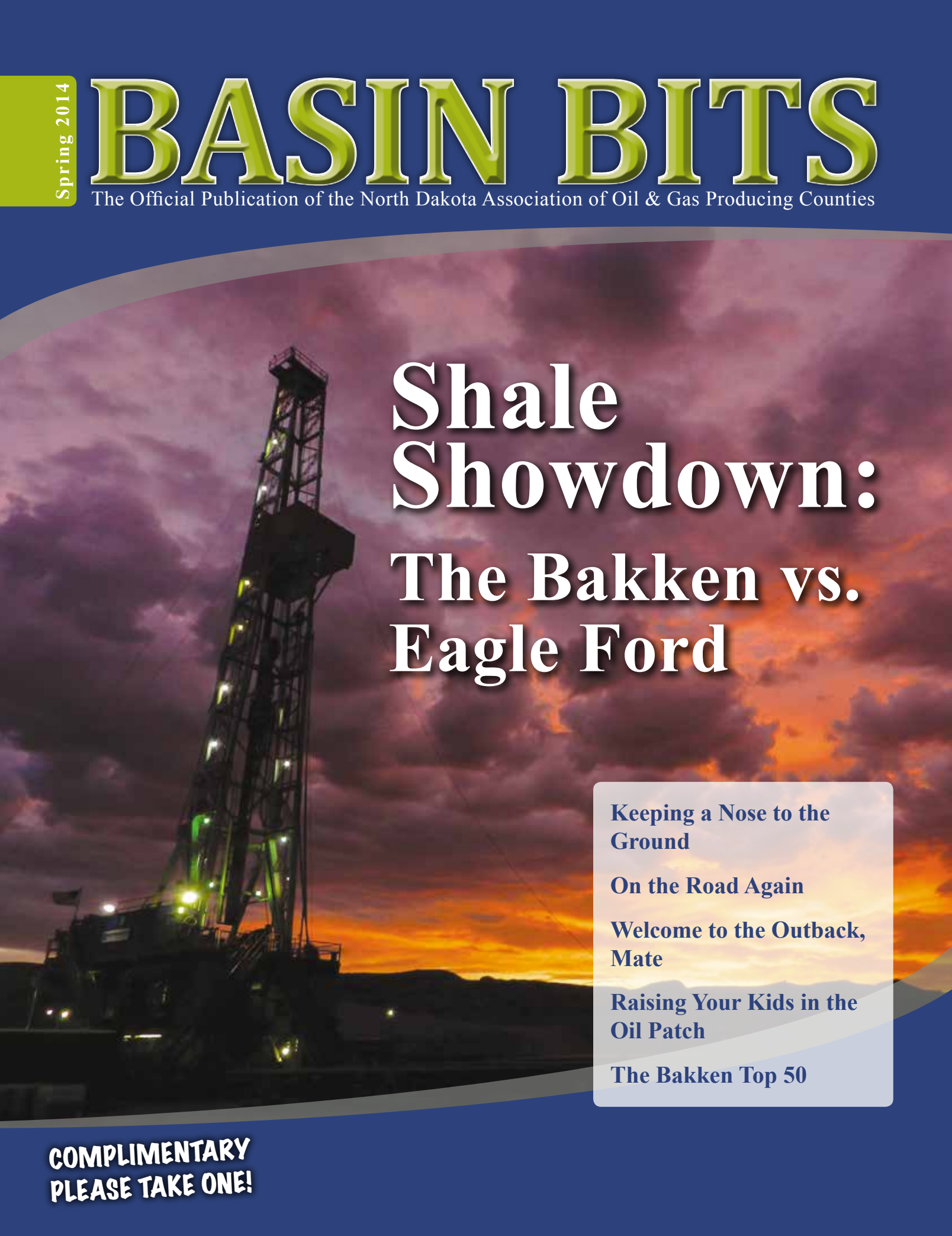


Spring 2014

BASIN BITS

The Official Publication of the North Dakota Association of Oil & Gas Producing Counties



Shale Showdown: The Bakken vs. Eagle Ford

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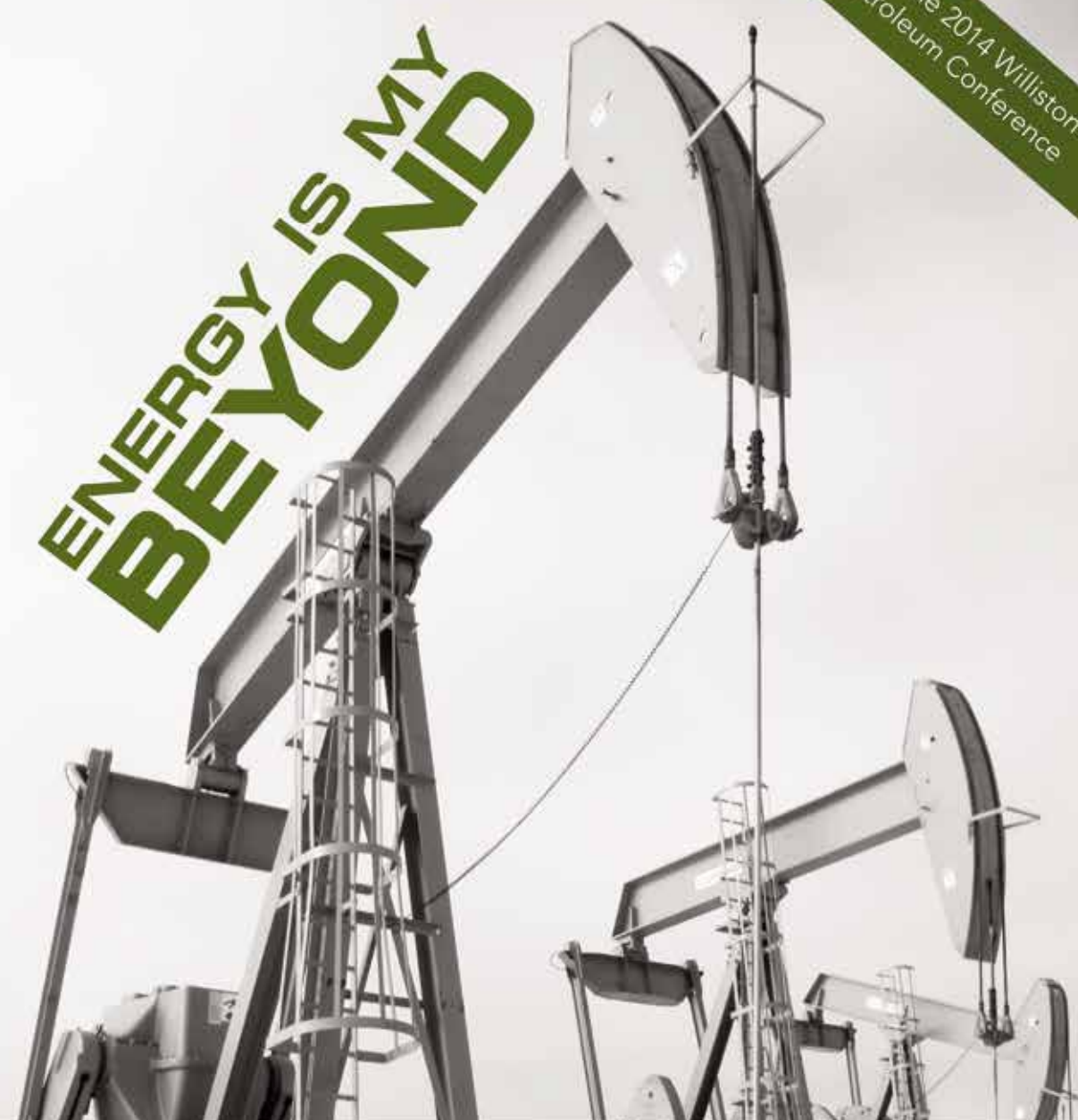
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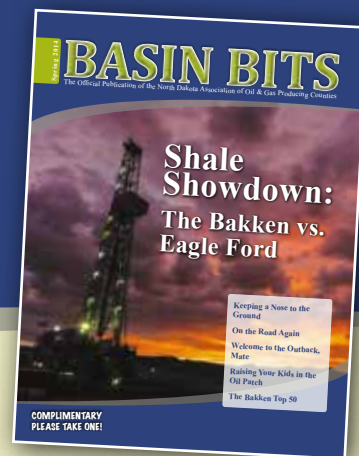
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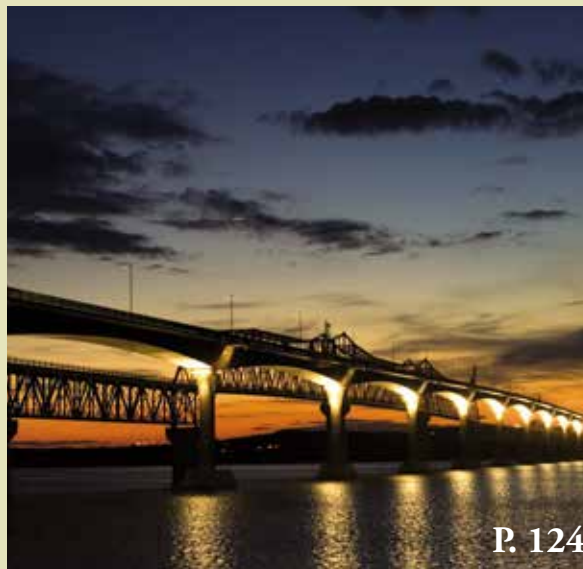
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Cover photo credit: This issue's cover depicts an early-morning sunrise at a rig on federal land in North Dakota. The image was taken by Marc Poutre near the Montana border and has been printed with permission.



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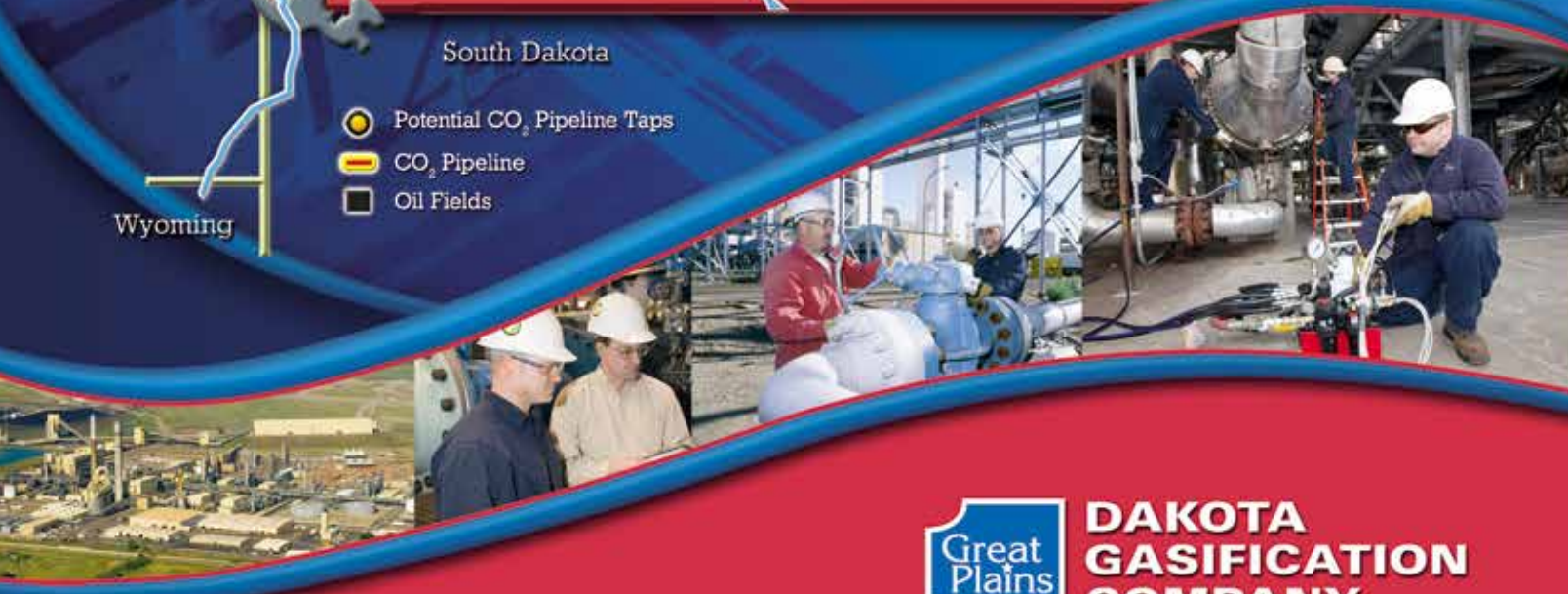
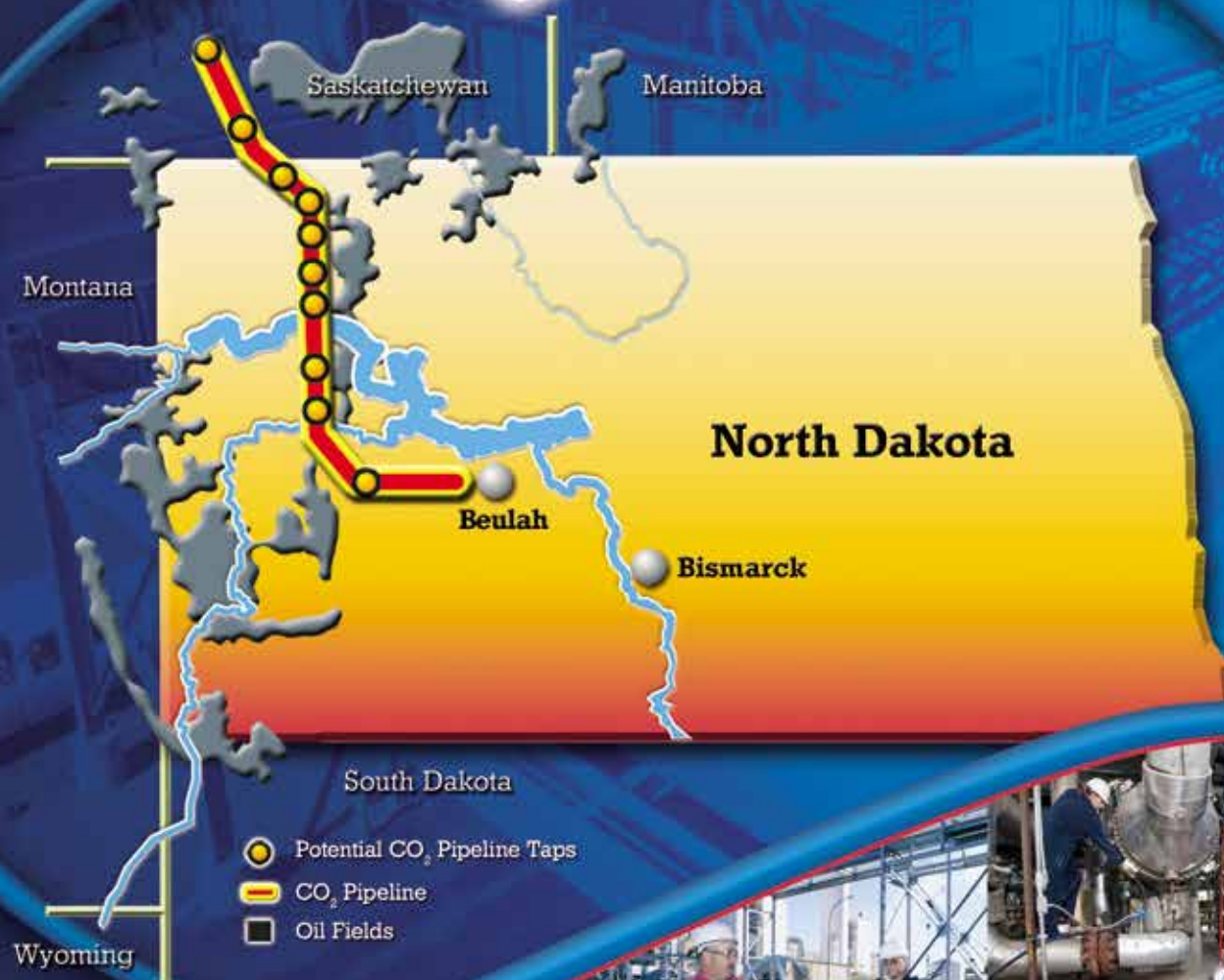
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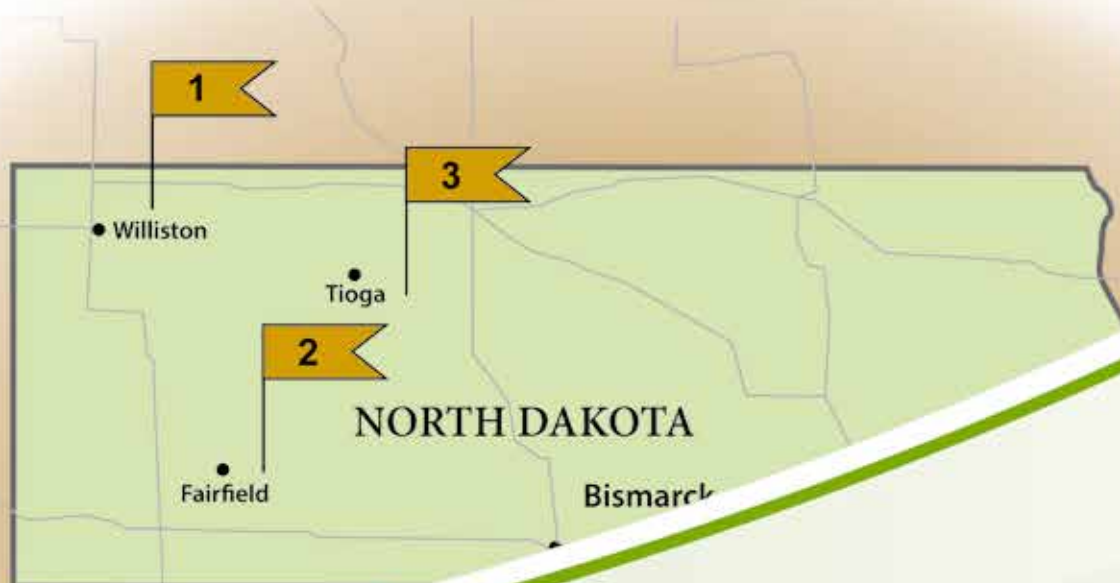
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From the Desk of the North Dakota Department of Transportation



Dave Leftwich
North Dakota Department of
Transportation

To meet the growing challenges felt all over the state, the governor and state legislature designated \$2.3 billion for transportation projects across the state for the 2013-2015 biennium.

Governor Jack Dalrymple and North Dakota Department of Transportation (NDDOT) Director Grant Levi recently announced that Dave Leftwich will serve as liaison for western North Dakota transportation development. In this role, Leftwich will work with city and county officials in western North Dakota, as well as the state's energy impact coordinator, Rory Nelson, to help meet the transportation needs in the state's oil and gas region.

Leftwich retired from the NDDOT in November 2013 and started in this new role in January. During his 39-year-long career at the NDDOT, he worked closely with local officials, serving a majority of those years as local government engineer.

