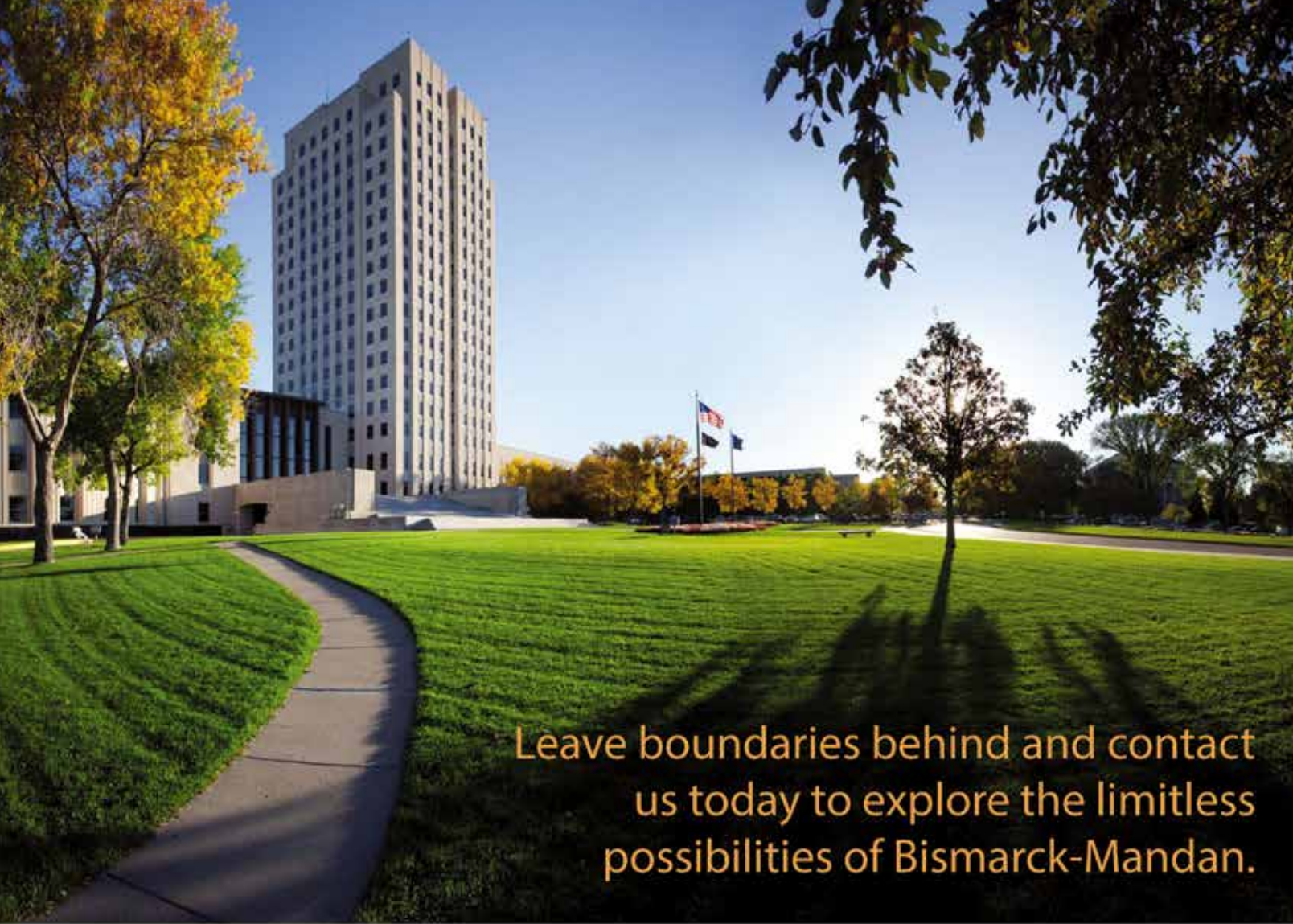
Geoff Simon, Executive Director
Tel: (701) 527-1832 (cell)
Email: geoff@ndenergy.org

As I write this message in mid-July, it feels, looks and is acting like late summer or early fall in the majority of western North Dakota. We're seeing long, hot, windy days, and just about the only greenery is found in sub-irrigated fields and creek beds. It has grown to be the worst drought in my 21 years of owning and 44 years of helping operate the ranch. As my grandparents used to say, 'You should have seen the 1930s in the dust bowl days,' I will ask my grandchildren if they remember the drought of 2017 in western North Dakota!

The energy industry also faces many challenges that we, as farmers and ranchers, are faced with daily during such a severe drought. They too deal with dust problems, fire, storage of water, employees working in hot conditions, vehicle problems, and more, from substantial amounts of snow in the months of December through February this year, to drought conditions now, which will also raise operating costs throughout a normal year.

Since the closing of the state 2017 legislative session, many interim study committees have been appointed and meetings will take place over the next several months. One of the key areas of interest to WDEA is determining the appropriate level of oil and gas tax revenue allocations to Hub Cities and Hub City schools based on infrastructure and other needs in those areas.

WDEA's members include cities, counties, and school districts within the state's energy-producing counties. As noted in the legislative description, any changes to the formula will have an impact on political subdivision throughout the region. Because of this, WDEA has an interest in representing



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From the Desk of the Western Dakota Energy Association's Executive Director



Geoff Simon
Executive Director
Western Dakota Energy Association

Here We Go Again, Oil Communities on the Defensive

Another legislative session is behind us and interim studies are underway to prepare for the next one. Unfortunately, distribution of oil and gas tax dollars to North Dakota's oil-impacted communities is once again under scrutiny.

If member counties, cities and school districts of the Western Dakota Energy Association (WDEA) ever have doubts about the value of their membership, look no further than Senate Bill 2013, Section 22, subsection 2(f), which directs a legislative study committee to consider the "fiscal impact to hub cities and hub city school districts ... if the oil and gas tax revenue allocation formula would be changed to discontinue the allocations to hub cities and hub city school districts."

You read that right. As unbelievable as it sounds, with Williston and Dickinson contending with hundreds of millions of debt directly related to growth in the oil industry, some legislators are actually wondering if it's time to cut off revenue to the Hub Cities.

As you will read elsewhere in this edition, our association will vigorously resist legislation that cuts Hub City funding (turn to page 28 to read more about this). The cities of Williston, Dickinson and Minot depend on that revenue stream to repay debt incurred for municipal infrastructure projects needed to accommodate oil-related growth in their communities.

Sure, we understand times are tough. The drop in oil prices effectively cut in half the amount of oil and gas tax revenue the state collected from the peak of activity. Extraction and production tax collections in the

2013-15 biennium added up to just over \$6 billion. The amount projected for the 2017-19 biennium is slightly more than \$3 billion. That reduction means everyone needs to tighten their belt. But we think it's important legislators understand that although the pace of the oil industry may have slowed, it hasn't gone away and won't anytime soon.

WDEA's Six City Study indicates Hub Cities and other communities in the Bakken will continue to see population growth in a moderate oil price environment. And it's happening. As this issue of *Basin Bits* was going to press, there were 55 rigs drilling in the Bakken. That's twice as many as we saw in North Dakota last summer. It means more people and more traffic, which means more demands on local infrastructure.

There is a funding mechanism intended to help impacted counties, cities and school districts meet those infrastructure needs. The gross production tax (GPT) is imposed **in lieu of property taxes** on oil and gas producing properties. Most businesses and industries support their local economy through property taxes, but oil producers pay the GPT instead. The dollars are collected by the state Tax Department, and from there it's up to the legislature to decide how the money is spent.

Oil tax revenue has done a lot of good for all of the citizens of North Dakota. Oil money has supported the construction of water and flood control projects, new facilities on college campuses, airport improvement and expansion projects, new agricultural facilities, outdoor heritage projects and major improvements in state and local transportation infrastructure.

...the legislature's top priority should be addressing the needs of citizens in the communities where the oil is produced.

Taxes paid by the oil industry have clearly done a lot of good in North Dakota. But I believe the legislature's top priority should be addressing the needs of citizens in the communities where the oil is produced. In down times when revenue is tight, there are typically more hands out than there is money to give. We saw that during the 2017 session and, realistically, I expect we'll see it the next time the legislature convenes.

It is my sincere hope when January 3, 2019 rolls around, North Dakota legislators can find a way to agree on a distribution formula that will once-and-for-all ensure western communities get the financial support they deserve.

Let's fix it and forget it.



Mark Your Calendars for the 2017 WDEA Annual Meeting

November 1 to 2, 2017 | Dickinson, ND
Ramada Grand Dakota Lodge



Save the date for the Western Dakota Energy Association's (WDEA) upcoming annual meeting. You will not want to miss this informative event. The meeting will take place November 1 to 2, 2017 at the Ramada Grand Dakota Lodge in Dickinson, ND. A block of motel rooms has been reserved at the Ramada in Dickinson. The special nightly rate of \$69.00 can be obtained by calling (701) 483-5600 or (800) 422-0949 and using the meeting code WDEA.