"In serving NDDOT and western North Dakota as a transportation liaison, I hope to learn more about the local needs in each of the impacted communities," says Leftwich. "Working together, we can make informed decisions about the future of transportation in North Dakota."

Leftwich will work primarily out of Watford City and meet with local community leaders on a regular basis to get a better understanding of the transportation challenges that many communities in the area are facing.

The transportation needs are great in western North Dakota. Increased traffic volumes, particularly heavy trucks, have accelerated the deterioration of state

highways in the oil impacted areas. Roadways in the western part of the state were originally built to handle agricultural traffic and were not built to carry the heavy loads associated with oil development. Traffic volumes have increased significantly in recent years. From 2010 to 2012, traffic statewide has seen an increase of 22 percent, while western North Dakota has seen an increase in traffic of 53 percent.

To meet the growing challenges felt all over the state, the governor and state legislature designated \$2.3 billion for transportation projects across the state for the 2013-2015 biennium. Approximately \$1.5 billion of that amount is being spent in the western part of the state on state highways, along with county and township roads. With that being said, the Department of Transportation had the largest construction program in 2013, with approximately \$878 million in projects taking place across the state. The 2014 construction program is almost just as large, with approximately \$815 million being bid this year.

The projects taking place in western North Dakota are large-scale investments. Nearly \$300 million is being devoted to the US Highway 85 corridor to four-lane the roadway between Watford City, ND and Williston, ND, including the replacement of the Lewis and Clark Bridge south of Williston.

Other high-profile projects include the many truck reliever routes and truck bypasses being built around communities

in oil-impacted areas to help relieve truck traffic through these cities. The department is working on a total of seven reliever routes, including:

- The Watford City US 85 Southwest Bypass;
- The Watford City ND 23 Southeast Bypass;
- The Alexander Bypass;
- The Williston Northwest Bypass;
- The Dickinson Interim Bypass;
- The New Town Northeast Bypass; and
- The Killdeer Bypass.

These kinds of projects are unprecedented for the department, which, for many years, has focused on maintaining the transportation system that has met the needs of North Dakotans for many years. Now, that system is being greatly enhanced to accommodate the sudden increase in traffic and accommodate the heavy trucks needed for oil development.

These investments will make a great impact to the infrastructure in western North Dakota. However, there are many more needs to be addressed. The NDDOT is working with Upper Great Plains Transportation Institute to look at future statewide transportation needs and traffic modeling.

With a dedicated group of people and the collaborative work with local communities across the state, the Department of Transportation is confident that the transportation needs of North Dakotans will be met and the economic vibrancy of the state will continue to flourish.



From the Desk of the North Dakota Association of Oil & Gas Producing Counties' President



Supt. Steve Holen
President
North Dakota Association of
Oil & Gas Producing Counties

If everyone is able to come together and work toward long-term solutions, the entire state will benefit for years, even decades, to come.

Hello! Allow me to introduce myself. I am proud to be the 2014-2015 president of the North Dakota Association of Oil and Gas Producing Counties (NDAOGPC). I know I have big shoes to fill following past president Dan Brosz. Thank you, Dan, for your service to the NDAOGPC.

I am currently the superintendent of schools for McKenzie County Public School District #1, which is located in Watford City, ND. I have been a member of the executive committee for the NDAOGPC for seven years. I am a member of many boards and committees in my work; however, my involvement with this association has been some of the most rewarding work I have done. There are many great individuals and leaders in western North Dakota addressing the needs and impacts of the current oil development. It is a privilege to be part of these efforts and to work

for the benefit of the citizens of western North Dakota.

My journey to education administration began with my graduation from Des Lacs – Burlington High School. I then became a mathematics teacher in the Fargo school district. I received a Master's Degree from North Dakota State University and, eventually, a Doctoral Degree from the University of North Dakota. Upon completion of my administrative degree, I accepted my first administration position in the Bisbee-Egeland school district in central North Dakota. It was a great experience for two years; however, the ability to work for the McKenzie County Public School District #1 – Watford City was a tremendous opportunity and I took it in July 2005.

District #1 is a school district with a long history of strong education and community support. When I arrived, the

Continued on page 17

ABOUT THE NORTH DAKOTA ASSOCIATION OF OIL & GAS PRODUCING COUNTIES

The North Dakota Association of Oil & Gas Producing Counties (NDAOGPC) is the trusted and unified voice for the betterment of the citizens of North Dakota and the membership of the NDAOGPC.

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school district environment was much different than it is today. Our community had declining student enrollment, teacher reductions, and we were considering a move to one school building, which would have eliminated the current elementary building. We faced declining enrollment in students, despite our best efforts to encourage families to move back to our area.

In the spring of 2008, our enrollment dipped to its lowest at 512 students for Grades K-12. At that point, however, the school district began to see some small increases or leveling off of decline with the Bakken oil development beginning to make a substantial presence in our area. Fast forward to today, just six years later, and the McKenzie County Public School District #1 has 1,070 students in Grades K-12, which includes a kindergarten class of over 120 students—a substantial increase from 38 in 2008.

The school board began working on the new growth issues by filling in current buildings and moving the sixth grade to the high school facility. The school district also completed a building addition and renovation at the elementary school to start the 2013-2014 school year, which added capacity for almost 200 students to the building; however, the growth filled the additional area immediately.

In the summer of 2013, the school district completed a demographic study that showed an expected student population of over 1,600 students by 2017-2018. The school district, while being virtually at capacity with the current population, began planning for a new school building to be built, increasing capacity and alleviating the need for portable classrooms. In North Dakota, public schools are required to provide education for the students in their districts. We cannot simply say “no more, we’re full.” We must provide for our new students.

On March 11, 2014, the school district residents held a scheduled vote on a \$27-million bond referendum for a new high school to be built east of Watford City, ND.

The journey from school closures to new school construction happened quickly and is certainly an interesting dynamic. Our school district is not alone in that journey. Many school districts in western North Dakota have similar experiences and also face unprecedented school construction projects. The North Dakota school construction loan program, which typically has been a very quiet program, increased its allocation by over 400 percent. The

requests were more than the allocation within the first four months of the current biennium. The North Dakota Legislature meets once every two years, and the state budget is set in two-year increments. Because of the budget cycle, schools in need may have to wait until 2016 before they see walls going up on new buildings. The resurgence of youth in the state is tremendous to see and is certainly putting school districts into growth mode after years of managing declining enrollment.

The news of record births in North Dakota after so many years of decline is certainly encouraging; however, the challenges of bringing school district infrastructure back to levels to support the growth are clear and need additional funding. The rapid growth for western North Dakota needs some additional support to ensure that the tax payers in these areas are not overburdened with the challenges of school districts and additional facilities. The efforts to reduce property tax in North Dakota are appreciated, however, some of it is reversed when building projects are initiated and funded by local tax bases.

Of course, the funding of infrastructure in our oil-impacted areas is much more than a school district problem. Cities, counties and townships are challenged with the ability to address infrastructure issues with limited resources and short timeframes. The extension of road systems and improvements to withstand current volume and loads are well above the resources currently available to these subdivisions—especially those in the heart of this development. Road systems, as well as water and sewer lines, are an essential element to the development of badly needed permanent housing projects in western communities.

The cost of construction in our areas is a major obstacle for addressing the growth issues and is a challenge for keeping the cost of living at a reasonable level. The cost of infrastructure is often placed back on the developers, which is, ultimately, driving the housing and rental prices up, as well. The long-term solution for many of the issues is more supply to reduce prices and address the demand. However, the ability to get the supply increased to meet demand is a challenge for the political subdivisions in providing the access and infrastructure expected for the private developers to do business in our areas.

While the state legislature has attempted to address the issues of western North Dakota in recent legislation, it is apparent that the need is exceeding

the funding provided and new solutions should be explored. The reality remains: these solutions need to be found quickly; time is very important for infrastructure construction and to prevent our cities, counties and school districts from getting further behind in their ability to address needs. Whether it is a special session or an influx of state investments, western North Dakota is asking for a broad and swift solution to the funding gaps currently found and to allow the local subdivisions to address individual issues.

The opportunity for North Dakota to capitalize on the current economic environment and oil development is tremendous. This generation needs to look back and feel proud of the way this opportunity was handled. If everyone is able to come together and work toward long-term solutions, the entire state will benefit for years, even decades, to come. However, the solutions need to come quickly to avoid missed opportunities and the ability to build communities in western North Dakota.

I look forward to meeting you in my role as president of the NDAOGPC. Have a great summer!



SAVE THE DATE!

High-fives all around! Now that we're right about to surpass the milestone, the Bakken will be celebrating the fact that we're on track for 2014 to be the year that we produce one million barrels per day! The festivities will be held on June 25, 2014 in Tioga, ND and will be put on by Neset Consulting Service. Don't miss the party!



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LED-Driven Infrared Sensors: Shining New Light on LEL Gas Measurement for Oil and Gas and Confined Space Entry Applications

Oil and gas production and work in confined spaces exposes field personnel to a variety of toxic and explosive gases in every day drilling, processing, transport and municipal operations. Explosive gas build-ups can endanger not only the workers nearby, but also a widespread area beyond the working area; making fast, accurate measurement of combustible gases below LEL levels critical to maintaining safety. Today, there are two main sensor technologies used for detecting explosive gases: catalytic bead and infrared.

“With more workers requiring confined space entry than ever before, safety during these industrial operations is critical.”

Catalytic Bead Sensors

Catalytic bead, or “pellistor”, sensors were developed in the 1960s as a more accurate replacement to canaries as early warning systems for toxic and explosive gases in mines. The sensor design features a platinum coil embedded in a catalyst-coated alumina bead (Diagram 1). A gas sample oxidizes, or combusts, upon contact with the catalyst, causing the temperature of the bead to increase, which in turn causes the resistance of the platinum coil to change. The measured change in resistance indicates the amount of combustible gas present.

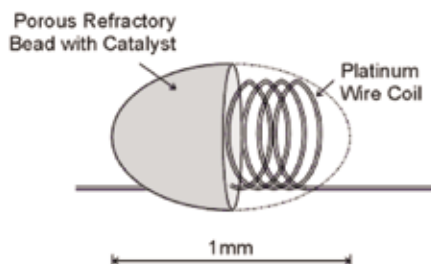


Diagram 1
Image from City Pellistor Technology:
<http://www.citytech.com/technology/pellistors.asp>

The sensor responds differently to different types of combustible gases due to four main causes:

1. Heat of combustion. Different gases burn, or combust, at different temperatures, causing different amounts of heat to be transferred to the bead, and thus different changes in resistance through the platinum coil.
2. Lower Explosive Limit (LEL) volume. Each combustible gas has a particular concentration in air at which it becomes explosive. When a sensor displays a percentage of LEL readout, it is based on the LEL concentration for a specific reference gas. It is no surprise that the gases with a higher v/v percentage required for their LEL also have higher signal outputs on catalytic bead sensors.
3. Diffusion due to Brownian motion. Gas molecules diffuse through air and filters, with the speed largely dependent on their molecular size. Large gas molecules, such as the long hydrocarbon chains, diffuse more slowly than smaller molecules, such as methane gas.
4. Catalyst-gas reactivity. Combustible gases react differently to different catalyst coatings. One coating may react strongly to a

particular gas, but only weakly to another gas.

Though they've been in use for over 60 years, catalytic bead sensors have changed very little over time. Most improvements have been focused on the catalyst materials used to coat the alumina beads, along with the reduction in bead size, to reduce required power, but the majority of the design remains unchanged.

During normal sensor operation, gases reacting with the catalyst can consume the catalyst coating, gradually degrading sensitivity and causing signal drift and reducing the lifespan of the sensor. Because of this, catalytic bead sensors have a typical lifespan of 3-5 years (most are warranted for two years) and must be calibrated and tested as frequently as every day and no less than every 90 days.

Catalytic bead sensors are also susceptible to poisoning by a variety of materials commonly found in oil and gas applications, including silicone vapors, sulfur compounds such as hydrogen sulfide (H₂S) and halogenated hydrocarbons, such as those used in fire suppression. These chemicals reduce and eventually completely degrade the sensitivity of the catalytic bead sensor until it fails to react to gas at all, a potentially hazardous condition.

Because catalytic bead sensors combust the target gas within the sensor cell, they are not typically intrinsically safe and a flame arrestor must be used to prevent ignition of environmental gases. This flame arrestor significantly reduces sensor response to large hydrocarbons, such as those found in diesel gasoline and jet fuel. The sensor will read low even in high concentrations of those gases. Oxygen must also be present in the environment for the target gas to combust; pellistor sensors will not work in the inert, oxygen-depleted atmospheres used in many oil and gas operations.

Catalytic bead sensors require around 225mW of power to operate. For the average portable four-gas detector, the catalytic bead type LEL sensor typically accounts for more than half of the total power draw of the unit, which results in typical run times of 10-20 hours, before a detector must be charged.

Non-Dispersive Infrared Sensors

In more recent years, non-dispersive infrared (NDIR) sensors have emerged as an alternative for the aging catalytic bead technology. Infrared sensors consist of a gas cell through which infrared radiation passes (Diagram 2). Gas molecules in the cell absorb certain frequencies of radiation in the bonds between dissimilar atoms (carbon and hydrogen, for example). Dual infrared radiation detectors within the gas cell measure the amount of radiation transmitted through the gas (active detector). The reference detector measures a specific IR wavelength that is not absorbed by either the

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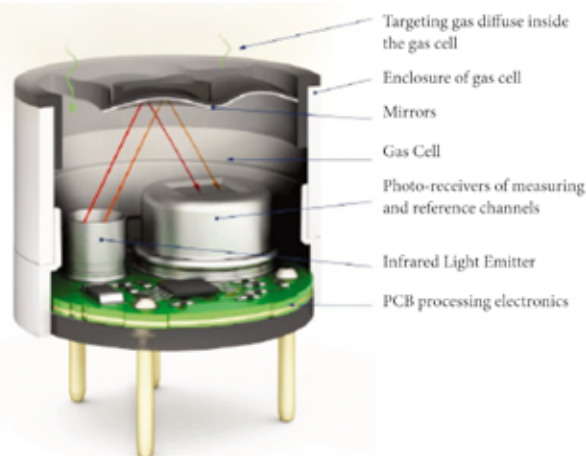


Diagram 2: Image from OptoSense, LLC

target hydrocarbon molecules or possible interfering molecules, such as water vapor, to compensate for any interfering factors such as dust and humidity. The difference in radiation measured by the two detectors indicates the level of gas present.

Photodiode powered NDIR sensors are intrinsically safe and don't require the use of a flame arrestor. This more easily allows large hydrocarbon molecules to be detected. Since the gas is not reacting with chemicals, the sensor is immune to poisoning. Additionally, unlike catalytic beads which require oxygen to operate, NDIR sensors can be used in reduced-oxygen or even inert environments. Recent advances in NDIR sensors have replaced the traditional incandescent radiation source with photodiodes (similar to LEDs), significantly reducing the power consumption of the sensor from 100mW to less than 5mW.

NDIR sensors are typically tuned to measure the absorption of hydrocarbon (C-H) bonds at 3.4 or 3.33 microns, which are suitable for most hydrocarbon gases. Due to its diatomic structure consisting of only two similar hydrogen atoms, hydrogen (H₂) gas does not absorb infrared radiation and will not be measured by an NDIR combustible gas sensor. Further, since the NDIR sensor is targeted for absorption at a specific micron wavelength, some gases, such as acetylene, will not be detected.

However, when an NDIR sensor is used in a multi-gas instrument, both hydrogen and acetylene gas can be detected through cross-sensitivity with the carbon monoxide (CO) sensor, as shown in Table 1:

Table 1: CO cross-sensitivity as %LEL

Gas	LEL	CO cross-sensitivity	CO reading at 10% LEL
Hydrogen	4% by vol.	30%	1200 ppm
Acetylene	2.5% by vol.	30%	750 ppm

Dual-beam/dual-detector sensor designs (Diagram 3) provide a fail-safe method to detect when either the transmitter or the receiver components fail. Since the sensor cannot be poisoned like catalytic beads, only a blocked sensor would prevent the sensor from indicating a problem. The redundancy also serves to minimize signal drift, which allows for testing, calibration and maintenance cycles of six months or more.

Sensor Comparison

As previously mentioned, NDIR sensors are more responsive to larger hydrocarbons than to smaller ones. This is opposite of catalytic bead sensors, which has caused many multi-gas manufacturers to recommend calibrating to pentane or hexane, in order to compensate for the catalytic bead sensor's lack of sensitivity to heavier hydrocarbons. NDIR equipped multi-gas instruments calibrated to methane will allow increased sensitivities to larger hydrocarbon gas while not having to deal with the problems associated with calibrating to an uncommon and non-target gas. This difference in catalytic bead and NDIR sensor response to the alkane chain of hydrocarbon gases is demonstrated in Diagram 4.

Infrared Measurement Scheme

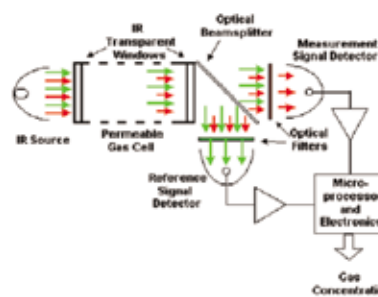


Diagram 3: Dual-beam/dual detector NDIR sensor design

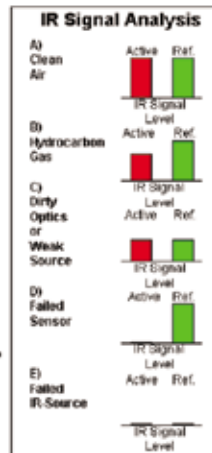


Diagram 4: Pellistor vs. IR Cross-Sensitivity to Various Hydrocarbons

Table 2: Sensor Comparison Summary

Catalytic Bead	LED-Driven Infrared
Power hungry – short battery life	Low power – 2-month battery life
Not fail-safe	Fail-safe
Susceptible to poisoning and inhibiting chemicals	Immune to poisoning and inhibiting chemicals
Requires oxygen to operate	Can operate in inert atmospheres
Typically not intrinsically safe	Intrinsically safe
Reduced response to large hydrocarbons	Increased response to large hydrocarbons
Testing/calibration interval of 1-90 days	Testing/calibration interval of 6+ months
Susceptible to significant signal drift	Minimal signal drift
Detects all combustible gases	Detects only hydrocarbons
Lifespan of 3-5 years	Lifespan of 10 years
Shock-sensitive	Shock-resistant
Simple analog circuits	Digital communication
Lower initial cost	Lower long-term cost

While the initial cost of infrared sensors is typically slightly higher than that of catalytic bead sensors, the medium to long-term costs favor the infrared sensor. However, the LED-driven NDIR equipped multi-gas instruments are now available in the mid-\$700 range and are more compact and easier to use than those equipped with the catalytic bead sensors previously available. The photodiode-driven infrared sensor fails to a safe condition compared to the catalytic bead which fails to an unresponsive condition, requiring significant field maintenance (frequent bump testing and calibration) to ensure it is still functioning. Catalytic beads can detect more combustible gases which may make it the more appropriate choice in certain applications. NDIR sensors are usable in inert atmospheres, whereas the catalytic beads require oxygen to operate. A summary of the sensor differences as shown in Table 2.