With educational presentations on important western North Dakota issues, like refracturing, lignite research, road needs, education funding, a legislative report, and a county by county production potential update, the annual meeting is sure to be a success.

Members will also elect county, city and school district committee members and the representatives on the executive committee.

Registration is open on the WDEA website, www.ndenergy.org. We look forward to seeing you there!



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WEDNESDAY, NOVEMBER 1

4:00 p.m. MDT	Registration Opens
5:30 p.m. – 7:30 p.m.	Opening Social
6:30 p.m.	Remarks from the Governor's Office, Lt. Gov. Brent Sanford Presentation by Cal Klewin, Theodore Roosevelt Expressway Association

THURSDAY, NOVEMBER 2

7:30 a.m. – 8:30 a.m.	Continental Breakfast (Rolls, Fruit, Coffee, Juice, etc.)
8:30 a.m.	Call to Order and Welcome Remarks from WDEA President Daryl Dukart
8:35 a.m.	Welcome to Dickinson from Mayor Scott Decker Welcome to Stark County from Commission Chairman Jay Elkin
8:45 a.m.	ND Pipeline Authority ReFrac Study Presentation by Justin Kringstad
9:00 a.m.	Refracs & Optimizing Oil Recovery: Jeff Parker, Marathon Oil; Charles Ohlson, Whiting Petroleum; and Charles Gorecki, EERC. Panel Moderator: Justin Kringstad, North Dakota Pipeline Authority
9:35 a.m.	Lignite Research Update from Dr. Mike Holmes
9:55 a.m.	Dakota Gasification Company Urea Project Update from Steven Liebelt
10:10 a.m.	Networking Break
10:25 a.m.	North Dakota Public Service Commission Update from PSC Commissioner Julie Fedorchak
10:40 a.m.	NDDOT/NDLTAP GRIT System and Road Needs Assessment Presentation by Brad Wentz and Alan Dybing
11:10 a.m.	Education Funding Panel with Sen. Don Schaible, Sen. David Rust, and Alexander Supt. Leslie Bieber; Panel Moderator: Dr. Steve Holen, WDEA Executive Committee Member and Past WDEA President
11:40 a.m.	Legislative Interim Report from Sen. Rich Wardner
12:00 p.m.	Lunch, Prayer by Geoff Simon Lunch Speakers: Mark Fox, Chairman of the Mandan, Hidatsa and Arikara Nation; and Dr. Thomas Mitzel, President, Dickinson State University
1:15 p.m.	LoadPass Permits Update from Janet Sanford, System Operator, and Brent Bogar, Jadestone Consulting
1:35 p.m.	Department of Mineral Resources and County Update from Lynn Helms, ND Department of Minerals
2:15 p.m.	Annual Business Meeting: Treasurer's Report, County/City/School Committee Meetings, Executive Committee Election and Election of Officers
3:00 p.m.	Adjourn

**Agenda may change. The latest version is available on the WDEA website, www.ndenergy.org.*

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Your Guide to the 36th North Dakota Petroleum Council Annual Meeting



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TUESDAY, SEPTEMBER 26, 2017	
1:30 p.m. – 5:00 p.m. (Ballroom 4)	Bakken Backers Hosts: Bakken 2.0 (Free and open to the public)
5:30 p.m. – 7:00 p.m. (Ballroom 5)	Social and hors d'oeuvres (Annual Meeting registrants only)
7:00 p.m.	Annual Bakken Pub Crawl (Annual Meeting registrants only)
WEDNESDAY, SEPTEMBER 27, 2017	
8:00 a.m.	Registration Opens
10:00 a.m.	Opening Remarks, Ron Ness, NDPC
10:05 a.m.	Doug Burgum, North Dakota Governor (invited)
10:30 a.m.	Doubling Down on Bakken Recovery Panel Discussion Moderator: John Harju, EERC; Panel: Lynn Helms, ND Department of Mineral Resources; Chris Wright, Liberty Oilfield Services
11:15 a.m.	Stephen Moore, The Heritage Foundation
12:00 p.m.	Break
12:15 p.m. – 1:40 p.m.	Lunch & NDPC Awards: <ul style="list-style-type: none"> • NDPC Excellence in Safety Award: Enerplus - Automated Tank Gauging Project • NDPC Community Engagement Award: Crestwood - Culture of Giving • NDPC Environmental Stewardship Award: Targa Resources - Bioremediation of Crude Oil Impacted Soils • NDPC Distinguished Leadership Award: Brent Eslinger - Halliburton
2:00 p.m.	30-Day Permitting: Is it Achievable?, Vincent DeVito, Department of Interior
3:00 p.m.	Break
3:15 p.m.	Regulators and Industry, The Collaborative Model to Compliance, Dave Glatt, ND Department of Health
3:35 p.m.	The Next Generation of Petroleum Engineers: UND Petroleum Engineering Moderator: Jeff Kummer, McKenzie Energy Partners; UND Petroleum Engineering Industry Advisory Council Panel: Joel Brown, 2014 UND PE Graduate, McKenzie Energy Partners; Max Johnson, 2015 UND PE Graduate, Hess Corp.; Dylan Willoughby, Expected 2018 Graduate; and Tanner Hopfauf, Expected 2018 Graduate
4:05 p.m.	Adjourn
6:00 p.m. (Ballroom 5)	Social
7:00 p.m. (Ballroom 5)	Chairman's Banquet, NDPC Outstanding Public Service Award (Rep. Al Carlson), NDPC Hall of Fame Award (Craig Smith - Crowley Fleck) & Entertainment by Bengt Washburn, Comedian
THURSDAY, SEPTEMBER 28, 2017	
7:00 a.m.	Buffet Breakfast
7:30 a.m.	Registration Opens
7:45 a.m.	Opening Remarks, Brent Lohnes, Hess Corporation
7:50 a.m.	Video Greeting, U.S. Senator John Hoeven (invited)
8:00 a.m.	Motivational Speaker Brian Biro, America's Breakthrough Coach
9:00 a.m.	LoadPass Permits System, Geoff Simon, Western Dakota Energy Association
9:10 a.m.	Oil Market Outlook, Helen Currie, ConocoPhillips
9:50 a.m.	Break
10:15 a.m.	NDPC Year-in-Review, Eric Dille, NDPC
10:30 a.m.	Bakken Refracs & Transportation, Justin Kringstad, ND Pipeline Authority
11:00 a.m.	Bakken Refracs, Curtis Ryland, Marathon Oil Corporation
11:30 a.m.	NDIC Regulatory Update, Bruce Hicks, ND Department of Mineral Resources
12:00 p.m.	Closing Remarks and Adjourn, Ron Ness, NDPC (no lunch provided)

*Agenda may change. The latest version is available on the NDPC website, www.ndoil.org.

The Art of the

REFRAC

By Paul Adair

The hydraulic refracturing—or refrac—market has been opening up across North Dakota over the last few years and production companies in the Bakken are now making the economic decision to either re-enter a well to complete new zones or refrac existing perforations.

As a practice, hydraulic refracking has been used in the oil and natural gas industry for decades, and vertical wells in the U.S. and abroad have found positive results in relying on refracking techniques since the mid-1970s. Even so, the refracking of multi-stage horizontal wells—particularly in the Bakken—is still considered a relatively new phenomenon. Because of this, companies and operators in North Dakota find themselves in the experimental phase, still tinkering with different degrees of treatment volumes, varying refrac technologies, and candidate selection plans.

Operations in North Dakota nowadays use numerous criteria when selecting potential refrac candidates from a pool of existing wells; many of these criteria are proprietary in nature.

“Promising refrac candidates in the Bakken tend to have been drilled four to five years ago and were typically completed

using early hydraulic fracturing technology such as open-hole and single-stage fracture treatments,” says Justin Kringstad, director of the North Dakota Pipeline Authority.

“The vast potential in North Dakota for refracturing a large number of existing and future wells will mean that there should be an increased need for completion crews for years to come.” With up to 8,500 of these early wells drilled with older technology across the state, the future potential for refracs is incredible.

It is difficult to determine the exact number of refracs carried out within the Bakken. Kringstad and the North Dakota Pipeline Authority report that 144 modern wells have undergone the refrac process, primarily centered in McKenzie, Mountrail, and Dunn Counties. In particular, refracking in Dunn and McKenzie Counties has demonstrated excellent results for the region and currently produces good economic value in spite of oil priced at \$50 per barrel.

The top companies currently performing refracs in North Dakota are Marathon Oil Corp., Whiting Petroleum Corp., and ConocoPhillips Co. Together, these three companies—along with Continental Resources, which has since stepped back from refracking in North Dakota—represented 67 percent of the entire Williston Basin refrac market

from January 2014 through June 2015. In comparison, their completion activity only represented 34 percent of the overall initial completion market within that same period.