With more workers requiring confined space entry than ever before, safety during these industrial operations is critical. Using the latest, most advanced technology to overcome the limitations of older sensor designs ensures the safest conditions for workers, residents in the surrounding areas and the environment. For combustible gas measurement, photodiode-driven infrared sensors are the next generation of safety.



Diagram 5: Gas Clip Technologies' Multi Gas Clip

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ENERGY ON THE MOVE

From the Desk of the North Dakota Association of Oil & Gas Producing Counties' Executive Director



Vicky Steiner
Executive Director
North Dakota Association of
Oil & Gas Producing Counties
North Dakota House Representative
for District 37, Dickinson, ND

Pipelines will fail at times; but as a state, we can work to ensure more success with pipeline regulation and reclamation.

If you are new to this area, you will likely notice that North Dakotans often start conversation with a weather topic. This past winter, the topic had predictably been focused on “what a long, cold winter” it was. By March, you could just look at someone and say, “Cold, can’t wait for summer,” and their heads would shake in immediate agreement.

The winter of 2013-2014 was a tough winter—and it impacted my car, a used, grey, non-descript Buick Park Avenue with 160,000 miles on it.

Right after Christmas, on a fiercely cold day, the gas gauge needle in my Buick dropped to empty and never moved again. Even with a full tank, the needle sags down. For those of you who know my husband, well, you know he might remind me that a broken gas gauge is not a big deal because you will always know how much gas you have if you calculate miles driven and tank capacity. That would be true, if I were him. Or, you can push the “Miles to Empty” button on the left-hand side of the dashboard. The biggest problem is that you have to remember to check; it limits how many times you jump in and start driving with wild abandon. That’s a challenge.

And, challenges are what you face in North Dakota, especially in this part of the Bakken. Extremely cold weather this past year was only one of them. Car gauges, frozen waterlines, icy highways, flooding rivers, trains colliding and people who take shortcuts with radioactive waste material are only part of that list.



As we move into spring and summer, you will notice that the state will be growing its lists of regulations and rules on various parts of the oil and gas industry. Why? In part, it is because some people took illegal shortcuts this past winter. It is a challenge getting everyone to play by the same rules. The

companies that play by the rules end up with higher costs because, obviously, the shortcuts saved somebody some money.

I won’t defend every rule but, generally, rules are in place to protect the public from harm. Our state agencies are entrusted to

Continued on page 23

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CASE
CONSTRUCTION

Continued from page 21

protect the public from harm, but they will have public input on new rules this spring and summer.

Laws and rules are made to level the playing field for everyone working in the Bakken. A good example was the illegal dumping of filter socks near Noonan, ND. Filter socks pose a risk to human health if their concentration is above natural limits. We are exposed to naturally occurring radiation every day, but certain concentrations can be toxic, so rules will be created to curb this illegal activity. Hopefully, the fine can recover the clean-up costs.

Some of our members from the communities of Williston, Watford City, Dickinson and Minot, ND outlined their issues, along with oil county commissioners, this February at "A Western Conversation" meeting hosted in Bismarck, ND by the North Dakota Association of Oil & Gas Producing Counties and Vision West ND. After looking to increase their infrastructure capacity, they discovered the "sunset" provision put on last legislative session in a new funding formula from *House Bill 1358* meant they would miss the construction season of 2015. Those cities have taken on debt at a time when the state's coffers are building surpluses.

The "sunset" is a legislative term meaning that the new law ends and the old law takes effect. The new funding from 2013 session ends June 30, 2015. The challenge for these communities is to provide necessary housing for a workforce expected to top at 65,000 people, as the Bakken and Three Forks is "mined" or produced over the next 30 years. Williston Mayor Ward Koeser says the cities cannot afford to miss a construction season.

Oil companies pressure for more housing to retain their employees; the state keeps inviting workers to come. If the energy companies have adequate housing, they will retain employees and, ultimately, lower their costs. It is a challenge and we are looking for solutions. The governor and the Legislature's budget section approved some stop-gap measures, but the real solution has yet to be implemented.

The Williams County sheriff's department truck regulatory staff used to work 8:00 a.m. to 5:00 p.m. On March 14, 2014, their department went to a 24-hour schedule, looking for overweight, unpermitted trucks running illegally on county roads. They were suspicious that some trucks were running at night to evade the scales, so they changed their enforcement hours. Trucking companies that run



legal weights said, "Good." They bid jobs against the companies that try to take the illegal shortcuts, and this move to weigh more trucks at night levels the playing field.

The train derailment and fire near Casselton, ND, and others across the country brought federal attention to the safety of the railcars transporting Bakken crude. With 70 percent of Bakken oil being transported by rail, it is a challenge to the Pipelines & Hazardous Materials Safety Administration and the United States Department of Transportation to develop tank car requirements that improve public safety. They had considered new rules since 2012 but recent accidents brought the rulemaking to the forefront. The North Dakota Petroleum Council said, "Good; get out." And BNSF also announced a track improvement for its line from Minot, ND to Glasgow, MT, and promises to be more responsive to farm contracts.

"We expect pipeline operators in North Dakota to use best practices, and that may mean going above and beyond existing requirements to monitor and control pipeline flows," said Gov. Dalrymple, following a major pipeline spill.

Pipelines from the Williston Basin have the capacity to ship 583,000 barrels of oil per day. Three major pipeline projects, scheduled to be completed by late 2014, are expected to increase shipping capacity by 200,000 barrels of oil per day. Other pipeline projects, including the proposed Enbridge Sandpiper pipeline, which would transfer as much as 225,000 barrels of oil per day to eastern United States markets, are in various stages of development.

Pipelines will fail at times; but as a state, we can work to ensure more success with pipeline regulation and reclamation.

Special places in western North Dakota drew some attention as new rules were discussed. The North Dakota Industrial Commission decided to limit comment to

public lands, leaving private lands alone. Wildlife habitat and view-shed issues will likely challenge all of us as the Bakken moves into our rural landscape.

Flaring. So much is written on flaring, I dare not step into it. It seems the challenge of flaring creates business opportunity for those who can find solutions. According to the *Prairie Business Magazine*, "The North Dakota Industrial Commission in March adopted several steps aimed at curbing natural gas flaring as recommended by the Department of Mineral Resources Director Lynn Helms. Commission members voted to begin requiring gas capture plans for all drilling permit applications after June 1. Operators also will have to provide an affidavit stating they have provided the plan to all natural gas gathering companies in the area. Helms says companies are more likely to invest in gas gathering projects if they know the operator's plans a year or two in advance."

All the challenges here create lessons learned. Coming up in this edition of *Basin Bits*, the knowledge of the Bakken and Three Forks formations in North Dakota are being applied in other states. In this issue, look for news from Texas on the Eagle Ford formation and how Mexico wants in on the action. Read about how water will be managed in North Dakota, about research from the Energy and Environmental Research Center in Grand Forks, ND, and about emergency ambulance services rising to the challenge with grants from the state's oil impact fund. And how can you go wrong with a story on how oilfields are hiring dogs that can detect pipeline leaks?

The summer of 2014 will certainly be brighter and warmer than the winter "Polar Vortex" of 2014, and the Bakken will continue to be a challenge as it grows and blossoms this summer. If I can find another used car with a working gas gauge, maybe summer will be a little less challenging for me. That is the perfect summer. 🐾

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A Message from the North Dakota Department of Mineral Resources



Lynn Helms
North Dakota
Department of Mineral Resources

We've reached somewhat of a cruising altitude in the Bakken, averaging about 190 rigs, but that doesn't mean that there won't still be turbulence along the way.

About 15 years ago, when I first became director of the Oil and Gas division, Google launched as a search engine, the United States announced its first budget surplus in 30 years, and the average price for a gallon of gas was \$1.15. Two other major events happened soon after I became director—a new crop of youngsters entered kindergarten and the last rig moved out of North Dakota.

Today, “Google” is used as a verb, there has been only one federal budget approved in four years, the average price of gas \$3.20, and North Dakota has about 190 rigs running every day. Oh, and those kids that entered kindergarten? Well, they are about to graduate college, maybe with a degree and a job that will keep them working in North Dakota. A lot can happen in 15 years—it is nearly a generation.

Some things, like rig counts and the prices at the pump, can change rapidly, making that time frame seem insignificant. But when you think of it in terms of generations, it really puts all of this oil and gas development in our state into perspective.

We are just beginning an oil play that will span at least five generations. So, if you have grandchildren like me, it will be their grandchildren that will eventually reclaim these well sites we are building today. We need to ensure the wheels for proper development are in motion now, to make final reclamation easier in the future. We have already started by establishing energy corridors, and thanks to the use of multi-well pad drilling, there will be one-tenth the amount of roads and pipelines to reclaim. And to date, we have successfully

reclaimed nearly 8,500 legacy wells around the state, with many lessons learned.

But how did we get to where we are today? When the last rig left the state in 1999, I spent time with the Legislature and the Industrial Commission working to draft emergency rules to keep the oil and gas industry in sort of a “hibernating” state until oil prices could rebound and productivity could resume. Little did we know that when prices did rebound, we would experience the Bakken. Fortunately, we had already experienced something, which seemed enormous at the time, but was really like a kindergarten class that prepared us for the Bakken.

Cedar Hills in Bowman County was where old Red River Formation wells were starting to decline. When Cedar Hills was developed using horizontal wells from 1995 to 1998, it became the largest oilfield discovered in the United States in 20 years, at 200 square miles. It made the rig count climb from zero to 20 and improved technology on how wells can be drilled to extract oil. Sound familiar? The unitization battle in Cedar Hills took two years, resulting in the first horizontal well water flood in the United States, and the first horizontal well fire flood in the world. Both methods were successful in extracting otherwise trapped oil. It pushed the limits on how regulations, development and communities needed to evolve in order to keep up with technology. What we learned from Cedar Hills set the stage for how Bakken development could, and would, be approached.

In early 2010, the Industrial Commission took a card from the hand that Cedar Hills dealt us and standardized spacing for development across 15,000 square miles of western North Dakota, essentially creating the world's

largest oilfield. Horizontal drilling, combined with hydraulic fracturing and the aforementioned multi-well pad drilling, created a unique opportunity to manage such a huge oil play. Once again, technology drove the need for regulations, development and communities to evolve. At the height of development, the rig count had pushed to 218 by May 2012.

We've reached somewhat of a cruising altitude in the Bakken, averaging about 190 rigs, but that doesn't mean that there won't still be turbulence along the way. The pace of development may soon feel like it's slowed in some counties, thanks to multi-well pad drilling. In 2013, more than two-thirds of the permits issued were on multi-well pads, and that number should continue to rise.

Over the next year, we will begin to move out of a phase of development that required 2,000 truck trips to a single well in the first year, and we will move into a phase of development that will bring about 850 trips to each additional well. When pipelines are in place, those truck trips should be reduced to less than 250 per well. However, due to great geology, McKenzie and Mountrail Counties will still be the most heavily impacted, even as truck trips are reduced. We still have a generation of drilling a head of us, so the sooner we can reduce truck trips with multi-well pads and pipeline infrastructure, the better.

Oil production is now an integral part of everyday life for North Dakota residents, and it will continue to be for four or more generations. That means we're still very early in Bakken development—you could say we've just completed kindergarten and still have a lot to learn. To quote Winston Churchill and his reference

Continued on page 29

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Continued from page 27

to Russia during World War II, "I cannot forecast to you the action of Russia. It is a riddle, wrapped in a mystery, inside an enigma."

Like elementary school students, we probably haven't learned half of what there is to know about it all. But, as we near our state producing 1,000,000 barrels of oil per day, the residents of North Dakota should receive a tremendous amount of credit and thanks at such a special time in our state's history. Our citizens, state government and industry need to continue to work together as we continue to learn and progress along this multi-generational journey. 

ABOUT THE DMR'S OIL & GAS DIVISION

The Oil and Gas Division regulates the drilling and production of oil and gas in North Dakota. Its mission is to encourage and promote the development, production and utilization of oil and gas in the state in such a manner as will prevent waste, maximize economic recovery and fully protect the correlative rights of all owners to the end that landowners, royalty owners, producers, and the general public realize the greatest possible good from these vital natural resources.



TRIVIA TIME

A DECADE-TO-DECADE LOOK AT ND ANNUAL OIL PRODUCTION

Here is a look, from decade-to-decade, since the first year that oil production numbers were available in North Dakota. To see how the play in the Bakken has exploded in recent years, we have also included stats for 2012. Final figures up to the end of 2013 were not available at the time of publication.

1951

Wells producing: 1
Bbbs per well: 26,196
Yearly oil total (bbls): 26,196

1961

Wells producing: 1,648
Bbbs per well: 14,367
Yearly oil total (bbls): 23,676,981

1971

Wells producing: 1,575

Bbbs per well: 13,749
Yearly oil total (bbls): 21,653,912

1981

Wells producing: 2,829
Bbbs per well: 16,227
Yearly oil total (bbls): 45,907,342

1991

Wells producing: 3,627
Bbbs per well: 9,898
Yearly oil total (bbls): 35,899,235

2001

Wells producing: 3,372
Bbbs per well: 9,399
Yearly oil total (bbls): 31,693,576

2011

Wells producing: 6,562
Bbbs per well: 23,324
Yearly oil total (bbls): 153,052,635

2012

Wells producing: 8,373
Bbbs per well: 29,051
Yearly oil total (bbls): 243,246,417

Source: www.dmr.nd.gov/oilgas/stats/annualprod.pdf

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A Message from Ryan Rauschenberger, North Dakota Tax Commissioner



Ryan Rauschenberger
North Dakota Tax Commissioner

If oil production levels and oil prices continue to be strong, the balance of this fund will be a likely funding source for additional infrastructure in western North Dakota.

Governor Dalrymple appointed me as tax commissioner effective January 1, 2014. I have been fortunate to serve the people of North Dakota for the past four-and-a-half years as the deputy tax commissioner. This valuable experience will help me to be an effective commissioner and to “hit the ground running” in this new role.

Prior to becoming the deputy tax commissioner, I was the manager of energy development at the North Dakota Department of Commerce and worked on recruiting energy-related businesses to the state. I also staffed the state’s Energy Policy Commission, EmPower North Dakota. Before my work for the Department of Commerce, I was an auditor with PriceWaterhouseCoopers, providing auditing services for the energy, manufacturing and financial services industries.

In my current role as tax commissioner—just as in my past roles as deputy commissioner and manager of energy development—I expect to work closely with the western oil producing counties (and other political subdivisions) on many initiatives. One example is in the area of oil and gas gross production tax distribution formulas and revenue forecasts. This tax is shared between the state and the counties, cities, schools and townships. The tax department is responsible for forecasting oil tax revenue and quantifying the fiscal impact of various legislative proposals.

So far this biennium, actual oil tax collections are well above what was forecasted, primarily due to higher than anticipated production. Late January 2014 oil prices were hovering around \$78 per barrel for North Dakota light sweet crude, compared to a forecasted price of \$75 per barrel; North

Dakota production as of November 2013 was a record 973,280 barrels per day, compared to forecasted production of 850,000 barrels. It is likely production will reach one million barrels of oil per day in this calendar year. If this trend continues, there will be a sizeable balance in the state’s “Strategic Investment and Improvements Fund,” which is to be used for one-time strategic expenditures. If oil production levels and oil prices continue to be strong, the balance of this fund will be a likely funding source for additional infrastructure in western North Dakota.

It has been my pleasure to work closely with the oil producing counties on issues important to western North Dakota. I look forward to continuing our progress as the tax department works with the oil producing counties, the legislature and the governor’s office during the upcoming 2015 legislative session.

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Your Guide to the 22nd Annual Williston Basin Petroleum Conference

Bakken Strong

May 20-22, 2014, Bismarck Civic Center, Bismarck, ND

The 22nd Annual Williston Basin Petroleum Conference will be held May 20-22, 2014 at the Bismarck Civic Center in Bismarck, ND. With oil and gas activities reaching a feverish pitch in the Williston Basin, more than 3,500 people are expected to attend this year's conference.

Ron Ness, the North Dakota Petroleum Council; Lynn Helms, the North Dakota Department of Mineral Resources; and Melinda Yurkowski, the Saskatchewan Ministry of the Economy will be your event hosts. Anyone with an interest in the oil and gas business in the Williston Basin should attend. Topics will range from North American and world energy supply and demand, to highly technical Bakken talks, to managing community impacts and Bakken Basics education.

Revenues from the 2014 Williston Basin Petroleum Conference have been designated for the following:

- Contributions to the geological exhibits at the North Dakota Heritage Center;
- Contributions to western North Dakota non-profit organizations;
- Support for the North Dakota Petroleum Council Al Golden Scholarship Fund; and
- Funding for the Oil Can! Education and outreach program.

To register for the 22nd Annual Williston Basin Petroleum Conference, go to www.wbpcnd.org/registration.aspx. Shuttles buses will be provided during the conference for transportation between some hotels and the Bismarck Civic Center. To view a shuttle schedule, go to www.wbpcnd.org/Hotel-Travel.aspx#ConferenceTransportation. Taxis are available by calling (701) 223-9000 or (701) 667-4567.