As the price of oil has tumbled from historic highs, the importance and significance of refracking has grown. While the completion costs of a new well can be as high as \$4 million or more, the costs associated with a simple horizontal refrac treatment are typically much lower, costing as little as \$1.8 million, approximately 25 percent of what it costs to create a new well. This cost reduction is what gives operators in North Dakota a much higher return on investment on the well—so much so, that (for some) refracking strategy has become part of the initial development of a play.

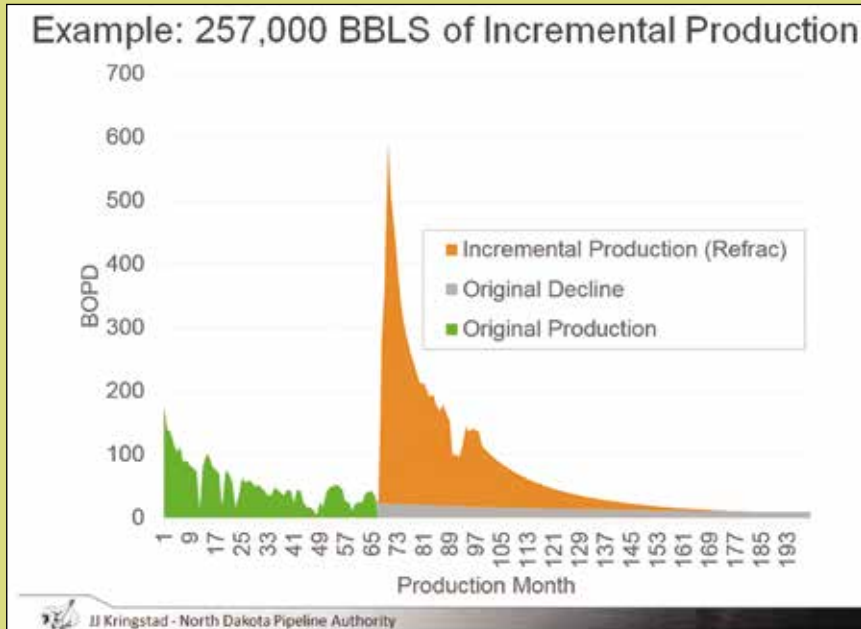
This is not to say that refracking is yet in any position to completely replace traditional hydraulic fracturing within the Basin. At the industry’s current level of refracking technology, the bottom-line economics of fracking simply outstrips that of refracking. But North Dakota has always been well-regarded as a hotbed of innovation, and if the past is any indication, the industry will find a way to narrow, and perhaps close, the cost-point gap between the two processes.

During a refrac, a secondary stimulation treatment is pumped downhole to existing fractures, which are then re-stimulated to access the additional reservoir volumes, or tapped to access the untouched parts of the horizontal lateral. Operators also have the ability to perforate between existing fracture stages, altering the existing fracture geometry and connecting as many natural fractures as possible, creating pathways to help with fluid flow.

The real benefit of refracking is being able to increase production from an existing asset. Refrac projects of today can vary significantly in scope and cost, from the small refrac looking to reconnect with an existing completion, all the way up to a massive refrac designed to tap into a virgin reservoir. The older the play, the more potential a refrac has in capturing more oil, as the older technology used in drilling the original well would have left more product in the ground.

"Prior to 2015, the Bakken saw a large number of wells drilled in very good geology that did not perform to their full potential simply because the completion technology at the time was limited," says Kringstad.

"Each individual case in the Bakken is unique, but refracking has the potential to be very effective at increasing production from existing wells. On average, the refracked wells we have reviewed in North Dakota



Incremental production at a refracked well in Mountrail County, ND.

performed better after the refrac than they did during the initial completion."

There are many factors that can lead to the success or failure of a refrac, but none appear more important than an operator's choice of technology for the refrac operation. Over time, as companies have tried refracking practices, they have gained a

more complete understanding of a refrac's impact downhole. Armed with this understanding, operators have started to see the tangible benefits of using refracking, whether it's used as a strategy to slow the decline rate of a well and extend its viability or to accelerate a well's overall recovery within a shorter timeframe.



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While the combination of stabilizing oil prices and lower completion costs could make a refrac seem economically attractive, the industry's current lack of ability to predict refrac reservoir performance with any real accuracy is the primary reason cited for why refracking has not exploded across North Dakota shale plays. It will take a greater understanding of refracking performance and impact to elevate the process from a somewhat unconventional practice and turn it into an industry standard.

"In the grand scheme of things, refrac development in North Dakota is still relatively young," says Kringstad. "I believe that as the technology and knowledge continue to improve over time, the refracking of existing wells will be one of the next phases of development in the Bakken."

The ability to take full advantage of its shale resources would be a major boon for the economy of North Dakota and would also add to the viability of the area's shale play. Refracking a large number of existing and future wells in the state would certainly extend the prosperity provided by oil and natural gas throughout the boom.

The resources recovered from these refractured wells could result in billions of barrels of additional oil production. North Dakota legislators recently passed House Concurrent Resolution 3027 during the 65th legislative session, requesting an interim legislative study to see if the state should offer financial incentives to encourage the refracturing of existing oil wells. The results and recommendations of this study are expected to be revealed when the 66th Legislative Assembly convenes in 2019. 

GET TO KNOW THE EXPERT JUSTIN KRINGSTAD



On August 1, 2008, Justin Kringstad was appointed by the North Dakota Industrial Commission as Director of the North Dakota

Pipeline Authority.

Kringstad received his degree in Geological Engineering from the University of North Dakota's School of Engineering and Mines, where he has served in the past as a member of the University's Geological Engineering Advisory Board.

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WILLISTON WATFORD CITY MINOT DEVILS LAKE JAMESTOWN GRAFTON GRAND FORKS

Now That's a QUALITY Department

By Paul Adair

Last April, state legislators in North Dakota passed legislation that would see the separation of the Environmental Health Section from the North Dakota Department of Health to create a new standalone Department of Environmental Quality (DEQ). The DEQ will continue to administer and enforce the same environmental protection programs as the existing Environmental Health Section and will not create new programs or eliminate existing ones.

The creation of this DEQ for North Dakota will demonstrate the importance of environmental protection in the state by elevating that responsibility to a cabinet-level agency. The DEQ director will be appointed by, and report directly to, the governor.

"Preserving our natural resources for current and future generations is a top priority," said Gov. Doug Burgum in a news release in April. "In the spirit of reinventing government, this new agency maintains existing staffing and program levels while giving our environmental team the autonomy it needs to be more efficient, flexible and better able to implement federal regulations."

Given the intensified federal environmental oversight in recent years and increasingly complex environmental issues, this seemed an opportune time to create a new department focusing solely on North Dakota's environment.

The Department of Health has until July 1, 2019, to amend the agreements necessary to ensure the state maintains strong primacy over all federal and state regulations that protect North Dakota's clean air, water, and land. The Environmental Health Section anticipates it will meet the 2019 transition deadline as it addresses

the challenges of separating itself from the Department of Health regarding state law, sharing services with other agencies, and administrative responsibilities.

"There is still a lot of connective tissue between the two departments and, in a perfect world, we would just like to make that surgical cut in order to form the

DEQ with very few changes,” says North Dakota Environmental Health Section Chief David Glatt. “This is still our ultimate goal, but it’s going to take time as we figure out how we are going to do it in the most cost-effective way.”

The Environmental Health Section still also needs to obtain approval from the U.S. Environmental Protection Agency (EPA) to move forward in creating the DEQ, making certain the EPA is comfortable with the proposed transition and confident that North Dakota will continue to protect public health and the environment as it has in the past.

The Department of Health is working with the current Environmental Health Section to establish the DEQ at no additional cost by restructuring and repurposing current positions beyond any that may be transferred. The section presently has about 174 positions, including engineers, scientists, chemists, microbiologists and administrative support staff.

“We are looking inward to find the cost savings required to make this transition happen,” says Glatt. “We want to be sure that, by the end of the day, this move toward a DEQ will have zero-impact to the state budget. And while there will be some challenges in doing this, I am confident we will find ways to make our department run more efficiently and be cost-effective for the government.”

Once separate, the DEQ will consult with a new 13-member Environmental Review Advisory Board, which will be created through the consolidation of the existing Air Quality Advisory Board and

the Water Pollution Control Advisory Board. This new board will consist of the state engineer, state geologist, director of the state Game and Fish Department and 10 members appointed by the governor. In addition, the board reserves three spots for representatives of crop agriculture, the livestock industry, and agronomy/soil sciences to address any potential concerns raised by the agricultural sector.