THE 22ND ANNUAL WILLISTON BASIN PETROLEUM CONFERENCE TENTATIVE AGENDA

TUESDAY, MAY 20, 2014		
7:00 a.m.	Exhibitor Set Up Begins	Exhibit Hall and Outdoor Exhibits
10:00 a.m.	Conference Registration Opens	Upper Level Lobby
Tyler / Bakken / Three Forks / Red River Workshops		
NOTE: Pre-registration is required (\$125/person)		Oak, Maple, Birch, Cottonwood & Linden Rooms
9:00 a.m. – 12:00 p.m.	Workshop # 1: North Dakota Geological Survey	Oak, Maple, Birch, Cottonwood & Linden Rooms
1:30 p.m. – 4:30 p.m.	Workshop #2: North Dakota Geological Survey	Oak, Maple, Birch, Cottonwood & Linden Rooms
NOTE: Lunch is on your own; there will not be food at the Civic Center.		
Open Sessions to the Public (Free of Charge)		
1:30 p.m. – 3:00 p.m.	Bakken Education Sessions, featuring Ron Ness, Kathy Neset & Alison Ritter	Ballroom, Ramkota Hotel
3:30 p.m. – 5:00 p.m.	Bakken Education Sessions, featuring Ron Ness, Kathy Neset & Alison Ritter	Ballroom, Ramkota Hotel
Williston Basin Solutions		
Session Chair: Eric Dillé, EOG Resources; and Lynn Helms, the North Dakota Department of Mineral Resources		Meeting Rooms 103, 104 & 105
1:30 p.m.	Assessment of Remote Capture Technologies to Improve Gas Utilization: Chad Wocken, EERC	Meeting Rooms 103, 104 & 105
1:55 p.m.	LNG for Rigs: Patrick Hughes, Prairie Companies	Meeting Rooms 103, 104 & 105
2:15 p.m.	Well Stimulation Using Produced Water: Darren Schmidt, Statoil North America, Inc.	Meeting Rooms 103, 104 & 105
2:35 p.m.	Dakota Prairie Refinery: John Stumpf, MDU Resources	Meeting Rooms 103, 104 & 105
2:55 p.m.	Naptha Utilization: Todd Borgmann, Calumet	Meeting Rooms 103, 104 & 105
3:15 p.m.	Break	
Crude Oil Transportation		
Session Chairs: Justin Kringstad, North Dakota Pipeline Authority; and Julie Fedorchak, North Dakota Public Service Commission		Arena
1:30 p.m.	Enbridge Sandpiper Project: Guy Jarvis, Enbridge	Arena
2:00 p.m.	Moving Bakken out of the Rockies: Tad True, True Companies	Arena
2:30 p.m.	Reaching Coastal Markets: Curtis Shuck, Port of Vancouver USA	Arena
3:00 p.m.	Break	Arena
3:30 p.m.	Crude Oil Movements & Market Dynamics: Trisha Curtis, Energy Policy Research Foundation Inc.	Arena
4:00 p.m.	Tesoro High Plains Pipeline: Speaker TBA, Tesoro (invited)	Arena
4:30 p.m.	Bakken Crude Oil Characteristics: Dennis Sutton, Crude Oil Quality Association	Arena
Bakken Investment Session		
Session Chairs: Mark Johnsrud, Nuvera; and John Zimmerman, Intervention Energy		Meeting Rooms 101 & 102
2:30 p.m.	More is More: Supply, Demand, and Complexity: Vikas Dwivedi, Macquarie Securities Group	Meeting Rooms 101 & 102
3:00 p.m.	The Next Big Thing: Mike Kelly, Global Hunter Securities	Meeting Rooms 101 & 102
3:30 p.m.	Profiting from Liquid Markets: John O'Shea, CPA; and Brooke Borner, JP Morgan Asset Management	Meeting Rooms 101 & 102
4:00 p.m.	North Dakota Crude Differential History: Ryan Rauschenberger, North Dakota State Tax Commissioner	Meeting Rooms 101 & 102
Bakken Workforce & Housing Session		
Session Chairs: Al Anderson, North Dakota Department of Commerce (invited); and Blu Hulsey, Continental Resources		Meeting Rooms 103, 104 & 105
3:45 p.m.	Workforce Demographics: Nancy Hodur, North Dakota State University	Meeting Rooms 103, 104 & 105
4:05 p.m.	Housing Overview: Jeff Zarling, DAWA Solutions	Meeting Rooms 103, 104 & 105
4:25 p.m.	Topic TBD: Pat Bertagnoli, B&G Oilfield Services	Meeting Rooms 103, 104 & 105



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Expo Opens & Ice Breaker		
5:00 p.m. – 8:00 p.m.	BBQ provided by Halliburton and hosted bar from 5:00 p.m. – 6:30 p.m.	Exhibit Hall
WEDNESDAY, MAY 21, 2014		
7:00 a.m.	Conference Registration Opens	Upper Level Lobby
7:00 a.m. – 8:30 a.m.	Hot Breakfast Buffet	Arena and Upper Level Lobby
8:00 a.m.	Expo Opens	Exhibit Hall
Morning Session		
Introductions: Brian Kroshus, Bismarck Tribune		Arena
8:00 a.m.	Welcome: Ron Ness, North Dakota Petroleum Council; John Warford, Mayor of Bismarck, ND (invited); and Central Dakota Children's Choir	Arena
8:25 a.m.	Video: Kevin Cramer, United States Congressman	Arena
8:30 a.m.	North Dakota Governor Jack Dalrymple	Arena
9:00 a.m.	Williston Basin Roundup Moderator: Drew Wrigley Melinda Yurkowski, Saskatchewan Ministry of the Economy; Keith Lowdon, Manitoba Innovation, Energy & Mines; Montana Board of Oil & Gas Conservation (invited); Michael Lees, South Dakota Department of Mineral Resources; and Lynn Helms, North Dakota Department of Mineral Resources	Arena
10:00 a.m. – 11:00 a.m.	Break: Visit the Expo & Outdoor Exhibits	
Introductions: Joel Heitkamp, News and Views with Joel Heitkamp, KFGO Radio		
11:00 a.m.	Market Opportunities for NGLs: Don Bari, IHS Chemical	Arena
11:20 a.m.	The Future of Crude by Rail: Matt Rose, BNSF	Arena
Keynote Luncheon Speaker		
11:45 a.m. – 1:30 p.m.	Lunch is available in both the Arena and the Exhibit Hall	Arena and the Exhibit Hall
12:20 p.m.	Introduction: Wayne Stenehjem, North Dakota Attorney General; Keynote Speaker: The Bakken: Creating a New Reality for America's Energy Future: Lee Tillman, Marathon Oil Corporation	Arena
Bakken Optimization		
Session Chairs: John Harju, Energy & Environmental Research Center; and Brent Miller, Whiting Petroleum Corporation		Arena
1:30 p.m.	Integrated Reservoir Characterization & Modeling in Support of Enhanced Oil Recovery for the Bakken: Basak Kurtoglu, Marathon Oil Company	Arena
1:50 p.m.	Laboratory Comparisons of CO ₂ and Rich Gas Injection on Oil Recovery from Bakken Reservoir Rock and Shale: Steven Hawthorne, EERC	Arena
2:10 p.m.	Multi-Well Pad Drilling: Alan McNally, Continental Resources	Arena
2:30 p.m.	Frac Operations: Review of Offset Producing Well Protection: Jared Hoerner, Marathon Oil Company	Arena
Williston Basin Geology		
Session Chairs: Ed Murphy, North Dakota Geological Survey; and Melinda Yurkowski, Saskatchewan Ministry of the Economy		Meeting Rooms 101, 102 & 103
1:30 p.m.	Continued Geological and Geochemical Evaluation of the Tyler Formation: A Dual Petroleum System: Tim Nesheim, North Dakota Department of Mineral Resources Geological Survey	Meeting Rooms 101, 102 & 103
2:00 p.m.	Determining Three Forks Oil Prospectivity with Core and Fluorescence: John Hohman, Hess Corporation	Meeting Rooms 101, 102 & 103
2:30 p.m.	The Relevance of Core and Lab Work in Whiting's Pronghorn Project Area, Stark County, ND: Mark Sonnenfeld, Whiting Oil and Gas Corp.	Meeting Rooms 101, 102 & 103
Regulatory & Environment		
Session Chairs: Dave Searle, Marathon Oil; and Zac Weis, WPX Energy		Meeting Rooms 104 & 105
1:30 p.m.	Exploring Technologies in Managing Solid Waste Streams: Jeff Kummer, MBI Energy Services	Meeting Rooms 104 & 105
1:50 p.m.	Federal Permitting: Jamie Connell, Bureau of Land Management	Meeting Rooms 104 & 105
2:10 p.m.	Permitting Waste Facilities: Dave Glatt, North Dakota Department of Health	Meeting Rooms 104 & 105
2:30 p.m.	The Power of Integrated Logistics: Mark Johnsrud, Nuvera Environmental Solutions	Meeting Rooms 104 & 105
3:00 p.m. – 3:45 p.m.	Break: Visit the Expo & Outdoor Exhibits	
Bakken Optimization		





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Session Chairs: John Harju, Energy & Environmental Research Center; and Pam Roth, WPX Energy		Meeting Rooms 104 & 105
3:45 p.m.	TBD	Meeting Rooms 104 & 105
4:10 p.m.	TBD	Meeting Rooms 104 & 105
4:35 p.m.	TBD	Meeting Rooms 104 & 105
Williston Basin Geology		
Session Chairs: Ed Murphy, North Dakota Geological Survey; and Melinda Yurkowski, Saskatchewan Ministry of the Economy		Meeting Rooms 101, 102 & 103
3:30 p.m.	Provincewide Hydrogeological Characterization Mapping of Saskatchewan: Gavin Jensen, Saskatchewan Ministry of the Economy	Meeting Rooms 101, 102 & 103
4:00 p.m.	The Evolution of the Spearfish in the North-Central Portion of the Williston Basin: Dan Hermery, Corinthian Exploration	Meeting Rooms 101, 102 & 103
4:30 p.m.	Activation Energies and RockEval Analyses of Kerogenites in the Red River Formation in North Dakota: Steve Nordeng, North Dakota Geological Survey	Meeting Rooms 101, 102 & 103
Workforce Safety		
Session Chairs: Kari Cutting, North Dakota Petroleum Council; and Dave Galt, Montana Petroleum Association		Meeting Rooms 104 & 105
3:45 p.m.	Topic TBD: Bryan Klipfel, North Dakota Workforce Safety Insurance	Meeting Rooms 104 & 105
4:05 p.m.	The Importance of Partnerships Between Law Enforcement & Industry in Combatting Crime: John A. Dalziel, FBI	Meeting Rooms 104 & 105
4:20 p.m.	Topic TBD: Brad Eaton, DuPont Protection Technologies	Meeting Rooms 104 & 105
4:35 p.m.	Safe All-Weather Drilling Sites: Joe Penland, Sr., Quality Mats	Meeting Rooms 104 & 105
Expo & Social		
5:00 p.m. – 7:00 p.m.	Hors d'oeuvres and hosted bar from 5:00 p.m. – 6:30 p.m.	Exhibit Hall
7:00 p.m. – 10:00 p.m.	Social gathering, sponsored by the North Dakota Oil PAC (Minimum \$20 donation at the door); Music by the Joe Friday Band	Dakota Ballroom, Ramkota Hotel

THURSDAY, MAY 22, 2014		
7:00 a.m. – 8:30 a.m.	Hot Breakfast Buffet	Arena and Upper Level Lobby
7:30 a.m.	Conference Registration Opens	Upper Level Lobby
8:00 a.m.	Expo Opens	Exhibit Hall
Morning Session		
Introductions: Scott Hennen, What's On Your Mind, KFVR Radio		Arena
7:55 a.m.	Video: Heidi Heitkamp, United States Senator	Arena
8:00 a.m.	What's Ahead?: Lynn Helms, the North Dakota Department of Mineral Resources	Arena
8:20 a.m.	Gas and Oil Infrastructure Development: The View from the FERC: Tony Clark, Federal Energy Regulatory Commission	Arena
8:40 a.m.	Break: Visit the Expo & Outdoor Exhibits	Arena
9:30 a.m.	Keynote Speaker: Sean Hannity, host of Premiere Radio Network's The Sean Hannity Show & FOX News' Hannity with Sean Hannity	Arena
10:55 a.m.	Video: John Hoeven, United States Senator	Arena
Bakken Strong: Leadership for Energy Security		
Introduction: Doug Goehring, North Dakota Agriculture Commissioner		Arena
11:00 a.m.	Domestic Oil's World Impact: Tom Petrie, Petrie Partners	Arena
11:45 a.m.	Moderator: Ron Ness, the North Dakota Petroleum Council Rock Steady in the Bakken: Harold Hamm, Continental Resources Whiting's Path Forward: Jim Volker, Whiting Petroleum Bakken Operational Efficiencies: Tommy Nusz, Oasis Petroleum	Arena
1:00 p.m.	Conference adjourns	
NOTE: Lunch is on your own; there will not be food at the Civic Center.		

* Agenda is subject to change but is up-to-date as of publication of this magazine. Please check the latest version of the conference agenda on the WBPC website, www.wbpcnd.org.



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Beaver Creek
ARCHAEOLOGY

Bruce Hicks, assistant director of the North Dakota Department of Mineral Resources' Oil and Gas Division, spoke about multi-wall pads, spacing units and future development of energy corridors.



Highlights from The Bakken/ Three Forks Shale Oil Innovation Conference & Expo

*Conference & Expo
Explains Significant
Technology, Research
and Strategies*

By Luke Geiver

The Bakken/Three Forks Shale Oil Innovation Conference & Expo brought together oil and gas industry experts to discuss proven and future technologies, strategies and research work responsible for maintaining and increasing energy production from the Williston Basin. The two-day event, which was held February 10 to 12, 2014 at the Alerus Center in Grand Forks, ND, was organized in collaboration with the University of North Dakota's College of Engineering & Mines, the Department of Petroleum Engineering and the Harold Hamm School of Geology and Geological Engineering.

During the two-day event, attendees from 41 states and five Canadian provinces listened to presentations on well completion designs, drilling strategies, federal and local policy, frack water recycling technologies and updates on pipelines, refineries and other infrastructure.

We are producing more energy here at home, in large part because of American entrepreneurship and technologies like hydraulic fracturing, directional drilling and the innovative work happening in the Bakken and Three Forks shale.

Attendees at the event came from 41 U.S. states and five Canadian provinces.



Bruce Hicks, assistant director for the North Dakota Department of Mineral Resources' (DMR) Oil and Gas Division, provided a keynote address. Hicks highlighted the DMR's success in developing spacing units and its push to create energy corridors in an effort to reduce the surface footprint of oil production. The impact of multi-well pads has been significant, he says, adding that larger spacing units could further reduce the surface impacts. "We are getting more wells drilled with fewer rigs."

EVOLUTION OF RIGS; TREATING AND RECYCLING WATER

John Staub, team leader for the exploration and production team at the office of petroleum for the United States Energy Information Administration, also spoke about the evolution of drilling rigs in the United States. Staub and his team have developed a more accurate method of tracking and analyzing drilling rig efficiency, a method he spoke about during a panel headlined by Jim Sorenson, senior research manager for the Energy & Environmental Research Center. Sorenson spoke about the potential to use CO₂ for enhanced oil recovery someday in the Bakken. The panel was also headlined by Steve Benson, director for the Department of Petroleum Engineers at UND. Benson explained his team's efforts to educate the next generation of Bakken workers and engineers.

The topic of water was a major portion of the event. Grant Slick, principal engineer for AE'S Water Solutions, joined representatives from GE Power and Water and Halliburton, to discuss efforts that each were working on to handle, transfer, treat or recycle water in the Bakken. Slick explained the engineering firm's efforts with operators to develop pipeline systems for transferring fresh and produced water to and from several wells in an operator's fields.

ELECTRICAL POWER PRODUCTION

Will Gosnold, a professor at the University of North Dakota's Harold Hamm School of Geology and Geological Engineering, presented on his team's joint efforts with Continental Resources, Slope Electric Cooperative and Access Energy on a project to demonstrate electrical power production from oil-field produced fluids. According to Gosnold, the idea is based on geothermal heating systems.

"We take hot water or oil and run it through a heat exchanger. The heat exchanger then heats an organic liquid that is turned into gas, and, to create power, the gas is run

through a power turbine that turns a generator.” Gosnold says the infrastructure needed to run the system already exists and is easy to bring to the oilfields.

In May, the partnership will bring a geothermal power plant online in Bowman County, ND; the power plant will consist of two high-efficiency organic Rankin cycle engines that will convert heat from a Continental Resources water production well. The system should generate 250 kW of electricity to power other producing and water injection wells in the area. According to Gosnold, North Dakota has the power potential of roughly 4.0 GW from oilfield fluids.

Vicky Steiner, executive director for the North Dakota Association of Oil & Gas Producing Counties, presented on a panel titled, “Policy, Regulation and Economics: A 2014 Shale Energy Update,” with other national and local experts. Steiner’s presentation covered oil taxes in the current biennium. John Felmy, chief economist for the American Petroleum Institute, presented on facts he uses to address energy policy in the United States.

Next year’s event will follow the same structure and theme of innovation, adding more topics and industry experts, researchers and operator-affiliated speakers to talk about the innovative technologies or strategies responsible for making the Bakken and Three Forks formations global hotspots for shale oil development.

BUILDING BUSINESS IN THE BAKKEN

Prior to the conference and expo, a one-day event, “Building Business in the Bakken,” was held to provide insight and perspective from successful companies that operate in or outside of the oil producing regions of the Bakken.

To start the event, a panel of economic developers and chamber of commerce members informed and energized the crowd about the reality and potential present in the Bakken circa 2014. Tom Rolfstad, executive director for the Williston Economic Development Corp., addressed the question that all developers wanted an answer to: “How long will this last?” His opening, safe harbor presentation provision was his answer.

“Everyone in the Bakken is struggling to keep up with things, so in the interest of time, please use this presentation as a means of learning what is happening. Please use your own judgment in evaluating what it means to you. This is the way I see the world at the present time. Change is constant here,” he read to the crowd. “So, I can assure you that how I see the world will change again in 30 days. It will just get bigger.”

A roundtable discussion on the current state of the industry provided attendees with insight into the development of the Bakken and Three Forks shale formations. The panel included Luke Geiver, editor of The Bakken magazine (left), Patrick Montalban, president of exploration and production firm Mountainview Energy, (middle), Trent Howard, director of oilfield services for KLJ Inc. (right) and Terry Palisch, global engineering advisor for CARBO.



Exhibitors at the event included proven companies and start-ups providing services or technologies, all geared toward the Bakken and Three Forks shale formations. In total, the exhibit space included 160 exhibitors. All photos in this article are provided by The Bakken magazine.

Joe Rothschiller, president of the Dickinson-based manufacturing company, provided insight into his vision for building the company’s capabilities. For Rothschiller, the business model focused on providing solutions has been a boon to the company.

“We design, build and market sustainable, high-value added, innovative manufactured solutions for the energy, construction and other industries,” he says. The company has already designed several well pad products, including a proven flare handling product.

In 2014, the company is focused on bringing more products to market, including tank-to-tank piping and UL listed oilfield control panels. For Rothschiller, an emphasis on providing solutions to problems, and not just providing product, has been the key to the growth of his firm.

In total, the one-day event featured more than 15 speakers, including a luncheon video presentation delivered by United States Senator John Hoeven, R-N.D. “Thank you for the opportunity to speak today about the important work happening today in North Dakota and the Bakken,” he says. “We are producing more energy here at home, in large part because of American entrepreneurship and technologies like hydraulic fracturing, directional drilling and the innovative work happening in the Bakken and Three Forks shale.”

Luke Geiver is editor of The Bakken magazine. The Bakken/Three Forks Shale Oil Innovation Conference & Expo was organized by The Bakken magazine, in collaboration with the University of North Dakota’s College of Engineering & Mines, the Department of Petroleum Engineering and the Harold Hamm School of Geology and Geological Engineering.



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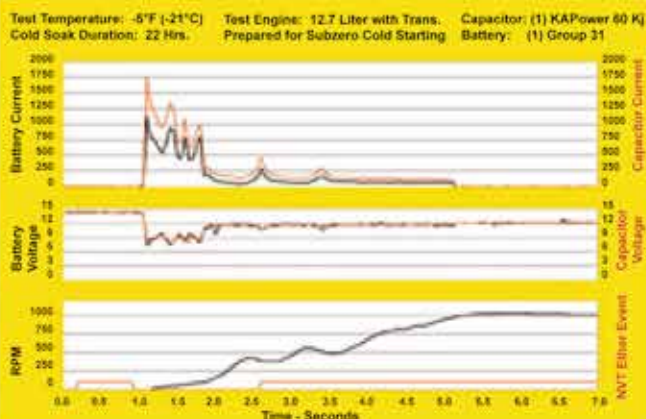
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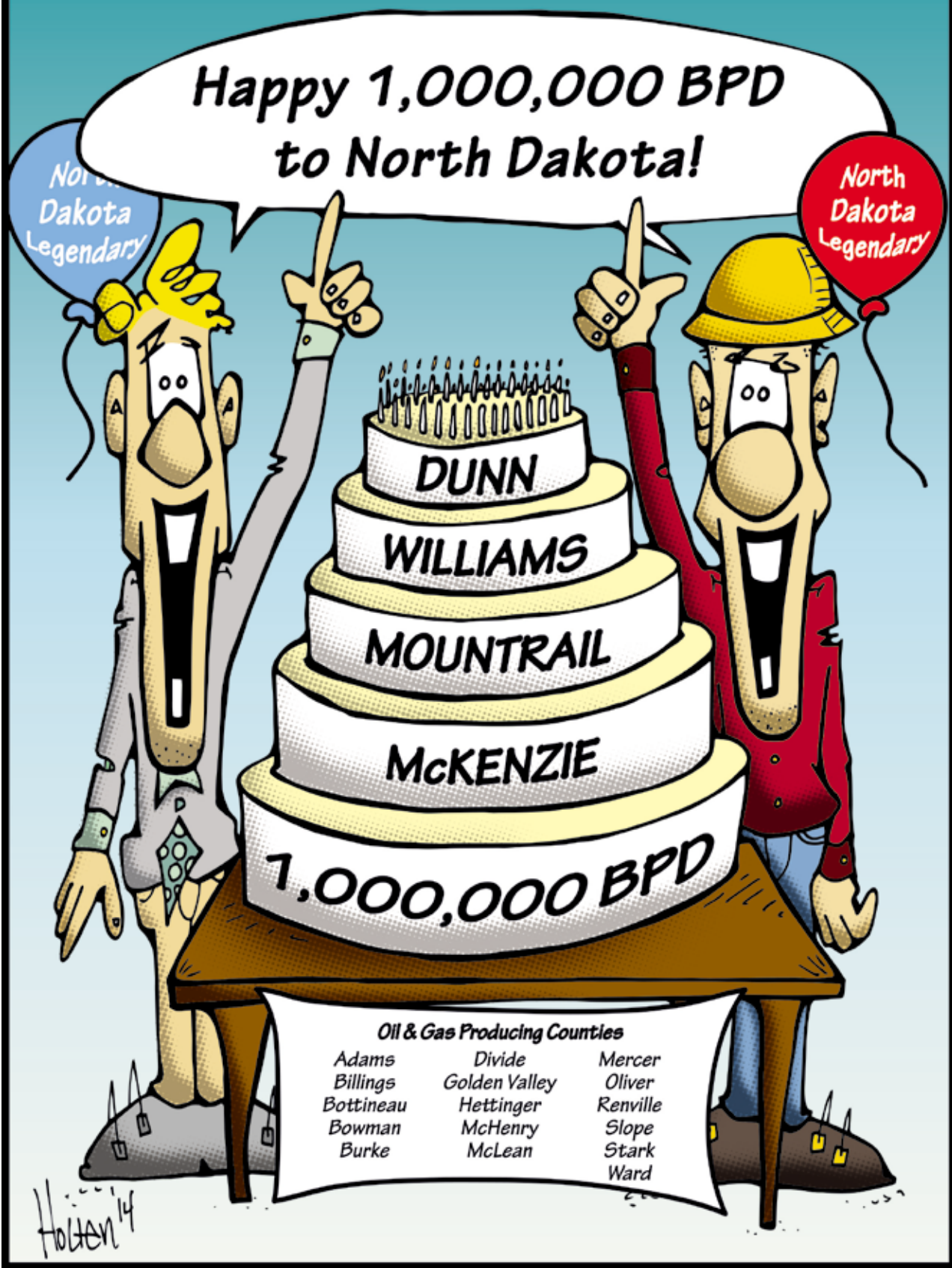


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CARTOON CORNER



Cartoonist Kevin Holten, holten24@gmail.com
As of publication, expectations were that 2014 would be the year in which North Dakota would surpass the production milestone of one million barrels per day.

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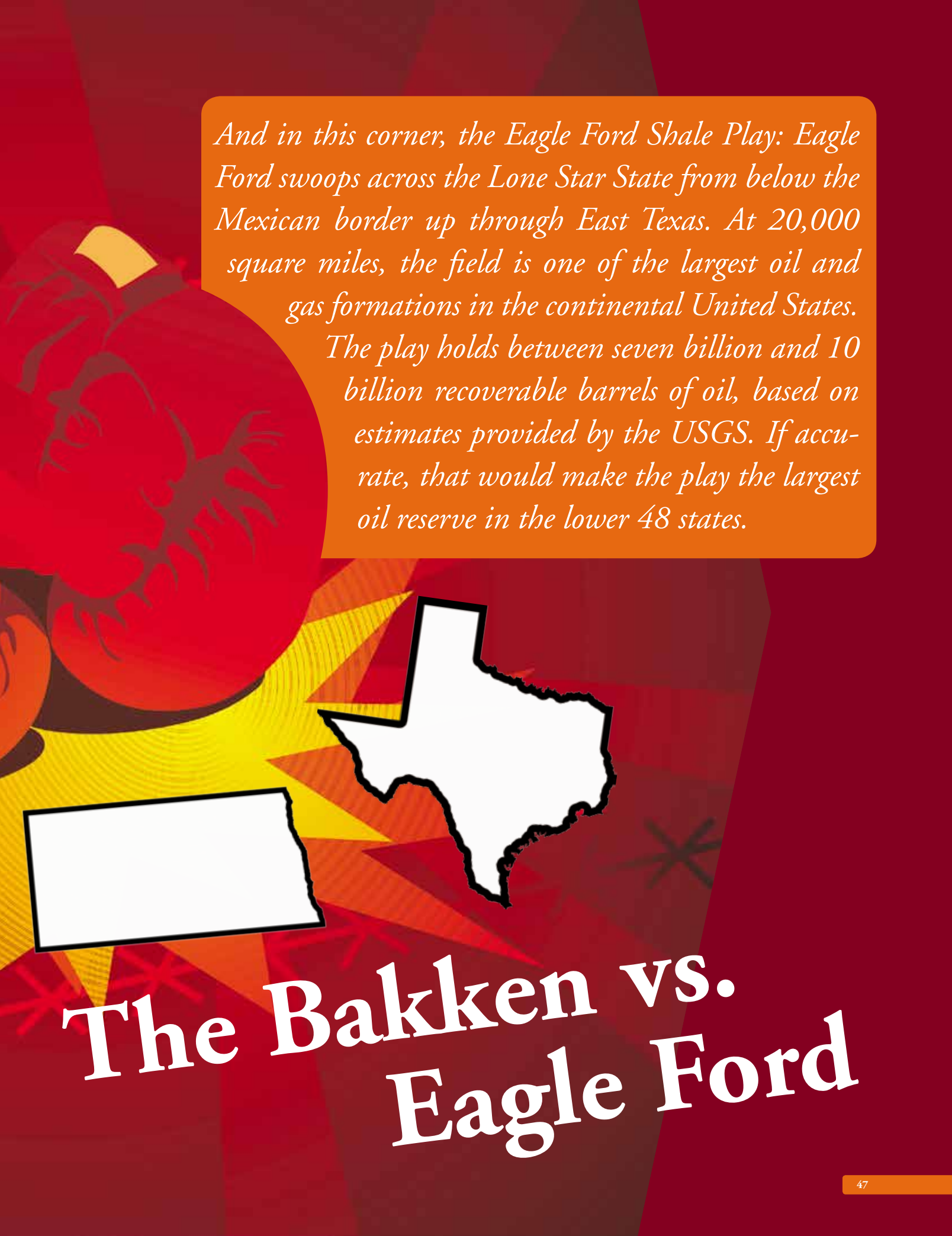
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Shale Showdown:

In this corner, the Bakken Play: The Bakken formation is a rock unit from the Late Devonian to Early Mississippian age occupying about 200,000 square miles of the subsurface of the Williston Basin, underlying parts of Montana, North Dakota, Saskatchewan and Manitoba. The formation is entirely in the subsurface. In April 2008, a United States Geological Survey (USGS) report estimated the amount of recoverable oil using technology readily available at the end of 2007 within the Bakken Formation at 3.0 to 4.3 billion barrels, with a mean of 3.65 billion. In April 2013, the USGS released a new figure for expected ultimate recovery of 7.4 billion barrels of oil.



And in this corner, the Eagle Ford Shale Play: Eagle Ford swoops across the Lone Star State from below the Mexican border up through East Texas. At 20,000 square miles, the field is one of the largest oil and gas formations in the continental United States. The play holds between seven billion and 10 billion recoverable barrels of oil, based on estimates provided by the USGS. If accurate, that would make the play the largest oil reserve in the lower 48 states.



The Bakken vs. Eagle Ford

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Technologies that work in the field

In terms of oil and gas production, much of the nation's recent focus has been on the Bakken—and rightly so. The Bakken Formation is massive, both in terms of size and economic potential. A rock unit from the Late Devonian to Early Mississippian age, the Bakken occupies approximately 200,000 square miles of the subsurface of the Williston Basin, underlying sections of Montana and North Dakota, as well as north of the American/Canadian border into Manitoba and Saskatchewan.

In early 2008, the United States Geological Survey used the technology readily available at the time to estimate the amount of recoverable oil in the Bakken Formation, and came up with a number of approximately 3.0 to 4.3 billion barrels, with a mean of 3.65 billion. Last year, the United States Geological Survey released new numbers estimating an expected recovery of around 7.4 billion barrels of oil, reflecting the improvements in extraction technology.

There has been a boom in Bakken production since 2000, when hydraulic fracturing and horizontal drilling technologies were first being applied to the region. Ten years later, oil production rates had reached almost half-a-million barrels per day, outpacing the pipeline capacity to ship oil out of the Bakken.

On the other hand, this sudden increase in production has also brought a number of challenges to the region; challenges related to the subsequent growth in the communities that make up the heart of the Bakken, such as rising house prices, stresses to municipal infrastructure and substantial damage to North Dakota's roads and highway systems. That being said, most would agree that the positives gained because of the boom far outweigh the negatives. However, with this much attention being paid to the Bakken Formation, many Americans have missed the meteoric rise of its smaller southern—and, potentially richer—cousin from Texas: the Eagle Ford Shale (EFS).

TEXAS TEA

Only five years ago, few were talking about the EFS discovered in La Salle County by Petrohawk, however, with activity ramping up in 2010, the EFS can be now considered one of the largest oilfields in the nation and, based on invested capital, can be ranked as one of the largest oil and gas developments in the world.

With almost 250 active wells, the EFS encompasses 14 counties, all of which are currently booming. Additionally, six other counties along the periphery are being indirectly impacted by the EFS, including Uvalde, Victoria, Jim Wells, Nueces, San Patricio and Bexar.

Approximately 20,000 square miles of the Eagle Ford Formation resides within the United States, along with a sizable portion of the formation dipping further south into Mexico, and, despite its somewhat smaller size when placed beside the burgeoning Bakken, the potential of recoverable oil is substantially greater. Whereas the Bakken is comprised primarily of oil and gas commodity, the EFS is often referred to by experts as being a 'triple play', meaning it is rich in oil, gas and condensate, which is obtained after the transition of a gaseous substance into a liquid state due to a drop in pressure or temperature. Additionally, the EFS is expected to have seven to 10 billion barrels of recoverable oil available to be extracted, while the Bakken is estimated to have around four to seven billion barrels of recoverable oil.

In 2013, almost \$30 billion was spent developing the EFS play, and there were an estimated 116,000 jobs supported in the EFS, which, in turn, helped to provide more than \$60 billion to the local Texan economy. Studies conducted by the University of Texas at San Antonio project that by 2022 the region will be able to support upward of 127,000 jobs and produce an economic impact of approximately \$89 billion for the state of Texas.

At present, there is approximately \$100 billion in planned projects along the Gulf Coast to better reap the rewards of this rich formation. Counties are witnessing heavy investment in crude oil, natural gas and natural gas liquids (NGL) gathering and transmission pipelines; natural gas processing plants; fractional capacity projects; ethane, propane and related projects; rubber, fertilizer and export projects; and crude/condensate terminal storage projects, all of which will only improve the economic outlook of communities in the EFS.

DEALING WITH UNPRECEDENTED GROWTH

However, the 20 counties situated in and around the EFS are also experiencing the negatives associated with expansion resulting from the development of this vast energy potential. If the Bakken can be held up as a model for unbridled growth during



The Eagle Ford Shale play extends 20,000 square miles and dips south of the border into Mexico.



The development of the Mexican side of the EFS is critical for Mexico.



Production activity of the EFS in the United States and Mexico.

an oil boom, these counties are expected to bear the brunt of the region's unprecedented growth for years to come.

"I can say that most shale developments will experience the same challenges and opportunities," says Gil Gonzalez, director of the Rural Business Program and the University of Texas at San Antonio. "It begins with rapid growth at the primarily rural communities in the upstream,



The Bakken formation occupies about 200,000 square miles of the subsurface of the Williston Basin, in parts of Montana, North Dakota, Saskatchewan and Manitoba.

midstream and downstream path of the shale development.”

Immediate impacts to the communities are the influx of workers from outside the impacted area. Local businesses are flourishing because of the EFS boom, which

is creating a considerable increase in job growth for the region, almost eradicating the chronic, double-digit unemployment rates that have plagued the counties for years.

“For the most part, communities have

been receptive to the opportunities that the EFS development brings to their communities,” says Gonzalez. “Historically, many of these communities have, for many years, experienced job loss, high unemployment, outmigration, poverty and a declining tax base. In many respects, the EFS has brought jobs, a new-found prosperity and restored hope for many families in southern Texas, while making us less dependent on foreign sources of oil.”

However, along with an ever-increasing population, the counties of the EFS are also seeing a growing housing shortage, which has become more tangible since 2011. Workers that come into the area, hoping to take advantage of the jobs and higher wages, are finding themselves bunking in cars, tents and man camps before landing more permanent living arrangements. The lack of housing has allowed housing and rental prices to skyrocket, as the market is influenced by the rules of supply and demand.

Compounding matters, many of the affected communities also have obsolete infrastructure, such as water, waste and electric systems, to support current demand. Others are left struggling with a lack of a skilled local workforce to help support the

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SOLIDIFYING STRATEGIES

In order to help mitigate the negatives that are inherent with the production of oil and gas, state and local governments, along with many of the oil industry's major players, are working to form strategies to solve some of the many logistical issues in the transmission of the crude to its designated refineries.

"In 2012, efforts to alleviate the housing shortage have been made with the construction of new hotels, motels, RV parks, and housing subdivisions," says Gonzalez. "Also, many infrastructure projects had commenced or have completed construction, including multi-million dollar oil and gas operation centers and billion-dollar processing plants. In these formative years of the Eagle Ford Shale, both counties and companies have been forced to adapt to their quickly changing environments."

The counties of the EFS have had the benefit of being able to look north toward the Bakken to use its experience as a roadmap, helping them navigate the oil boom.

In these formative years of the Eagle Ford Shale, both counties and companies have been forced to adapt to their quickly changing environments.

As major shale developments tend to progress along similar paths, the EFS was able to communicate and work with those in North Dakota and Montana to learn from the record of counties situated in the Bakken's "sweet spot." This has allowed the counties in the EFS to avoid a cycle of trial and error, and instead more effectively spearhead their planning for the future.

"When reaching out to those in the Bakken, I found that we were using similar research and strategies to manage and develop in our respective states," says Gonzalez. "We then started assessing the economic impact of the EFS, followed with a workforce study and a strategic housing

analysis. In 2012, with funding from the Shell Oil Foundation, we developed a five-month Municipal Capacity Building Program (MCBP) with the College of Public Policy to increase the administrative capacity of city administrators, city managers, elected officials, ISD, and hospital districts to equip them with the proper tools and toolbox to plan and develop their communities and become more sustainable."

BELOW THE BORDER

The EFS drops south of the border, extending into Mexico past Veracruz. Although the potential of the EFS is just as

Continued on page 53



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When reaching out to those in the Bakken, I found that we were using similar research and strategies to manage and develop in our respective states.

Continued from page 51

rich in Mexico, the challenges faced by America's southern neighbors in exploiting this resource are far different than what is experienced in the United States' EFS and the play in the Bakken.

The primary roadblock that hampers Mexico from benefiting from the formation is that, at present, there is virtually no oil or gas production being pursued at the EFS in that country.

"The production activity literally stops at the United States-Mexico border at the Rio Grande," says Dr. Thomas Tunstall, research director at the University of Texas at San Antonio's Institute for Economic Development. "In fact, the only place that unconventional oil and gas production of any significance, whatsoever, is occurring, is here in the United States."

There are several issues associated with the potential for recovering oil and gas from the Mexican portion of the EFS through unconventional production. One issue is related to gain-sharing and to what sort of terms the federal and provincial governments will grant energy companies looking to invest in the Mexican side of the EFS. Will the industry be paid out in cash, which is less preferable, or in oil and gas, which is more desirable?

Additionally, there is the question about whether or not private companies will be required to work or subcontract with PEMEX, a very large, state-owned, entity with over 150,000 employees and little experience with competition. If PEMEX will be involved with every new venture, the process may prove to move slower than they otherwise expected, especially if there should there be greater competition.

Another issue relates to the guarantee of safety for both staff and property operating in the region. Already, Mexican drug cartels are making their presence known in the EFS by using the industry's own network of private roads to illegally cross the

border with contraband; the further south you go, the more it seems that these cartels operate with open audacity. However, this concern is mitigated by the fact that energy companies operate all over the world and, as such, are not completely unaccustomed to working in areas with security issues.

The third, and perhaps most pressing, issue is the availability of a suitably-skilled workforce on the Mexican side of the EFS. The kinds of technology needed to

develop shale formations are still relatively specialized to regions within the United States, where we are years ahead of Mexico in the skills needed for both development and production.

"The combination of hydraulic fracturing and horizontal drilling is a relatively new technology, with still relatively few experts from a global perspective," says Tunstall. "It's not clear that any country

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GET TO KNOW OUR EXPERTS

GILBERT GONZALEZ

Gilbert Gonzalez served as deputy undersecretary and acting undersecretary for the United States Department of Agriculture (USDA) Rural Development mission area in Washington, D.C. He managed Rural Housing Services, Rural Utilities Service and Rural Business-Cooperative Service and oversaw efforts related to minority home ownership, broadband, renewable energy, small business and faith-based programs.

On September 1, 2009, Gonzalez joined the University of Texas at San Antonio Institute for Economic Development to serve as director of the Rural Business Program (RBP). He manages the Rural Business Program (RBP), with major emphasis on rural community capacity-building and business development casework within the South-West Texas Border SBDC Network.



THOMAS TUNSTALL

Thomas Tunstall, Ph.D., is the research director at the Institute for Economic Development at the University of Texas at San Antonio. He was the principal investigator for the Economic Impact of the Eagle Ford Shale studies released in May 2012 and March 2013. Tunstall has spent a significant portion of his career on workforce and economic development assignments overseas in locations such as Azerbaijan, Afghanistan, Kenya and Zambia.

Tunstall's background includes work in economic research, statistical analysis, forecasting, strategy development and operational implementation. He holds a Ph.D. in economics and public policy, and an M.B.A. from the University of Texas at Dallas, as well as a B.B.A. from the University of Texas at Austin.