Glatt believes the concept of having a separate DEQ is not new and is an idea that has been tossed around for the better part of three decades. Given the intensified federal environmental oversight in recent

years and increasingly complex environmental issues, this seemed an opportune time to create a new department focusing solely on North Dakota’s environment. There is optimism that the “one-size-fits-all” approach to federal environmental legislation has come to an end.

“There appears to be a change in attitude and a greater understanding of the idea of cooperative federalism, accepting that the states themselves play a major and active role in protecting the environment,” says Glatt. “We are hopeful this attitude continues so we can continue to work together more effectively than we have in the past.”

GET TO KNOW THE EXPERT DAVID GLATT



Born in Valley City, ND, David Glatt first joined the North Dakota Department of Health in 1983 as an environmental engineer. In 2002, Glatt was named chief of the Environmental Health Section.

Glatt earned a Bachelor’s degree in biology and a Master’s degree in environmental engineering from North Dakota State University. He is a registered professional engineer in North Dakota and a member of both the North Dakota Board of Water Well Contractors and the National Ground Water Association.

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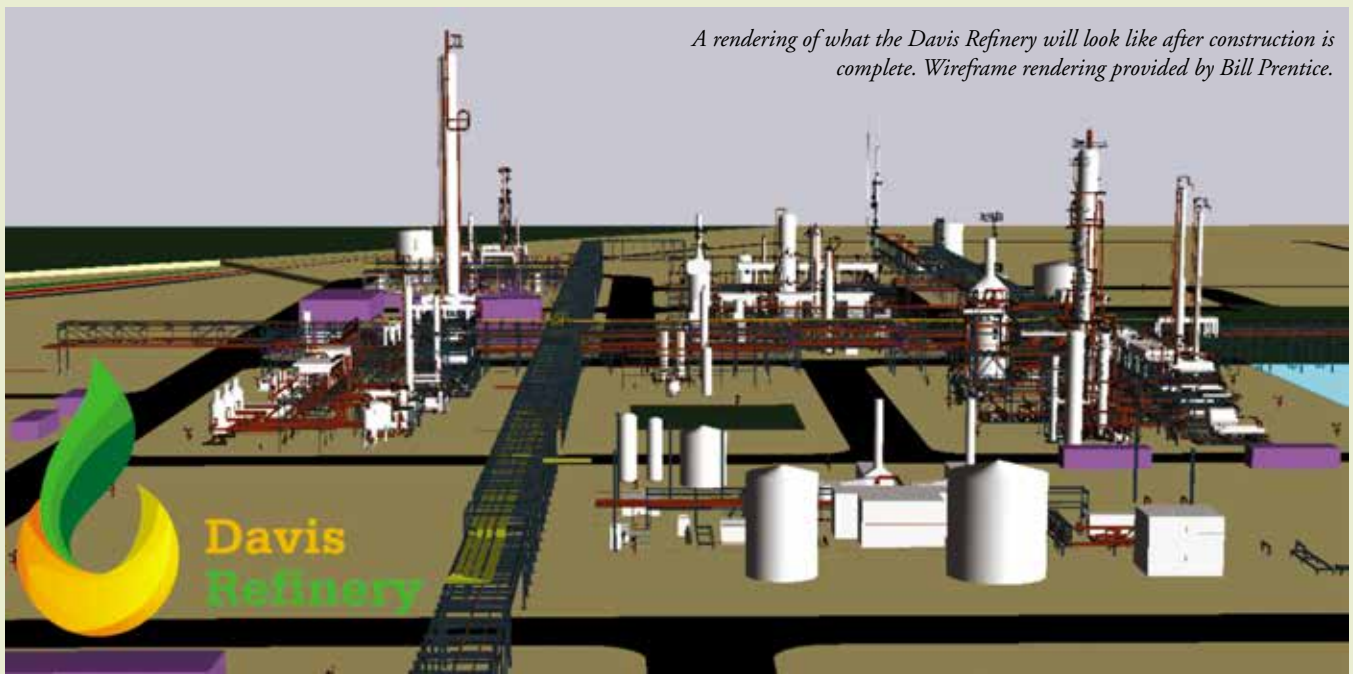
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Introducing the Cleanest Refinery on the Planet

A rendering of what the Davis Refinery will look like after construction is complete. Wireframe rendering provided by Bill Prentice.



By Paul Adair

Meridian has a plan for the heart of the Bakken and part of this plan is the construction of the \$850-million Davis Refinery, a ground-breaking crude oil refinery near the city of Belfield, ND. Davis is poised to become the first high-conversion refinery built from scratch in the U.S. since 1976 and it is seen by industry to be the cleanest on the

planet, producing far less of the greenhouse gas emissions commonly associated with older refineries.

As a greenfield refinery, Davis will not need to work in tandem with older technologies, instead using cutting-edge, clean fuels technology that rely on modern methods and environmental engineering that make the overall refining process more efficient and help reduce pollution.

“For me, pollution is just another word for inefficiency and a sign of a plant that is

either poorly designed, poorly maintained, or both,” says Bill Prentice, CEO at Meridian.

“I wanted to build a refinery that I am proud of and not one that I have to try and hide from and be defensive about.”

The Davis Family Partners developed the original idea for the Davis Refinery about five years ago, with the idea of giving back to North Dakota. The highly detailed engineering and permitting phase for the project began to take shape in 2015, and Meridian is now hoping that the permit to construct

is awarded sometime this fall, with shovels in the ground immediately after the company receives its go-ahead.

Should all go to plan, the initial 27,500 barrels per day capacity of the refinery, which is also known as Davis Light, will be operational by early 2018, and in full operation in 2019. After a couple of years in operation, Meridian will make a final decision on expansion of the Davis Refinery to its full potential capacity, which it will use up to 55,000 barrels of Bakken crude per day. The full Davis Refinery is to be rated a Nelson Complexity Index of just under nine for its ability to produce a full slate of refined products, such as jet fuel, lubricants, or asphalt base.

Even at fully capacity, the environmental care taken by Meridian to apply the highest level of Best Available Control Technology to manage emissions allows the new refinery to qualify as a Synthetic Minor Source of emissions when applying for its permit to construct. This gives the project the ability to avoid some of the burdensome federal scrutiny that would come along with major source designation.

"It has been interesting to show people that, with modern technology, a major refinery can be built as a minor source," says Prentice. "As I have said before, the Davis Refinery is not your grandfather's refinery."

Davis Light is expected to be a major economic boon for the region, creating approximately 500 jobs during the construction phase and 250 permanent, full-time refinery jobs when up and running. The State of Washington discovered that a new refinery creates a total of 12 to 14 jobs for every direct hire position, meaning there will be an additional 2,000 service and supply jobs created in Billings and Stark Counties to help support the refinery.

In addition to the recent stability in oil prices, the development of the Bakken as a major resource basin makes it an opportune time for Meridian to build this refinery. Even a decade ago, the feasibility of a new refinery such as Davis would be held in doubt because of the uncertainty over the viability and long-term sustainability of Bakken light crude.

"With oil prices rising again, it seems a good time to proceed," says Prentice. "But we are building a refinery that is going to be here for 100 years and will see a number of periods of very high and very low oil prices. That is why—frankly—I never look at the price of oil. I just don't care and I don't want to know. You could make yourself nuts if you're trying to figure out if today or tomorrow is a good day to build a refinery or not."

Looking ahead, the Davis Refinery will likely become the benchmark for new

refinery construction in the U.S., as the industry begins to absorb the ground-breaking innovations Meridian has put into play.

"What we are doing here will become the industry standard for the next project," says Prentice. "Ultimately, our industry is going to become cleaner as a result of what we're doing now and this is something we're extremely proud of."

GET TO KNOW THE EXPERT BILL PRENTICE



Bill Prentice has 37 years of experience in energy project development, finance, design-construction, operations, and new venture formation in the energy and technology industries. He is a board member of Meridian Properties Corporation, with which the company has a joint-venture real estate development.

Prentice holds a Master's Degree from UC Irvine, Graduate School of Management, and two Bachelor of Science Degrees in engineering from Arizona State University.

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Construction Takes off at Williston Basin International Airport



By Meg Crane

North Dakota is getting a new international airport in Williston, which is scheduled to open October 2019.

The current airport, Sloulin Field, has many issues, according to Williston Basin International Airport (XWA) Director Anthony Dudas.

“The existing facility does not meet FAA design standards for the size of aircraft currently operating every day,” he says, referring to the Federal Aviation Administration. This includes an incorrect airport slope, runway weight bearing capacity, and taxiway width and location.

Plans to get the city’s airport up to FAA standards got underway in 2011, when the City of Williston met with FAA to state its intention of exploring a possible relocation of the airport. A later analysis revealed it would be possible to fix Sloulin Field; however, the cost was determined to be comparable to relocating.

Construction on the old airport would mean the airfield would be closed for at least two years and it would have had more of an environmental impact than building a new airport. On top of this, there would be limitations for adding commercial air service. For these reasons, it was decided a new airport would be built and land from Sloulin Field would be sold to help pay for the \$240-million project.