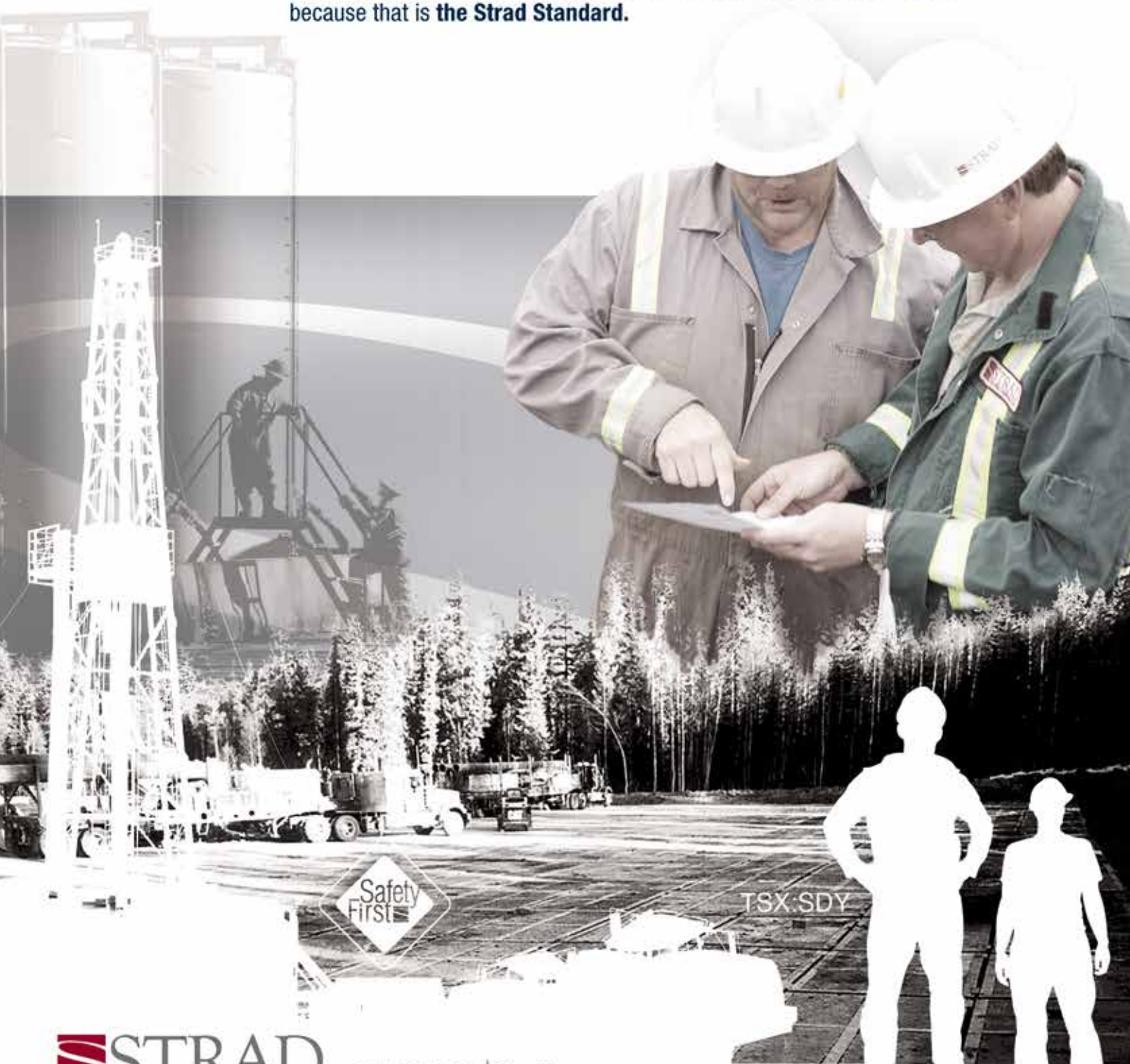


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Continued from page 53

outside of the United States, including Mexico, would be able to quickly deploy the cadre of highly-skilled professionals needed to undertake unconventional oil and gas production.”

Many of these issues are being addressed as Mexico has tabled energy reform legislation with the rule-making process now underway, with results to be made public as early as March or April of this year. This legislation has made it more palatable for the oil and gas industry north of the Rio Grande to start thinking about investing in Mexico.

“Now, with the passage of Mexico’s energy reform, there have been a series of meetings with the Eagle Ford Consortium to discuss the establishment of a binational committee with Mexico,” says Gonzalez. “The passage of Mexico’s energy reform legislation will open development opportunities for United States exploration and production and oilfield service companies.”

The development of the Mexican side of the EFS is critical for Mexico, which, in spite of sitting on enormous quantities of untapped natural gas reserves, currently imports its natural gas from the United States. Mexico has experienced oil booms in the past, but recently, oil production has been steadily declining from a lack of investment by the federally-controlled PEMEX.

“Eagle Ford and other shale formations in Mexico clearly represent an opportunity,” says Tunstall. “Energy reform could be the catalyst to turn things around. Mexico has an estimated 10.4 billion barrels of proven reserves, which can be produced using conventional and unconventional techniques.”

THE 1M BPD RACE

Total production from Eagle Ford hit one million barrels per day (bpd) in August 2013 and was projected to rise to 1.09 million bpd in November of the same year, according to a report from the United States Energy Information Administration.

The Bakken was expected to produce 935,000 bpd in October 2013, and 960,000 bpd in November of the same year. The Bakken has had drilling ongoing since 2003. The Eagle Ford was initially seen as a natural gas play and did not have notable oil drilling until early 2009.

Source: www.rigzone.com/news/oil_gas/a/129753/EIA_Eagle_Ford_Shale_Beats_Bakken_to_1_MMbpd_Milestone#sthash.ID5gecNH.dpuf



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Crude oil production growth in the United States has helped contribute to a global price stability in 2013. Highlights from significant events in the United States that affected oil markets in 2013 include:

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combined increases in the rest of the world, to reach its highest level in 24 years. This increase marked the largest observed annual increase in United States history.

- Production exceeded imports during several weeks for the first time in nearly two decades.
- Transportation infrastructure improvements enabled crude oil from Cushing, Oklahoma, and the Bakken, Permian, and Eagle Ford tight oil formations to better reach refineries, reducing the need for foreign crude oil.

Source: www.eia.gov/todayinenergy/detail.cfm?id=14531

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Keeping a Nose to the Ground

By Kim Babij-Gesell

From the time Bill Allen and his crew show up on a work site, it usually only takes a few minutes to find what they came for: a leak in an underground pipeline. But Allen doesn't employ a group of men with tools to find those leaks. In fact, his guys don't use a single piece of equipment and they operate without as much as a word.

Bill Allen is the owner of Outwest Canine Consulting and his "crew" is actually a team of three Labrador Retrievers named Kaaxan, Rider and Ruff. They're highly trained animals that use nothing but their noses to get the job done. "For lots of my clients, the dogs will get out of the truck and find a leak in a few minutes, and the clients can't believe it," says Allen. "But it's not just an amazing thing to watch. We save the oil companies hundreds

of thousands of dollars sometimes. If we can get out and find a leak for them on a long line, it saves them a ton of money and a ton of time."

Located in Weyburn, Saskatchewan, Canada, Outwest primarily services oil patches on the Canadian Prairies in Southeast Saskatchewan and Southwest Manitoba, just north of the Canada/United States border at North Dakota and Montana.

Allen's dogs are trained to detect pipeline leaks by picking up the scent of methanethiol, also known as methyl mercaptan, a colorless gas with a pungent scent similar to rotten cabbage. It's the same substance that gives natural gas its unpleasant odor.

When Outwest is called to a patch with a suspected leak, mercaptan is added to the line in question. The organic compound fills the line and when it hits the site of the leak, the gas escapes and works its way up to the surface of the earth.

That's where the dogs come in.

"The dogs will find it days before the human nose will," says Allen. "Their noses are way closer to the ground than ours, for one. And, obviously, their noses are far more sensitive. These dogs are finding odors that are parts per billion, sometimes even parts per trillion."

CANINE COLLEGE

Although Allen's dogs were originally trained to do search and rescue work before making the transition to searching for pipeline leaks, many dogs used in this line of work are born and raised with the job in mind.

Paris Nicholson and his team based in Sorrento, FL not only find oil patch leaks across the United States and Canada using a team of six canines, they also run an academy to train new dogs and new handlers to do the work.

All of Nicholson's employees with K9 Pipeline Oil Detection and the K9 Pipeline



*On the job, Kaaxan sniffs his way to a leak.
Photo provided by Bill Allen.*



*Leak detection dogs Kaaxan (left) and Rider (right).
Photo provided by Bill Allen.*

...their noses are far more sensitive. These dogs are finding odors that are parts per billion, sometimes even parts per trillion.

Training Academy are former law enforcement personnel, which he says is a perfect background for leak detection.

"We've all trained bomb dogs, narcotic dogs, police dogs. So, what we look for is a high drive, just like what you'd have for a law enforcement dog," says Nicholson. "Relatively speaking, the training is simple for this work because they're basically only searching for one odor they have to recognize. Whereas, if you're looking at explosives or narcotics, there are a lot of different odors a dog has to recognize. With narcotics, there are several illegal narcotic substances, like marijuana, cocaine, heroin, ecstasy or crack, so you've got to train a dog on all those odors. Whereas, with this chemical that we use to find a leak on a patch, there's only one odor."

Nicholson explains, once the dogs find that all-important odor, his four-legged employees are trained to use their instinctual response of digging to alert the human handler that they've hit pay dirt.

And he says getting them onto a site to get to work is exactly what the dogs want.

"Once the dog gets into his tracking harness and sees the visual command we give, he's on fire. Those dogs are ready to walk 100 miles until they find that smell," says Nicholson.

ON THE HUNT

While Allen's company uses Labrador Retrievers exclusively, Nicholson uses Labs, Belgian Malinois and Coonhounds, because those breeds are known to have a strong hunting drive.

Both Nicholson and Allen say their dogs are able to get remarkably close to the exact spot where a leak has occurred; Allen says the only time they might be a little further off is if they're dealing with a slope.

"If it's halfway up a hill, a lot of time the odor will run downhill with water or uphill with air," he says. "Then it's just a matter of us using our common sense to figure out that the leak wasn't exactly where the dogs alerted us to. But even then, we're usually within 15 to 20 feet."

Allen says there are times when extenuating circumstances prevent the dogs from detecting the leak, but generally their success rate is above 80 percent.

"What I tell my clients is, if the odor is on the surface, we are going to pick it up for you. And I mean, our guys are finding leaks buried under five or six feet of cover, in an area that's leaked maybe ounces throughout the day," he says.

Although there is a slim chance the detection dogs might not find a leak, the reality is that giving the dogs a shot is far more cost-effective than the alternative.

"The only other option an oil company would have is to uncover the whole line again and try to find it themselves, visually," explains Allen, "or they end up splitting the line. By that, I mean they'll dig up a spot, cut it, put in a set of flanges, test both sides, and just keep breaking it down until they find what they're looking for. Obviously, letting the dogs find the spot and then digging in that isolated area saves a ton of money. What we charge to go and find a leak is miniscule compared to what it costs to dig up a long line. And, environmentally, it's important too, because if we can get out there and find it before something major happens, it'll save from having to do a major cleanup."

Nicholson agrees. “The clients are absolutely amazed when they see what we can do. What it does for the clients, instead of having to dig up 100 miles of pipeline and they don’t know exactly where that leak is—we actually pinpoint exactly where the leak is coming from. Our trained dogs can detect vapor on a molecular level that far exceeds any mechanical bio-detection device.”

Word seems to be spreading about the effectiveness of using animals to detect leaks. In addition to the inquiries he gets from across North America, Nicholson says he has begun to get inquiries from overseas.

For now, he says the operation will have to remain on the continent because, even though it’s environmentally-friendly, the chemical odorant isn’t permitted to be transported by air. So, any time they get a call for a job, they load up their fleet of vehicles and hit the road.

And Nicholson says that’s the cue for his team of furry employees to get ready for another day on the job.

“When they know it’s time to go to work, they’re nuts,” he laughs. “We have a two- run indoor kennel facility, and the worst thing you could do to them is pull up the van and not let them go in, because they think they’re getting to go to work!”

GET TO KNOW OUR EXPERTS

PARIS NICHOLSON

Chairman and CEO of K9 Pipeline Oil Detection, K9 Pipeline Training Academy and K9 On Patrol Security, Paris Nicholson has been working intimately with dogs for the past three decades. He spent time as head trainer with the United States Virgin Islands Police Department K9 Unit before starting his own security guard agency.

Nicholson is also certified with the Detroit Police Department in the areas of narcotic and explosive detection, as well as with the Bureau of Alcohol, Tobacco and Firearms. His focus is now in the area of leak detection on oil patches, which he says is no different than his time in policing. The bottom line, he says, is picking the right dogs.

“We pick them for their drive. We’re all ex-law enforcement—the guys who work in the company—so, we know how the animals need to be. And when our clients see it, they absolutely can’t believe it.”



BILL ALLEN

For a decade and a half, Bill Allen has been working with dogs and taking advantage of their extraordinary sense of smell. It was 15 years ago when Allen moved from Alberta, Canada to the province of Saskatchewan and realized his search and rescue dog no longer had much work to do. He had heard about dogs that detected underground line leaks, so he and his pup took their work in another direction.

Allen now employs three dogs (Kaaxan, Rider and Ruff), who are all masters at leak detection. Although he’s highly successful at his work, Allen is humble about being called a specialist.

“It’s specialty in the sense that not many people do it. I’m just using the dogs and their noses to do exactly what they’re designed for, which is to find things.”

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Pooling Data:

The Bakken's Need for Water in the Future

By Jennifer Ryan

There is so much to measure: The energy boom in North Dakota is a phenomenon that has garnered a great deal of data. Those working and producing in the oilfields want to know how many wells, how many barrels, how many gallons. Those in the media want to know. Those who work, live, and play in the affected regions want to know. Politicians want to know. Competitors want to know.

The data is well-documented and, for the most part, readily accessible. Number crunchers and analysts work to provide daily results, as well as projections and predictions for the long-term. Those future forecasts are particularly important, as they estimate the viability of a specific region and its likely sustainability as an oil-producing well.

But those gallons and barrels of oil could never be calculated if it weren't for the high number of gallons of water used on the oilfields every day. Just as important as the number of barrels of oil collected, analysts are keeping a close count on water—and what those numbers show in the Bakken oilfield is a little worrisome; if not today, then in the near future. In about 35 years, the Bakken fields will no longer be sustainable based on the amount of water needed and the amount of water available.

WATER'S ROLE IN THE BAKKEN

Water serves three main purposes for oil production in North Dakota. First, water is a key ingredient in the hydraulic fracturing process. Currently, each well uses 3.5 million gallons of water per year to undergo the revolutionary fracking method. That volume of water has remained fairly steady over the past two to three years and can be used as a reliable indicator of water needs in the future.

Second, fresh water is needed to maintain the wells. Because the Bakken and surrounding regions like Three Forks have a high salt content, the water also has a higher degree of salinity. As wells age, they need fresh water poured in weekly to combat the infusion of salt. The number of gallons needed for



“They have created projections based on the age of all the wells over the next 25 years and found that the need for water, though already high today, will only continue to surge.”

Resources is preparing for the future water needs by counting everything. Using these informed estimates, here is the breakdown, by the numbers:

- There are currently about 7,000 producing wells in the Bakken that need maintenance water;
- They each need 15 barrels of water per day to maintain production;
- In the next 25 years, the number of producing wells in the Bakken will grow to 65,000; and
- Every year, those wells age, and that means that more and more wells need maintenance water in order to keep working.

No need to get your calculators out. The Department of Mineral Resources has done the math for us. They have created projections based on the age of all the wells over the next 25 years and found that the need for water, though already high today, will only continue to surge. The number they have come up with?

“Twenty-two-million gallons of water per day,” says Helms. “Maintenance water will actually grow to exceed the amount of water needed for fracking. In six to seven years—yes, possibly that soon—demand may exceed what we can supply.”

GOOD OLD TAP WATER

So far, this only discusses water which supports the oil industry. But it also supports the people working in the field, their families and citizens living near the Bakken region. Where does their clean drinking water come from?

“The drinking water infrastructure is currently inadequate to meet future needs,” says Andrea Boe, business development director at Advanced Engineering and Environmental Services, or more simply, AE²S.

AE²S works on general civil, electrical and structural engineering, as well as surveying and construction, but their primary specialty is water systems.

Their focus now is on the Western Area Water Supply Project (WAWSP), which aims to improve and expand on the water system that serves the northwest region of North Dakota.

Just as water data is being tracked for the oil industry’s perspective, more numbers are available to analyze the water needs of the North Dakota population.

“Most drinking water systems are built to serve a peak population projection of 25-30 years,” explains Boe. But the Bakken area experienced a population boom, which dramatically affected the drinking water systems.

“The WAWSP, in the heart of the Bakken, was first envisioned to serve a peak population of 48,000 in 2011. Fast forward two years, and the actual population in the service area was already at 58,000,” says Boe.

And that growth shows no signs of stopping. A 2012 North Dakota Statewide Housing Needs Assessment projects the total population in the WAWSP service area to reach almost 100,000 people.

TRYING NOT TO WASTE WATER

Yet another obstacle to overcome is what to do with the wastewater. The city of Williston has submitted a proposal to replace its existing wastewater treatment facility, which is located on Corps-managed federal land, to a site immediately adjacent to the existing facility on land owned by the city of Williston.

A press release from the U.S. Army Corps of Engineers explains that “the purpose of the proposed project is to meet the wastewater treatment needs of Williston’s growing population because the existing facility does not have the capacity to do so.”

As for industrial wastewater, Boe says that “there is an increasing movement to recycle those types of waste streams to reduce the use of fresh water. However, there are some current hurdles to widespread recycling in the Bakken.”

Those hurdles include the high cost, the need to then dispose of a waste stream produced by the recycling method, and the detrimental effect that some recycled water can have on oil-producing wells. Water is a highly lucrative resource, so many private technology firms are working to find ways to provide water and to reduce the amount of waste.

maintenance is a little bit more difficult to calculate, since it is impossible to predict when each well will begin needing the maintenance water. It can vary from one to five years before a well will need it. But once a well has reached this stage, each one needs approximately 15 barrels of water per day.

Finally, produced water is used and recycled for a number of purposes. Currently, the excess water high in salt content can be recycled for some uses, but fresh water is the more valued resource in oil production. However, the North Dakota Department of Mineral Resources is working with industry experts, scientists and oil companies to find a way to put the salty water to better use. Recycled water can increase the supply exponentially, as they develop more ways to use it.

WELLS BY THE NUMBERS

Other measures that must be taken into account include how many wells currently call the Bakken region home, and how many more have yet to take root. Lynn Helms, Director of the Department of Mineral Resources, said those numbers are “driven by estimates of how many wells will be drilled each year.” Currently, he says, we’re looking at numbers close to 2,000 new wells per year for the next 25 years. “CEOs have drilling inventories already in place for the next 17 to 37 years,” says Helms.

Using these approximations for their calculations, the Department of Mineral

"The chemical part of the technology is ready to go with some firms," says Helms. "The technology to safely transport and store water is needed." Until that is developed, the numbers will continue to be tracked.

"Regulatory agencies have the capability to accumulate and analyze data to educate companies and policymakers on what direction we have to go," says Helms.

"If we weren't collecting the data, we wouldn't know where we have to develop these new processes. It is a really important role. We have lofty goals. We know where we want to go."

GET TO KNOW OUR EXPERTS

LYNN HELMS

Lynn Helms' work in the oil industry has taken him all over the world. Most recently, Lynn serves as director of the North Dakota Industrial Commission's Oil & Gas Division, since taking on that role in July 1998. He has also been director of the Department of Mineral Resources since it was formed in July 2005.

Before moving to Bismarck to work in state government, Lynn worked as a production engineer, reservoir engineer and asset team leader on projects in Abu Dhabi, Alaska, Arkansas, Louisiana, Mississippi, Montana, New Mexico, North Dakota, Texas and Wyoming. He earned his Bachelor of Science Degree in Engineering from the South Dakota School of Mines and Technology. When he is not working, Lynn enjoys spending his free time with his wife, college-aged children and his four horses.



ANDREA BOE

Andrea Boe is business development director at AE'S Water Solutions and AE'S Construction. She has over 18 years of business development and marketing experience in the architecture, engineering and construction industry, with a primary focus on infrastructure for public and private markets.



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TRIVIA TIME

WATER USAGE FOR FRACKING

The 2013 Western Organization of Resource Councils' report, "Gone for Good: Fracking and Water Loss in the West," found that fracking is using seven billion gallons of water per year in four western states: Wyoming, Colorado, Montana and North Dakota.

As North Dakota's Bakken shale fields have grown, the fight over who has the right to tap into the multi-million-dollar market to supply water to the energy sector has arisen. It has been reported that "the state draws water from the Missouri River and aquifers for its hydraulic fracturing, the key that has unlocked America's abundant shale deposits. The process is water-intensive and requires more than two million gallons of water per well, equal to baths for some 40,000 people."

A co-op backed by the government to ensure fresh water in an area where its drinkability is compromised. "The co-op has decided to sell 20 percent of its water to frackers to help keep prices low and pay back state loans. That has not gone down well with the Independent Water Providers, a loose confederation of ranchers, farmers and small businesses that, for years, has supplied fracking water . . . The Independent Water Providers have fought back, arguing that the co-op should not be selling fracking water at all. The state Legislature stepped in with a law last month designed to quell the tension and nurture competition, but industry observers expect the acrimony to continue."

Source: www.sourcewatch.org/index.php/North_Dakota_and_fracking#Refining_and_transport

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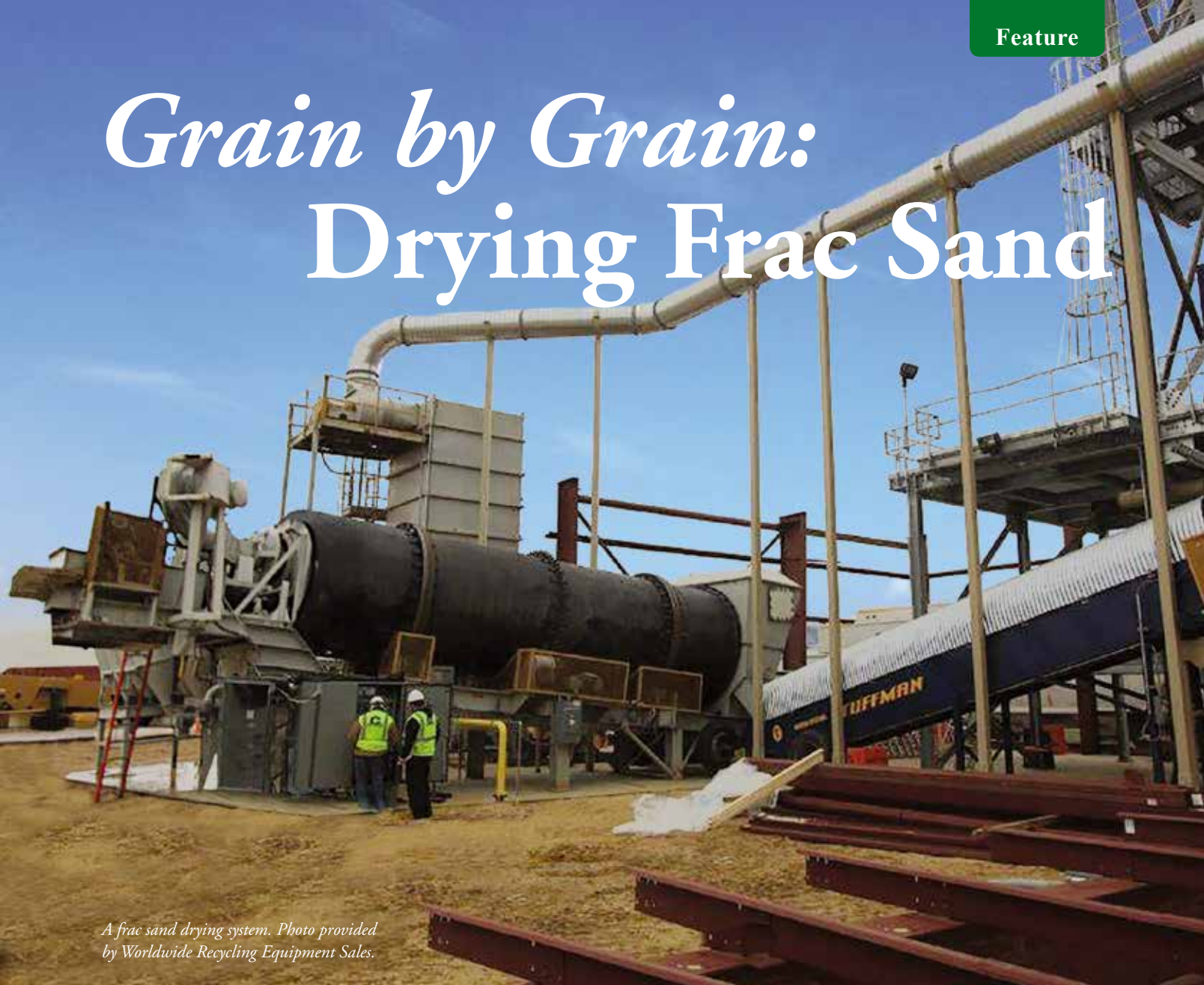


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Grain by Grain: Drying Frac Sand



A frac sand drying system. Photo provided by Worldwide Recycling Equipment Sales.

By Savannah Cooper

With the frequent rises in oil prices and the increase in oil and gas exploration in the United States, experts anticipate that the demand for frac sand will increase by at least 4.8 percent every year until 2016.

In 2009, the average price of industrial sand was \$28.82 per ton, and the average price of frac sand was \$44.33 per ton. With the addition of transportation costs from the Midwest to oil and gas sites in places like Colorado, Texas and Canada, the total cost of frac sand can be over \$300 per ton. Many wells use more than 2,000 tons of frac sand, leading oil and gas producers to look for more cost-effective alternatives.

For years now, frac sands have been used to augment the production of natural gas and oil from wells, and frac sand use will almost certainly become more common and frequent in the years to come.

The hydraulic fracturing, or “fracking,” process begins with the drilling of a well into a rock formation. A high-pressure fracking fluid is injected into the well. This fluid, made up of water mixed with frac sand and a blend of chemicals, acts as a propping agent, or proppant. The proppant prevents the fracture from closing and permits gas to flow through the well.

Frac sand is a natural silica-based proppant. In 2009, 6.5 million metric tons of sand were mined to meet the demands of the fracking industry—an amount worth

a total of \$319 million. The United States Geological Survey estimated that frac sand mining doubled in 2010.

Frac sand requires pure quartz with as few contaminating materials as possible. The American Petroleum Institute (API) has specific criteria that must be met for frac sands, including its weight percentage, sphericity and roundness, crush resistance, acid solubility and turbidity. To ensure that the quality of sand is acceptable, mining companies wash and dry the frac sand to rid it of all possible impurities.

To meet API standards, frac sand particles must be well-rounded and relatively clean of other minerals and impurities. High-purity quartz sands are common in the United States but most silica sand



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Rotary dryers are the most proven and preferred method to dry frac sand...a rotary dryer allows the user to vary the mass air flow for different moisture content levels or operation at lower throughputs.

deposits are already being exploited because of the numerous uses for the material in a variety of industrial applications, including glass making and filtration media.

The way in which frac sand is mined and processed depends on the location and quality of the sand deposit. In general, though, a typical frac sand flow sheet is made up of wet flow and dry flow. The goal of wet flow is to eliminate clay slimes and disintegrate any agglomerates, or clumps of material.

This portion of the flow sheet can also act as a preliminary sizing by rejecting excess fines—a process that is much more cost-effective if performed wet instead of dry. The first step in wet processing is to remove any clay. The sand is washed with water and then pumped to a cyclone for “desliming.” Slimes are materials that are usually in the form of clays or very fine silica. Since these materials are often harmful to frac sand processing, they must be removed through the use of classifiers.

In the dry flow portion, the sand is sized into a variety of products and any magnetic contaminants are removed because they would impede both crush and acid solubility. Sizes vary, but the most commonly used for frac sand are 12/20, 20/40, 40/70 and 70/140 mesh.

Shape and size have a significant effect on the sand’s final permeability through the

fracture. A wide variety of particle shapes and sizes will result in a tight packing arrangement, reducing conductivity and permeability. A controlled range of sizes and a spherical shape, however, will lead to greater conductivity.

FRAC SAND DRYING SOLUTION

Rotary dryers are the most proven and preferred method to dry frac sand. A varying total petroleum hydrocarbons (TPH) rate can often have a substantial effect on the efficiency of the drying process. A rotary dryer allows the user to vary the mass air flow for different moisture content levels or operation at lower throughputs.

In contrast, a fluid bed dryer features a drying gas medium that must produce heat for the drying process while also conveying the material. Because the mass air flow must stay constant, a fluid bed dryer can only be turned down by decreasing the inlet gas temperature, which has a detrimental effect on efficiency. Fluid bed dryers also require an increase in fluidizing velocities for larger particles, resulting in high power usage and lower evaporation and efficiency.

Rotary dryers, however, are far more efficient and capable of enduring the varying production requirements that accompany different drying projects. A rotary dryer is a sturdy piece of equipment that, when

well-built and maintained, can have maintenance costs that are comparable to a fluid bed dryer.

Dryers are available in countercurrent and concurrent flow models. In concurrent flow, the burner and feed system are located on the same end of the dryer and the material and exhaust gas exit the dryer on the opposite end. The primary advantage of using a concurrent flow dryer is the direct relationship between the dryness of the product and the temperature of the exhaust gas. This allows the dryer to adjust to changes in feed conditions in seconds, rather than minutes.

Dryers can be used at both the beginning and the end of the fracking process. Prior to its transportation to and use at a job site, frac sand must be dried and treated. After the process is completed, the waste fluids that remain form a sludge. Dryers can extract the liquid from this sludge and then turn it back into a solid for proper disposal.

Custom-built Vulcan rotary dryers are available from companies like Worldwide Recycling Equipment Sales, LLC. The line of rotary dryers can be manufactured to suit any job site or drying application, including frac sand. The units are available in direct or indirect heated models and feature burners ranging from one to 30 MMBtu and rotary drums ranging from 18 to 70 feet with a variety of diameters. Vulcan rotary kilns are ideal for quick and efficient drying of numerous materials in a wide range of industries, from soil remediation to food processing to mining. 

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SAVANNAH COOPER

Savannah Cooper attended Lincoln University and works at Worldwide Recycling Equipment Sales, which focuses on the waste processing, recycling and environmental process equipment industry.

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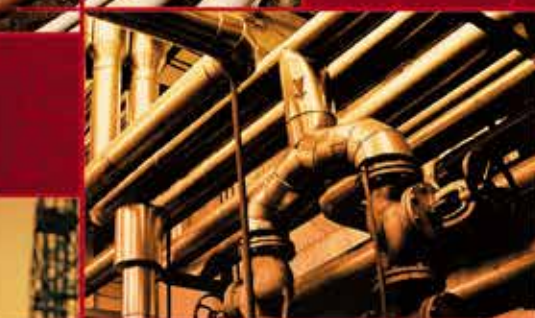
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Bettering Bakken Recovery Approaches

By Paul Adair

The Energy & Environmental Research Center (EERC) at the University of North Dakota is embarking on an ambitious multimillion-dollar project in the Williston Basin. Partnering with the North Dakota Industrial Commission and several companies investing in the Bakken, this project will focus on improving Bakken system oil recovery approaches, reducing the environmental impacts associated with oil and gas production and gaining a better understanding of the Bakken and Three Forks formations.

The EERC is a research, development, demonstration and commercialization facility recognized as one of the world's leading developers of more energy efficient and cleaner energy technologies, and of environmental technologies to protect the nation's air, water and soil.



The EERC has been doing research on a wide variety of topics since the mid-1980s, all of which strive to recognize the interwoven and complicated relationships between energy and the environment. Operating solely on a contract basis, the EERC follows a business model and pursues a market-driven approach to research and development. As such, the facility chooses the subject of its research based on the needs of its clients, which predominantly include commercial entities and federal and state government agencies.

"In many cases, we are able to form partnerships between government and industry to tackle problems in which everyone has a stake in the outcome," says John Harju, associate director for research at the EERC. "In a nutshell, the EERC conducts research, development, demonstration and commercialization activities to provide cost-effective solutions for our clients."

Much of the EERC's early work focused on issues pertaining to the use of low-rank coals but it has expanded its research over the last 20 years to include projects in nearly every kind of fuel imaginable, including oil and gas. This was a logical progression for the EERC, considering its close proximity to the Bakken and its history of working with key players in the formation's development.

"It was only natural that we develop a robust program to look at ways of extracting the resource while minimizing the environmental footprint," says Harju.

The EERC is no stranger to forming symbiotic relationships with its partners, having a long history of joint projects with the North Dakota Industrial Commission (NDIC) and the oil and gas industry.

ENHANCING OIL RECOVERY

Over a decade ago, the EERC established the Plains CO₂ Reduction (PCOR) Partnership; a multi-year, multi-million-dollar program that was geared toward characterizing opportunities in the northern Great Plains region to capture, use and store CO₂ from large industrial point sources. In doing so, the EERC wished to further explore one of the most economically attractive means of potentially using and storing CO₂ from North Dakota's coal-fired power plants: the injection of CO₂ into oilfields for enhanced oil recovery.

Initially the NDIC's interest in partnering with the EERC and some of the region's largest oil producers was driven largely by a desire to identify potential technologies that would enable North Dakota's coal-fired power industry to economically manage CO₂ emissions.

It was through the PCOR Partnership Program that the EERC was able to ensure the needs of both the NDIC and its oil

industry members were being addressed, while also facilitating dialogue and knowledge sharing between those key stakeholders.

"With the creation of the NDIC Oil and Gas Research Council by the state legislature in 2003, the NDIC recognized the positive impact that research focused on the oil and gas industry could have on the state," says Harju. "The experience and track record for performance that the EERC developed in working with the NDIC and the oil industry through the PCOR Partnership led to opportunities for projects focused on several other topics, including efforts focused on the Bakken. The EERC continues to serve all of our project stakeholders by providing impartial research results and facilitating knowledge sharing."



PARTNER UP

The new multi-million dollar Bakken CO₂ Storage Enhanced Oil Recovery Program that the EERC is undertaking will take a two-pronged approach to both improve its understanding of the Bakken and Three Forks resource and to develop cost-effective approaches to optimize the productivity of that resource, while also reducing the environmental effect of operations.

Leading the way to better characterize the Bakken and Three Forks resource is Continental Resources Inc., which is putting forth efforts that include primarily field-based work to identify "sweet spots," determine the optimal spacing of wells, evaluate well completion and stimulation techniques, develop

The EERC is currently endeavoring to also work on flaring and the collection and use of associated gas, solid waste and water management.

refined knowledge of fracture networks and conduct other activities to better define the reserves of the shale formations. Alongside Continental Resources Inc., the EERC is working to evaluate several key operational challenges that Bakken producers deal with on a daily basis.

"We work closely with our partners, which, along with Continental Resources, include Marathon, Whiting, ConocoPhillips, SM Energy, Oasis Petroleum, PetroHunt, Hess, Nuverra, Hitachi Data Systems, and the North Dakota Industrial Commission, to identify and prioritize those challenges," says Harju. "We then conduct field-based and/or laboratory-based research efforts to better understand the nature of those key challenges, with a goal of developing solutions that are economically and environmentally sustainable."

The EERC is currently endeavoring to also work on flaring and the collection and use of associated gas, solid waste and water management. The EERC's optimization efforts are designed to be flexible and responsive to meet the evolving needs of the project partners and, as such, new topics may be added in the future.

HOPPING HURDLES

Projects of this scale and scope tend to face a variety of logistical challenges, particularly when they involve multi-partner, multi-year and multi-topic variables. However, the enthusiastic support from project stakeholders, coupled with the EERC's track record, help to make clearing the potential hurdles an easier task.

"The EERC has a long track record of designing, implementing, and managing these types of projects," says Harju. "This experience has served us well in ensuring that the project got off the ground and continues to move forward in a smooth and timely fashion."

The results of this project are expected to provide the partners of the EERC and the citizens of North Dakota with scientifically robust knowledge that will ensure the resources of the Bakken and Three Forks system are developed in a cost-effective manner with minimal environmental impact. In addition, this project will strengthen the EERC's technical expertise and its relationships with stakeholders in the Bakken.

Although this project is currently confined to a three-year period of performance, the intention of the EERC is to continue on with the optimization efforts beyond the scheduled time frame. The EERC plans to proceed with commercial participation, building on its established and valued partnerships beyond the three-year window.

LONG-TERM SUSTAINABILITY

Ultimately, establishing the size and nature of the oil resources of the Bakken and Three Forks systems, and then developing approaches to improve operational efficiency and reduce the environmental footprint, will lead to overall improvements in production efficiency in North Dakota.

"Such results will directly benefit the state of North Dakota, the industry and royalty owners by supporting the maintenance of strong oil production rates and the revenues that go with it," says Harju. "The reduction of the environmental footprint will improve the long-term sustainability of the Bakken and Three Forks play in North Dakota, which will, in the long run, benefit all of the citizens of North Dakota."



GET TO KNOW OUR EXPERTS

JOHN HARJU

John A. Harju is the associate director for research at the EERC, where he oversees the activities of a team of scientists



and engineers focused on research, development, demonstration and commercialization of energy and environmental technologies. Before joining the EERC, he was vice-president of Crystal Solutions, LLC, a firm involved in commercial exploration and production water management, regulatory permitting and compliance and environmental impact monitoring and analysis.

Harju is a graduate of the Geology program at the University of North Dakota. He serves on the United States Department of Energy's Unconventional Resources Technology Advisory Committee, which provides advice to the Secretary of Energy on the development and implementation of activities related to unconventional natural gas and other petroleum resources.

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A Vision West ND Update:

Consortium Close to Wrapping up Regional Plan for Sustainable Development

By Heather Syverson, AE²S

The Vision West ND (VWND) Consortium is busy fine-tuning the regional plan for sustainable development as the project enters the home stretch. The federal grant that funds the three-year VWND project ends on January 31, 2015. The overall goal of VWND is to improve the lives of the people who live and work in the Bakken area of North Dakota.