The old airport has been in use for more than 70 years, but as demand for air travel increases, it has ceased to meet the needs of the region. In 2005, there were fewer than 6,000 passengers. After the North Dakota oil boom, the number of passengers jumped to 100,000



The official groundbreaking for Williston Basin International Airport took place in October 2016, with construction beginning in April 2017. The airport is expected to be up and running by late 2019.



An aerial view of Runway 14 looking southeast as of construction in August 2017.

in 2015. With the relatively recent dip in oil prices, some wondered if a new airport was truly necessary, but, currently, only 50-passenger regional jets are flying out of Sloulin Field.

"The airline industry is moving toward larger aircraft, which our current facility cannot handle. XWA will be able to handle aircraft that can carry at least 160 passengers," says Dudas. "XWA will meet all federal and state standards and allow more airlines with larger aircraft to serve western North Dakota."

The international significance of the Williston Basin oil reserves means it's unlikely there would be a decrease in service. In fact, neither Delta nor United Airlines has given any indication of ceasing service to the area. But without an airport that meets FAA standards where their planes can land, they may need to.

These updates will put Williston's airport on the same playing field as Minot and Bismarck when it comes to attracting and retaining air service. However, it's also being built in such a way that significant expansion would be easy if demand for air service increases. The building itself will include a full-service restaurant, gift shop and multiple lounges.

"We are thrilled about having a new airport—it will be essential for the continued economic growth of Williston and the entire northwestern region of North Dakota," said Shawn Wenko, director of economic development for the City of Williston, in a news release.

The project has many partners, including the City of Williston, the State of North Dakota, Cardon Global, Ulteig and KLJ. Dudas says they all continue to work together with the FAA to ensure they maintain environmental compliance throughout the life of the project.

Construction of the new airport began in April 2017, with grading of the 1,560-acre site.

"We turned a little bit of dirt at the official groundbreaking back in October, but now the real earth moving begins and we

couldn't be more excited," said Williston mayor Howard Klug in a news release when construction officially began.

Thanks to good construction weather since then, the project has stayed on schedule, says Dudas. At the time of publication, contractors were still working on levelling the land, preparing the ground for the commercial terminal, re-routing 59th Street and miscellaneous utility relocation and coordination.

Site work is being done by Martin Construction of Dickinson, ND and includes construction of four storm water detention ponds, storm sewers and various perimeter

roads. Bidding for the runway and taxiway construction was also underway at the time of publication, with those projects expected to start in the fall of this year.

Although many hiccups were expected—including difficulties with land acquisition, cost increases and delays getting funding—Dudas says the project is moving ahead smoothly. So far, there has been not one safety or health-related issue associated with the construction of the new airport.

As long as work continues to run this way, people in the region can expect to be stepping foot in the new Williston Basin International Airport in late 2019.



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GET TO KNOW THE EXPERT ANTHONY DUDAS



Anthony Dudas has been at Sloulin Field International Airport for more than six years. He started as airport operations officer before stepping into his role as assistant airport director and now airport director.

By Meg Crane

The North Dakota Uniform County Truck Permitting System (now known as LoadPass Permits) has been in place in up to 18 oil producing counties in North Dakota since the early 1980s, but that number could be about to increase. According to Permit System Operator Janet Sanford, the system will be expanding to other counties in the state, including non-oil producing counties.

The system was started by the Western Dakota Energy Association (WDEA) because roads in oil producing counties were taking a beating from all the additional traffic. The overweight and oversize truck permitting system has been used ever since to track heavy and large loads on the county and township roads in western North Dakota's oil country.

"We have had many inquiries through the years from other North Dakota counties," says Sanford. This includes non-oil producing counties. "A county may have wind energy coming in to their area or some other

industry that would require heavy loads travelling on their county or township roads. This system is already built and was designed as a comprehensive system that works in all 18 member counties and can be expanded to others as well."

While the regulations themselves are easy to apply across different regions because they've kept them broad, the expansion does create a need for change, adds Sanford. Currently, LoadPass Permits is governed by the WDEA Executive Committee with an advisory committee that consists of sheriffs, county commissioners, road superintendents and engineers from all member counties. "The advisory committee makes recommendations for changes to the permit system, from the field to the executive board, so the permit system can constantly be updated to keep up with the evolving industries and give the counties and townships the tools they need to protect their roads as much as possible."

While this has worked well for the past 30-plus years, going forward it could lead to an enormous group as advisors from each

new county get added. Sanford says WDEA was worried the advisory board could become too large to be effective.

To avoid this, a five-person advisory committee is being added to act as a liaison between the executive committee and the counties' advisory committee. The counties will come to the new advisory committee with information about what is happening on the ground, what changes could be made, and what could be improved.

"This five-person advisory committee will serve as a liaison between the local subdivisions and the WDEA Executive Committee, providing recommendations for changes from the field. It's just an additional layer that should simplify the procedure and give all entities a voice," says Sanford.

This new advisory committee will consist of an ex-officio member of the WDEA Executive Committee, the chair and vice-chair of the permit system committee, and two at-large members from the permit committee. Sanford says the at-large members of the committee could come from any county, whether or not they produce oil.

The Road to Expanding WDEA's LoadPass Permits



A Cruz heavy equipment Kenworth truck rolls down the road with an oversize load near Mandaree, ND.

Photo credit: Mike Kopp, Mykuhls Photography, www.beautifulbadlandsnd.com.



As the system expands, another exciting change is coming: routable maps. It will take a bit of time to get this new feature up and running, but Sanford says her team is excited to be working on it with the counties involved with LoadPass Permits. Right now, the system has a restricted roadmap for all the member counties that shows users when and where road restrictions are.

“Currently, the user has to enter each road segment as they’re creating their permit request. This will make it much easier for the user, having the ability to click their starting and ending points on the map and having a suggested route display for them. The road segments will then auto-fill into the permit form, which should save them a lot of time.”

This helps the counties as well, as they will be able to see a map of submitted routes, rather than receiving them in text form. It’s a complex project that will take a great deal of work, but Sanford says it’s an exciting enhancement to the system that will be a time-saving tool for the trucking companies and the local subdivisions using the system.

She and the WDEA look forward to the changes to the LoadPass Permits truck permitting system, which will help keep North Dakota roads safer for everyone.

GET TO KNOW THE EXPERT JANET SANFORD



Janet Sanford is the co-owner of TeamWorks Consulting Inc. Sanford and her staff conduct the day-to-day operations of the LoadPass Permits system on behalf of the Western Dakota Energy Association. She has been involved with the operation of the permit system since 2008 and has been Permit Operator since 2011.



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Legislature Has Busy Interim Ahead



By Geoff Simon, Executive Director, WDEA

North Dakota lawmakers have given themselves plenty of work to do before the 2019 Legislature convenes, selecting 50 topics to study during the interim.

Of utmost importance to members of the Western Dakota Energy Association (WDEA) is a study of oil and gas tax allocations to Hub Cities and Hub City school districts in Williston, Dickinson and Minot. The cities' allotment of revenue was reduced significantly by the 2017 Legislature, and it's apparent some legislators believe it could be eliminated altogether. The study directs lawmakers to examine "(the) estimated fiscal impact to hub cities, hub city school districts, other political subdivisions, and the state if the oil and gas tax revenue allocation formula would be changed to discontinue the allocations to hub cities and hub city school districts."

WDEA will vigorously resist legislation that further reduces Hub City funding, according to Dickinson City Administrator

Shawn Kessel. "Hub City funding is a stable source of revenue that is essential to service debt we were forced to incur at the height of oil activity," says Kessel, who is currently WDEA's vice-president. "To some extent, we can live with revenue volatility associated with the rise and fall of oil prices, but not when it comes to meeting our obligation to repay debt."

Early in the 2017 session, WDEA presented results of its Six-City study, which included the cities of Williston and Dickinson. The study showed that even a modest oil price recovery will continue to place big demands on the cities, with each still facing significant population growth under a moderate oil price scenario. To offset projected demands, cities in the oil-producing region will remain heavily dependent on revenue from the gross production tax and local sales taxes. Read more about this at www.ndenergy.org/News/SixCity.

Hub City funding won't be the only financial issue on WDEA's radar. The legislature


will also examine school funding issues during the interim, including one study which specifically looks at K-12 appropriations to school districts in the oil- and coal-producing region. HB 1423 directed the legislature to study "the portion of the elementary and secondary education funding formula which relates to the utilization of in lieu of property tax funds for the purpose of identifying and addressing any inequities in the application of the formula." The language is aimed at schools in energy-producing counties because oil and coal producers pay production, extraction and severance taxes, instead of (in lieu of) property taxes.

The interim Education Funding Committee has several other broad areas of study on its list of responsibilities. The committee is directed to "consider potential necessary changes to the (K-12) funding formula to ensure equity, adequacy and sustainability." Lawmakers are also charged with examining "the delivery and administration of elementary and secondary education in the state,

and the short- and long-term policy and statutory changes that may result from or be necessitated by 21st Century technological advances and global economics.”

Legislators will also take on several studies related to the oil industry’s practice of hydraulic fracturing. A resolution passed by the legislature provides for a study of the estimated fiscal impact to the state of refracturing existing oil wells, including the estimated costs and benefits related to tax collections and any potential tax incentives for refracturing existing oil wells. Flip to page 16 of this issue to read *The Art of the Refrac*, an article about an initial study of refracs in North Dakota.

During the interim, lawmakers will also look into industrial water use by the oil and gas industry. The study will examine the recapture of water used in fracking, the recycling of water used in fracking, and fracking methods which don’t require the use of water.

Transportation funding, pipeline siting and wind energy will also be the subject of interim studies. Lawmakers will look at funding mechanisms available to the North Dakota Department of Transportation and political subdivisions for road construction, maintenance and other transportation infrastructure needs. The Energy Development and Transmission (EDT) Committee will study the gas and liquid transmission pipeline siting process, a follow-up to the passage of SB 2286, which effectively consolidated state and local pipeline siting procedures. The EDT Committee will also investigate wind energy impacts on the environment, agriculture and property values, as well as wind energy taxation and the manner in which those taxes are distributed. 

To offset projected demands, cities in the oil-producing region will remain heavily dependent on revenue from the gross production tax and local sales taxes.

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Emmons County: Preparing the County for DAPL

By Paul Adair

The digging started last summer on the 1,160-mile Dakota Access Pipeline (DAPL) in Emmons County. Over the following months, the county experienced an unprecedented boom of activity—not in oil but in construction. Now, a year later, the \$3.8-billion project is carrying up to 570,000 barrels of domestically produced light sweet crude oil through the Dakotas down to a storage and terminal hub outside Patoka, IL.

While the pipeline project's work may have finished, the legacy of DAPL remains for Emmons County.

During the construction phase, Emmons County saw up to 600 pipeline workers move into the region. Before long, man camps were popping up and Linton's motels, campgrounds, and rental properties were swept up by construction crews. It was a short-lived economic blessing for businesses, such as the local grocery store and restaurants which were kept busy.



Marlys Ohlhauser, Emmons County auditor and treasurer, helped prepare the county for growth associated with DAPL by introducing the WDEA's digital LoadPass Permits program.

"It was all good—increased revenue is always good for the community," says Emmons County Auditor and Treasurer Marlys Ohlhauser, who has been the county's auditor since 2006.

"As far as any problems that occurred while the workers were here, I really can't think of anything. The only effect we actually noticed was that there was more traffic and more people. Other than that, everything was fine."

Although they had zoning in place prior to the construction phase of DAPL, Emmons County was lacking a sufficient permitting system and was only averaging up to \$200 per month from the issuance of building permits. The impending arrival of DAPL required Emmons County to take the bull by the horns and begin implementing a permitting plan that worked sooner than later.

When Emmons County first heard the news that DAPL was coming through, officials reached out to Dunn County auditors, commissioners, road supervisors, and its permit office to invite them to Logan County for the quarterly six-county meeting. It was at that meeting that Dunn County could



sit down with its jurisdictional counterparts and go through Dunn's experience in implementing permitting systems during a boom.

"I took a look at Dunn County's system, molded it for Emmons County, and it took off from there," says Ohlhauser. "We were ready a full year before DAPL came to our county and it really helped. The system is still working for us—not just with DAPL but also for future projects, like the new wind farm that's now being talked about."

During the construction phase, Emmons County joined the Western Dakota Energy Association's (WDEA) Uniform County Permit Program for heavyweight and oversized trucks (now called LoadPass Permits) and also issued utility and approach permits, generating up to \$20,000 in fees over the summer. While not a large sum, it was certainly more than the money earned by the limited number of permits issued prior to the construction phase.

Emmons County also worked out a haul-load agreement with Michels Pipeline Construction, the company tasked with the installation of DAPL, so that after the work on the pipeline was done, any roads that were damaged during construction would be repaired without any impact on the county's infrastructure.

"Haul Road Agreements mandated that the company fix anything that was destroyed, and what they couldn't fix, they paid Emmons County to do instead, which was another benefit for us," says Ohlhauser.

Well before construction, Michels Pipeline came into Emmons County with an acute awareness of what they needed for permitting, bundling all their permit requests into packs of 20 or more. This helped streamline the process so that, while the demand on the office of the Emmons County auditor was greater than before DAPL, the workload itself was not considered to be overly onerous on Ohlhauser and her team.

"We were able to keep up with the permits very easily," says Ohlhauser. "When I received the utility and approach permits, I would have our supervisor go out and check the area to make sure everything was alright before the commission would approve them. It might have taken a few extra hours to do it all, but we were certainly able to keep up with everything and it was no big deal."

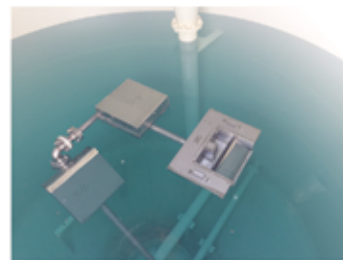
North Dakota has a deadline of February 1 for all valuations and because DAPL was not installed until after this deadline, Emmons County does not yet have the full taxable valuation for the pipeline from the state. These details won't be available until after

the State Equalization Board meets later in 2018. What is known, however, is that Emmons County will not be receiving any in lieu tax dollars for the pipeline and that the 2017 valuation will be based on the construction of DAPL rather than production.

As a member of WDEA, Emmons County finds great value in the LoadPass Permits program (formerly the Uniform County Permit Program). The permit system provides companies working within North Dakota a singular place to obtain permits for overweight and over-dimension loads that travel on the roads of member counties. The system itself has been in operation for over three decades, but the program has kept up with the times as the industry has evolved. As of 2016, the filing of permits through this system is strictly electronic and easily completed online, which Ohlhauser can appreciate.

"The LoadPass Permits program works very well for Emmons County. What I like about it is that truck drivers simply need to go to the website and apply for the permits online," says Ohlhauser. "We don't have to issue any permits, and the money is collected by the system before it is transferred into our bank account. I think it is a very positive program, and I am grateful we are a member of the WDEA and can make use of its permit program."

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EPA CHIEF SAYS DAYS OF FEDERAL COERCION ARE OVER

Gov. Doug Burgum is encouraging EPA Administrator Scott Pruitt to pursue a cooperative approach between the state and federal government on water, agriculture and energy issues.

Pruitt visited North Dakota in mid-August to discuss how federal regulations impact businesses in the state.

In an interview on the radio program *What's on Your Mind*, Pruitt said the Trump administration understands American businesses need regulatory certainty. Gov. Burgum said he appreciates Pruitt's plan to restore power to the states.

Pruitt is the former attorney general for the state of Oklahoma. During his tenure, he sued the EPA about a dozen times, including suits on regulations he's now reviewing including the *Clean Power Plan*, the "Waters of the U.S." rule and the Mercury and Air Toxics Standards.

LEGISLATURE'S TAX COMMITTEE GETS TO WORK

The North Dakota Legislature's Interim Taxation Committee held its initial meeting in August to begin its study of several topics assigned by the 2017 Legislature.

Top on the list is a study of the property tax system, with emphasis on the state's ongoing effort to deliver property tax reform and relief. The committee study will look at all property classifications and taxing districts. It will include an evaluation of the ways property tax information is provided to taxpayers and opportunities for participation and input in the property tax system.

Also on the committee's list of study topics are a look at how city growth and infill development affect property taxes and the application of property tax incentives to encourage economic growth.

For a list of committee assignments, go to www.legis.nd.gov/assembly/65-2017/committees/interim/taxation-committee.

GASOLINE PRICES EDGE UPWARD

The average price for gasoline is 23 cents higher than this time last year. The increase is attributable to higher demand during the summer travel season, which runs from April to September.

The federal government reported gasoline demand set a record in early August 2017 and Motor Club AAA said it expected those pressures to continue.

Crude oil prices remain stuck in a range between the upper \$40s and low \$50s per barrel, a slight increase from a trading band in the low to mid \$40s. Higher oil prices mean higher gasoline prices, though analysts said the rally for oil shouldn't push the price up too much higher, given a recent slowdown in exploration and production work in the United States.



BAKKEN OIL BOOM HAS BOOSTED TRUCKING

Improvement in one sector of the economy ultimately leads to boosts in other sectors, either directly or indirectly. This is the case with oil extraction in North Dakota and it has helped drive the growth of trucking services in the region.

North Dakota's oil boom also led to economic growth in other sectors such as real estate, hotels and restaurants, auto sales and others.

There are not enough truck drivers to fill all openings in western North Dakota. One company, Nuvera Environmental Solutions, recently went to a job fair in Duluth to recruit drivers to the Bakken.

NDLTAP PROMOTES SAFETY TALK

North Dakota's Local Technical Assistance Program is helping promote safety in the workplace.

Chris Padilla, NDLTAP technical outreach expert, writes a monthly publication called *Safety Talk* to help people become a "safety guru."

The publication covers many safety considerations to help develop, enhance and remind workers of key safety protocols. A safety mindset knows no boundary. It starts at home and carries through to community and work activities.



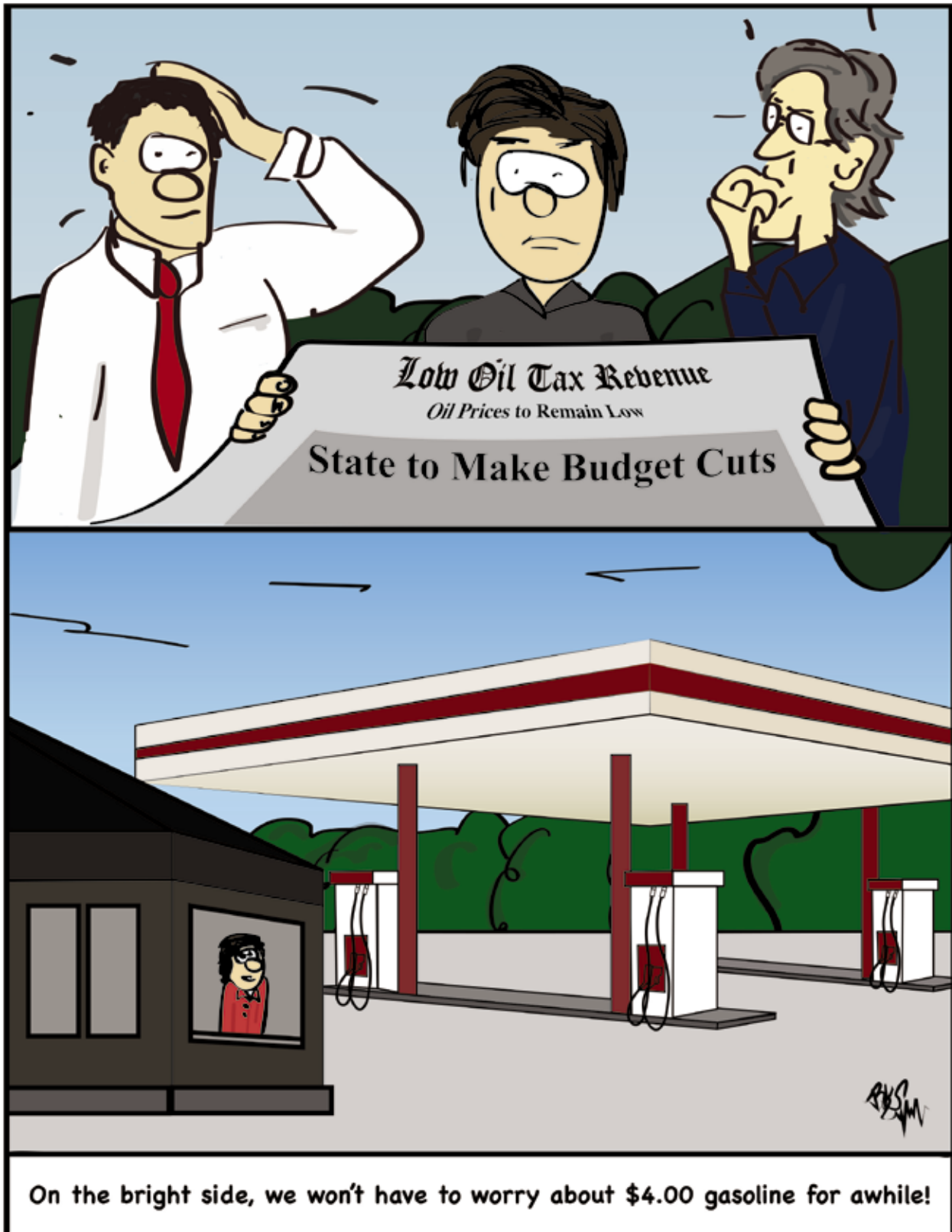
SHALE PLAYS SEEING STEEPER DECLINE CURVES

A new report from Horseman Capital Management Ltd. says decline rates in shale plays are becoming steeper than usual because drillers are placing too many wells in close proximity to one another.

The wells then kill pressure in each other, lowering the amount of oil that can be recovered from them.

"New well production is increasingly cannibalizing legacy production," Russell Clark, investment manager at Horseman Capital Management, said. "The decline rate looks to be accelerating."

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action combined with an engineered, laser-cut filter element delivers the highest possible flow and maximum solids separation without constant plugging or forming a cake layer.

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 - » Hair, lint and algae
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- Operationally efficient:
 - » Low maintenance and high uptime (no backwashing or excessive filter changes)
 - » High water recovery up to 99 percent
 - » Energy efficient (0.25 to two psi pressure drop across the filter)

The TEQUATIC™ PLUS F-75 Filter B-Series Skid is built and tested with your needs in mind. It is designed for fast “out of the box” installation and startup, and easy serviceability. Its reliable and proven skid design simplifies and optimizes performance in a compact footprint. It has a scalable modular configuration, so each skid can connect in parallel to a common feed manifold to meet required flows. Its innovative control system runs, monitors and logs essential parameters, and the touch screen interface allows for customization of timers and set points to any industrial setting.

Operation of TEQUATIC™ PLUS F-75 filters is simple yet effective. Pressure-controlled feedwater enters the unit and the water velocity across the filter screen initiates cross-flow filtration. The feedwater flow drives the cleaning brush assembly, activating the cleaning mechanisms within the filter, which continuously clean the filter screen, minimizing cake buildup. Solids enter the recirculation and solids collection chamber. Heavy solids remain in the collection chamber while other particles flow into the recirculation pipe, which feeds back into the feed inlet feedwater flow. Then, concentrated solids are purged periodically for disposal or further processing.

The control system for the TEQUATIC™ PLUS F-75 Filter B-Series Skid is a PLC-based processor (Siemens S7-1200) which automatically manages and monitors all critical system functionality. The HMI (Siemens KTP400) touch screen allows for simple customization of timers and set points to specific needs, and controlled access to set points is operator level and passcode protected. Automatic control, shutdowns and alarms are incorporated. Equipment includes ethernet communication hardware capabilities to communicate with plant SCADA systems or to set up remote monitoring/control. Operating data is recorded on an SD memory card. The controller and components are cULus-listed. Optional inputs and outputs are available to add sensors or to control additional valves and pumps.

www.dow.com



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Wilden® is pleased to announce the release of its new Chem-Fuse diaphragms specifically designed for industrial applications. Incorporating the core patented technology of the Wilden integral piston Pure-Fuse diaphragm, the new Chem-Fuse diaphragm is the ideal solution for critical industrial application issues without sacrificing performance.

Wilden Chem-Fuse diaphragm technology eliminates the potential leak point at the outer piston and outer piston abrasion, which is crucial for industrial applications that pump abrasive or dangerous fluids.

The diaphragm design also offers easy cleanability for faster changeovers between products. These features allow Chem-Fuse diaphragms to greatly enhance your pump through increased productivity, reliability and safety without impacting performance.

An additional benefit of Chem-Fuse diaphragms is the use of a large integral piston and full-stroke shaft that provides greater efficiency. This design allows Chem-Fuse diaphragms to provide up to 100 percent increased flow and suction lift compared to other diaphragms.

Wilden Chem-Fuse diaphragms are available in 25 mm (one in), 38 mm (one to 1.5 in), 51 mm (two in) and 76 mm (three in) sizes with a temperature range from -40°C to 107°C (-40°F to 225°F). These diaphragms are constructed of Wil-Flex™ material that offers excellent flex life, high abrasion resistance and outstanding durability, even when handling acids, caustics and other aggressive fluids. Chem-Fuse diaphragms are available for Wilden Pro-Flo® SHIFT bolted-metal and plastic models.

www.psgdover.com/en/wilden

THE BAKKEN TOP 20

The following are the top 20 oil and gas producers in North Dakota as of mid-August 2017. The list, which shows the cumulative amount of oil and gas that the companies have produced in North Dakota in 2017, was provided by the North Dakota Department of Mineral Resources in mid-August 2017.

As of mid-August 2017, there are 57 active rigs drilling in the North Dakota oil patch, according to the North Dakota Oil & Gas Division of the North Dakota Department of Mineral Resources. This number is up from 50 in May and 55 in June, and down one rig from 58 in July. The all-time high reached 218 on May 29, 2012.

As the West Texas Intermediate (WTI) oil price flows between \$40 and \$50 per barrel, operators have shifted from running the minimum number of rigs, with incremental increases and decreases throughout 2017. If the WTI price dips below \$45 per barrel for longer than 30 days, the rig count is expected to drop. The statewide rig count is down 74 percent from the high.

The number of producing wells in North Dakota, as of June 2017, is 13,915 (a preliminary, NEW all-time high). Of those wells, 11,891 (85 percent) are now unconventional Bakken – Three Forks wells and 2,024 (15 percent) produce from legacy conventional pools. Over 99 percent of drilling now targets the Bakken and Three Forks formations.

1. **Whiting Oil & Gas Corp.**
Oil production (2017): 19,008,368 bbls
Gas production (2017): 44,143,939 mcf
Tel: (303) 837-1661
Web: www.whiting.com
2. **Continental Resources, Inc.**
Oil production (2017): 17,546,775 bbls
Gas production (2017): 31,886,665 mcf
Tel: (405) 234-9000
Toll-Free: (800) 256-8955
Killdeer: (701) 764-6582
Rhame: (701) 279-6688
Tioga: (701) 664-3001
Web: www.contres.com
3. **Hess Bakken Investments II, LLC**
Oil production (2017): 16,524,506 bbls
Gas production (2017): 30,890,955 mcf
Tel: (713) 496-4000
Web: www.hess.com
4. **Burlington Resources Oil & Gas Co., LP**
Oil production (2017): 12,731,978 bbls
Gas production (2017): 20,101,755 mcf
Tel: (432) 688-6800
Web: www.br-inc.com
5. **XTO Energy Inc.**
Oil production (2017): 12,266,039 bbls
Gas production (2017): 26,044,613 mcf
Tel: (817) 870-2800
Toll-Free: (800) 299-2800
Web: www.xtoenergy.com
6. **EOG Resources, Inc.**
Oil production (2017): 11,703,109 bbls
Gas production (2017): 14,751,933 mcf
Tel: (713) 651-7000
Toll Free: (877) 363-3647 (EOGR)
Web: www.eogresources.com
7. **Oasis Petroleum North America, LLC**
Oil production (2017): 11,082,464 bbls
Gas production (2017): 25,407,140 mcf
Tel: (281) 404-9500
Web: www.oasispetroleum.com
8. **Statoil Oil & Gas, LP**
Oil production (2017): 8,707,656 bbls
Gas production (2017): 11,536,788 mcf
Tel: (512) 427-3300
Web: www.statoil.com
9. **QEP Energy Co.**
Oil production (2017): 7,951,319 bbls
Gas production (2017): 16,174,290 mcf
Tel: (303) 672-6900
Web: www.qepres.com
10. **Marathon Oil Co.**
Oil production (2017): 7,681,886 bbls
Gas production (2017): 9,044,768 mcf
Tel: (713) 629-6600
Web: www.marathonoil.com
11. **WPX Energy Williston, LLC**
Oil production (2017): 7,082,432 bbls
Gas production (2017): 7,438,386 mcf
Tel: (701) 837-2900
Web: www.wpxenergy.com
12. **HRC Operating, LLC**
Oil production (2017): 7,024,047 bbls
Gas production (2017): 9,129,168 mcf
Tel: (832) 538-0300
Web: www.halconresources.com
13. **Enerplus Resources USA Corp.**
Oil production (2017): 4,211,717 bbls
Gas production (2017): 5,233,721 mcf
Tel: (701) 675-2135
Web: www.enerplus.com
14. **Newfield Production Co.**
Oil production (2017): 4,173,477 bbls
Gas production (2017): 8,941,902 mcf
Tel: (281) 210-5100
Web: www.newfld.com
15. **Slawson Exploration Co., Inc.**
Oil production (2017): 3,887,744 bbls
Gas production (2017): 3,974,335 mcf
Tel: (316) 263-3201
Fax: (316) 268-0702
Web: www.slawsoncompanies.com/exploration.html
16. **Petro Hunt, LLC**
Oil production (2017): 3,111,793 bbls
Gas production (2017): 6,371,176 mcf
Tel: (214) 880-8400
Charlson: (701) 675-2467
Web: www.petrohunt.com
17. **Lime Rock Resources**
Oil production (2017): 2,297,550 bbls
Gas production (2017): 1,995,726 mcf
Tel: (713) 292-9500
Web: www.limerockresources.com
18. **SM Energy Co.**
Oil production (2017): 2,204,806 bbls
Gas production (2017): 2,427,351 mcf
Tel: (406) 245-6248
Web: www.sm-energy.com
19. **Zavanna, LLC**
Oil production (2017): 1,997,262 bbls
Gas production (2017): 7,202,102 mcf
Tel: (303) 595-8004
Web: zavanna.com
20. **Nine Point Energy**
Oil production (2017): 1,692,108 bbls
Gas production (2017): 2,595,010 mcf
Tel: (720) 697-2111
Web: www.ninepointenergy.com



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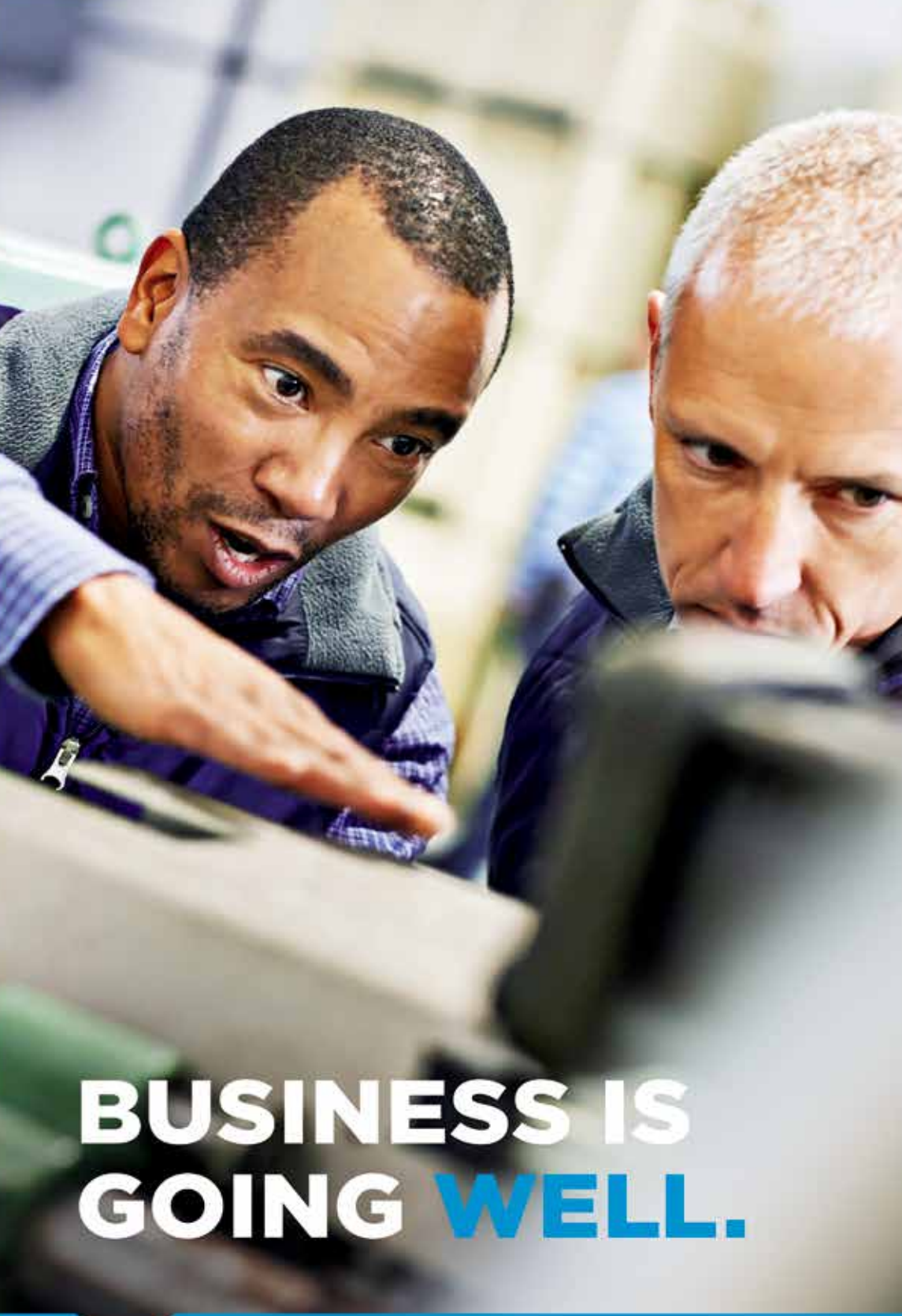


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