The regional plan will be the project's legacy, a course of action that includes pieces of all of the local plans that have been developed in conjunction with the State's 19 oil-impacted counties, as well as the Three Affiliated Tribes, four universities and colleges, two regional councils, Rural Economic Area Partnership (REAP) Fund, Southwest REAP Zone, and the North Dakota Association of Oil & Gas Producing Counties (NDAOGPC).

LOCAL PLANS MESH TO BECOME REGIONAL PLAN

The local plans came about over the past two years to address communities' immediate, short-term needs to meet growth management challenges and establish a diversified economy in the future.

"It's exciting to be nearing the end of this enormous project. We have gathered input from people all over western North Dakota, and now we have to take that information and make a plan that will lead the Bakken region into the next phase," says Deb Nelson, program manager for VWND. "The regional plan is going to help the area thrive well into the future."

The members of the VWND Consortium met in Minot, ND in early February to review the 16 improvement categories that were

The lack of child care in western North Dakota is a major roadblock for families that want to live and work in the Bakken. Developing more child care options is absolutely one of the top priorities of the Vision West ND project.

previously identified during the individual community planning sessions. More than 1,000 residents from 18 of the oil and gas producing counties, and four of the six tribal sectors of the Mandan, Hidatsa, and Arikara (MHA) Nation gave their input at public meetings over the past two years. That input helped to identify the 16 improvement categories. The top five priorities include housing, infrastructure, transportation, child care and emergency services.

During the recent meeting, the consortium came to an agreement on the top five issues and reviewed nine of the 16 improvement categories. Daryl Dukart, the newly-elected VWND board chairman and a Dunn County Commissioner, assigned special committees to work on the topics that created the most debate—housing and transportation. The remaining seven improvement categories were reviewed during the next consortium meeting, which was held on March 6 in Williston, ND.

PUBLIC HEALTH, EMERGENCY SERVICES AND CHILD CARE

The consortium added a public health section that will be developed with the

assistance of the three district public health units located in the 20 oil and gas producing counties during the February meeting. It also approved funding for two projects that address the lack of adequate emergency services and child care. Consortium members approved \$23,150 for emergency services planning for the MHA Nation.

"The availability of trained EMTs and ambulances is at a premium in many of these oil-impacted communities. This funding will help the MHA Nation better respond to medical emergencies," says Vicky Steiner, executive director for the NDAOGPC.

"The consortium voted to broaden the health care initiative grant beyond emergency services for the reservation for Native and non-tribal residents on a conference call, March 24, 2014. An EMS ambulance study completed by the NDAOGPC brought about a meeting in McKenzie County, which identified a need for additional EMS workers to transfer patients to hospitals in the region." Previously, \$10,000 was set aside for the emergency services project at a previous consortium meeting. That amount was increased by \$13,150 with the stipulation that



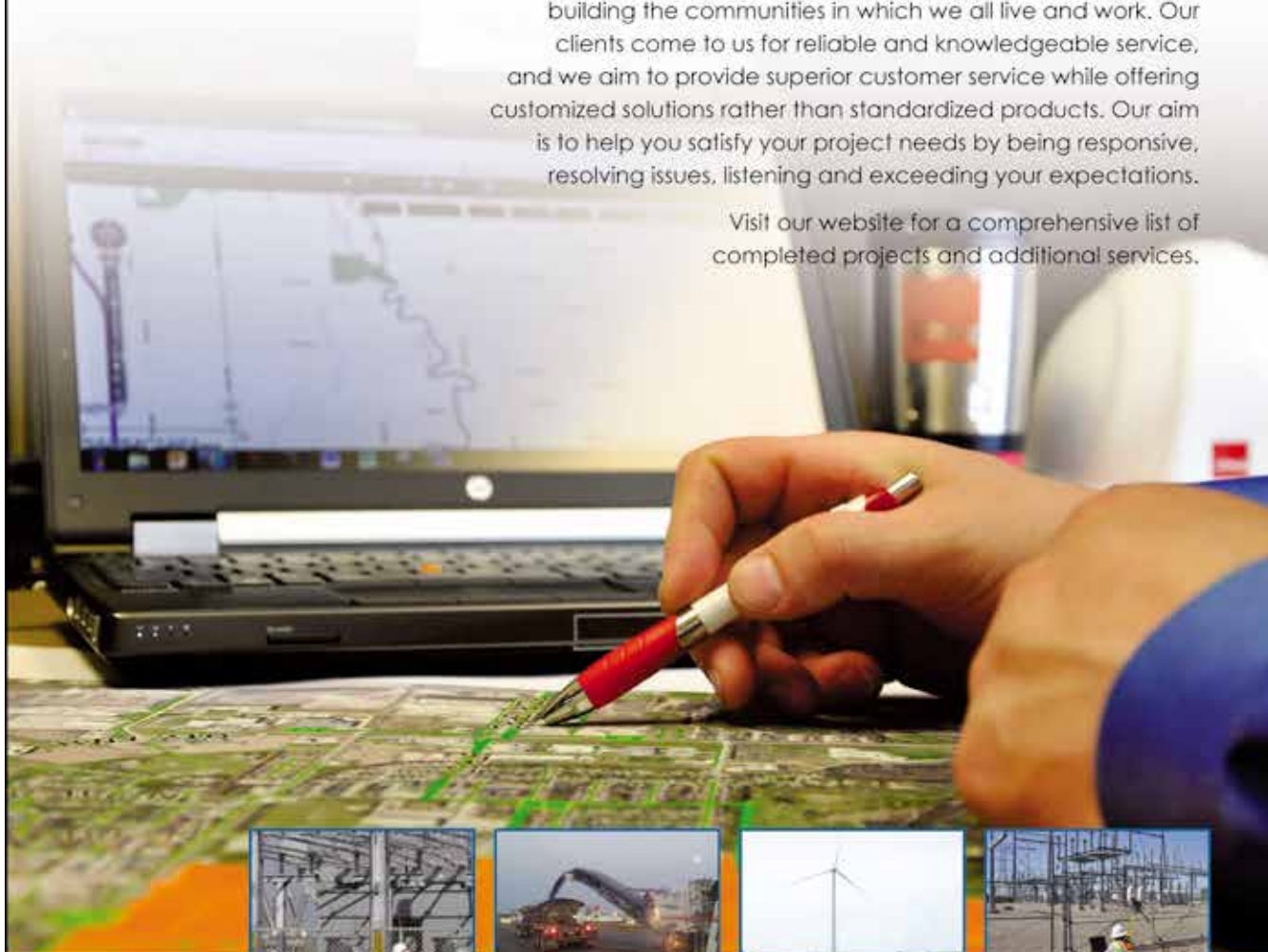
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a letter acknowledging the funding and project be received from Tribal Chairman Tex Hall before the money can be released. That stipulation has already been met.

"The lack of child care in western North Dakota is a major roadblock for families that want to live and work in the Bakken. Developing more child care options is absolutely one of the top priorities of the Vision West ND project," says Ray Ann Kilen, regional director for the Small Business Development Center (SBDC) in Dickinson, ND. Kilen is the organizer of the One-Stop Child Care Forums that are being planned in Minot, Dickinson, and Watford City in March. The dates for those events will be posted on VisionWestND.com. Members voted during the February meeting to approve reimbursement of travel expenses for the local plan directors to attend one of the three forums.

The consortium previously approved \$10,000 for the development of a resource tool for people who are interested in opening a child care facility. The tool will list all of the forms and other steps that must be taken at the local and state levels in order to open a child care center.

TRANSPORTATION INFRASTRUCTURE

On February 19, 2014, consortium members met in Bismarck, ND with legislators and other western North Dakota community leaders to discuss the current transportation infrastructure priorities. The VWND Consortium, the NDAO-GPC and the Theodore Roosevelt Expressway (TRE) Association are in agreement that Highway 85 needs to be expanded to four lanes.

"Highway 85 between Bowman and Williston needs to be widened to four lanes to allow more vehicles to safely travel between those two hubs," says Cal Klewin, executive director of the TRE Association. The 170-mile stretch of two-lane highway is currently a congested corridor that is crowded with trucks and commuting workers.

Another transportation initiative that is included in the Vision West ND regional plan includes a ferry transport service on

Lake Sakakawea. The potential service would connect the two segments of Highway 8 that are separated by Lake Sakakawea, from Highway 8 Bay to Elbowoods Bay. A proposal to conduct a feasibility study on the ferry project was presented at the March consortium meeting.

WRAPPING UP THE REGIONAL PLAN

When the finishing touches have been placed on the regional plan for sustainable development, the next step will be to share it with county commissions for their review. Then, consortium members will develop a legislative agenda for the next couple of biennia.

"Even though our federal grant funding ends in 2015, the work involved with implementing the regional plan will continue. This is definitely a long-term project for western North Dakota," says Nelson. 

GET TO KNOW OUR EXPERTS

DEB NELSON

Deb Nelson is program manager for Vision West North Dakota. Nelson is also president and owner of DLN Consulting, which aims to serve as a resource for organizations by building strategic plans to help move them forward.

RAY ANN KILEN

Ray Ann Kilen is regional director for the Small Business Development Center (SBDC) in Dickinson, ND. She is the organizer of the One-Stop Child Care Forums being planned in Minot, Dickinson and Watford City, ND.

HEATHER SYVERSON

Heather Syverson is Communications Coordinator at Advanced Engineering & Environmental Services (AE²S).



TRIVIA TIME

ROAD DAMAGE

A 2012 study estimated that it will cost North Dakota \$7 billion over the next two decades to maintain county and township roads, in large part due to heavy truck traffic from increased drilling and fracking. The state will need to pay \$834 million over the next two years alone to maintain county and township roads, two-thirds of that amount in western North Dakota, where oil production is booming.

The study was presented to the state Legislature's budget committee. The state said it has an oil-driven budget surplus, expected to reach \$1.6 billion by June 2013, and incumbent Republican Gov. Jack Dalrymple has previously recommended increasing state spending on roads.

Institute Director Denver Tolliver said the 28 percent increase in the group's spending recommendation was due to rising construction costs and an 80 percent increase in the number of wells that regulators expect companies to drill in the state.

Source: www.sourcewatch.org/index.php/North_Dakota_and_fracking#Refining_and_transport

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Get Your Feet Wet

By Darla Read

When Shawn Kessel became city administrator for Dickinson, ND, the city had already begun the process of looking at how it was going to treat effluents and its wastewater.

"It had become apparent that the lagoon-based system was not going to last long," explains Kessel.

He says that when the city began working with an engineering firm, Dickinson was expecting a population base of about 26,000, which would have worked fine with a rapid infiltration system.

The firm Dickinson began, and continues, to work with is Apex Engineering Group. Project manager Karla Olson says the wastewater pond system—also known as a lagoon-based system and what Dickinson had—is a great, low-maintenance option for smaller communities.

"At the time, the city was at 17,000 and looking up to 26,000, so our first recommendation was to expand the pond system," she says.

"Then the boom hit," recalls Kessel. "We quickly understood that we were going to exceed the capacity long before the life of it."

Olson says that all of a sudden, the city was looking at growth up to 26,000 people in a couple of years instead of just 20 years, and says the pond would have been at capacity by the time it was constructed. The rapid population growth occurring in the region is due to the oil formations in the Bakken area.

"It has created a lively economic environment," explains Kessel, noting that it has resulted in Dickinson, ND being the third-fastest growing micropolitan city in the United States in 2012.

GAUGING GROWTH

Olson says looking at the population range of 35,000 to 38,000 meant that a pond system was no longer feasible for Dickinson's rapid growth, so the company switched gears to a plant that would use aeration and mechanical means to speed up the process: more specifically, a mechanical wastewater treatment and reclamation facility. In addition to there being a difference in how wastewater is treated—naturally over time versus aided with mechanical equipment—there is a huge size difference between the two types of water treatment facilities; Dickinson's existing pond system is spread over 200 acres, whereas the new mechanical wastewater treatment facility treats the water to a better quality and will only take up about eight acres.

...the initial estimate was between \$13 and \$20 million, whereas the new project has a price tag of \$43 million, and that's just to complete the first phase.

Before the exact scope of the project was determined, staff from the City of Dickinson and Apex Engineering toured wastewater facilities across the United States that used some of the six technologies the company was considering, allowing staff to see first-hand the operation, maintenance and cost of the various treatment components. In the end, an integrated fixed-film activated sludge (IFAS) technology was recommended with a "flexible, modular approach" to prevent an unnecessarily large facility, which would have been expensive to construct and difficult to operate. The proposal also allows the city to double the capacity of the water reclamation facility in the same footprint.

PROJECTING PRICE TAGS

The entire project will be built over three phases: phase one can service 35,000 people; phase two can service a community of 48,000; and the third phase can service 65,000, so the facility will be able to keep up with Dickinson's projected growth.

The sanitary collection system upgrades to convey wastewater from the existing ponds to the new facility will include a new 15-million gallon per day influent pump station. The station will include coarse screening to remove large debris before entering the two-and-a-half mile pipeline to the new facility. Additional collection system projects will occur over the next few years in subsequent phases.

Because of the big change in the scope of the project from where it initially began, there was also a change in the cost. Kessel says the initial estimate was between \$13 and \$20 million, whereas the new project has a price tag of \$43 million, and that's just to complete the first phase. He says the operational expenses for this plant will also likely more than double because more technically trained people will be required to operate it than if there was an expanded pond system.

Kessel says the city raised its sewer rate right away so that there would be some accessible funds for when construction began; that way, financing can be delayed as long as possible, too. The rate increase was minimal: from \$1 to \$2 per 1,000 gallons per household. Now, the city is undergoing a rate study, which he says likely means the rate will increase again in the future; an increase that will exceed what has traditionally been implemented, says Kessel. However, he says having such a facility provides a "sense of security" to the city and region.

"We know it will be state-of-the-art," says Kessel. "It will allow us to treat constituents we couldn't treat as well before."

STATE-OF-THE-ART SCREENING

The treatment facility consists of fine screening to remove debris to three millimeters, vortex grit removal, integrated fixed film activated sludge (IFAS) biological treatment, clarification and UV disinfection. Biosolids produced from the treatment process will be land-applied to adjacent agricultural fields as fertilizer. The average daily wastewater flow will be around 3.65-million gallons per day, with its peak hourly wastewater flow at nine-million gallons per day.

The facility will be the first of its kind in North Dakota, using a biological treatment technology in the range of 15 to 20 years old; Olson says that most wastewater treatment technologies used were around 50 years old, making this fairly "new." The IFAS process was selected due to the ease of expansion, quality of water produced, small footprint and ability to resist plant upsets. The facility will treat water to some of the most stringent effluent standards in North Dakota.

Furthermore, "it will meet the expectations of today but also tomorrow. It will meet Environmental Protection Agency

requirements now, and it also provides us an economic development tool," notes Kessel.

Treated water will be sold to a local farmer, as it has "tremendous fertilizer value," he explains. He says it will also be used in fracking, a technique used in the oil industry where water is mixed with sand and chemicals, and the mixture is injected at high pressure into a wellbore to create small fractures.

Treated water will also be piped to the nearby Dakota Prairie Refinery, about seven miles west of Dickinson, ND, and wastewater from the neighboring community of South Heart, ND will also be treated at the facility.

Olson says there is also the opportunity to treat wastewater from man camps, as it would be much more financially feasible for such small camps and small communities to truck the waste to Dickinson's facility than to try to build their own.

"We're trying to conserve potable water and then reuse it for industrial purposes," says Olson. "That's pretty unique in this area of the country."

Construction has begun on this new state-of-the-art facility, and phase one is expected to be completed this October.

GET TO KNOW OUR EXPERTS

KARLA OLSON

Karla Olson is an associate with Apex Engineering Group. As a wastewater treatment and



process specialist at Apex, she has led several wastewater treatment projects throughout the region. She holds a master's degree in environmental engineering and has more than 13 years of experience in the evaluation, planning and design of numerous wastewater treatment and collection system facilities.

Karla became interested in the chemical and biological treatment side of civil engineering during a summer job and loves that her work allows her to see a project through conceptualization to construction.

"People come to you with problems and you help them solve problems," she says. Her experience includes all aspects of planning, design, construction administration and operations, as well as funding and grant writing.

SHAWN KESSEL

Shawn Kessel is serving his fifth year as city administrator with the City of Dickinson, ND, after working



in the same position for nine years in another community in North Dakota. He holds an undergraduate degree in social work and a master's degree in business administration. Kessel worked for years in social work, where he worked his way up into the administration of a health care facility and sees similarities in the work.

"It's almost a calling, because you're working for the benefit of a whole," he says. "Sometimes it's not always appreciated by everybody but it's used by everybody."

Kessel is originally from Dickinson, ND, so it was appealing for him to return home and give back to a place that had given so much to him.

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Landowner Rights Rise to the Surface

By Kim Babij-Gesell

Frank Falen is a busy man and an even busier attorney. So, it comes as no surprise that he schedules meetings to take place over speakerphone while he is making long highway drives through the Midwest—just like the interview he gave to *Basin Bits* magazine for this feature.

“You will have to ignore my GPS talking in the background; I apologize for that,” laughs Falen.

But one of Falen’s main concerns these days is no laughing matter. The Wyoming-based lawyer is spending a great deal of time working on landowner rights issues in North and South Dakota, Montana and Wyoming.

INDUSTRIAL-SIZED RISK

As the oil and gas industry continues to boom in those states, landowners are running into more and more situations where the authority to condemn is exercised against their land and they have no say in the matter.

Authority to condemn is the authority for someone to use the police power of the state to take a property, either in whole or in part. And when that happens, Falen says the landowners are increasingly finding themselves forced to take on industrial-sized risk while only being paid “ag value.”

“With all these land use issues, it seems like the companies—pipelines, power lines or whatever the case may be—it seems like the companies and their ownerships don’t



recognize that having this type of stuff on a person's property has risk and potential consequences for the landowner," explains Falen. "You have a very high dollar industrial use going on your property, and there is the possibility that it could harm you, and there is a possibility that you could harm it. Typically, you are simply paid based on the ag value of the property interest that you're giving up. But you get nothing for the fact that you have got to deal with this, go around it, be careful around it—that kind of thing."

Unfortunately, because of the way the laws are written regarding the authority to condemn, property owners don't have any room to demand more for their risk. And Falen says that there are any number of potential problems that can arise in that situation.

"There are different levels of danger. To the extent that we are talking pipelines, pipelines are definitely the cheapest and safest way to transport certain materials," says Falen. "So, while danger is a relative term, the risk or the extent to the landowner can be anything from a spill—which can be major—down to just people with the right to come onto the property, maybe spread noxious weeds, maybe start a fire. Those types of things. Basically, if you are where they need to put it, as a practical matter, you don't have a lot of choice."

NEIGHBOR TO AN INDUSTRIAL USE

Falen explains that the Constitution allows the government to take over parts of a property and pay to make the landowner whole, something that was established when the country was formed. Often times, he says, the landowner would then vacate the land.

"If they are just paying you the value of what it is worth and you are leaving and never coming back, that is one thing," he says. "But more so, now, it is not the government condemning you; it is the government giving its police power to a private company, and they have the authority to condemn an easement across your property, and then you are going to be neighbors. Then, what the law doesn't recognize, is that you are going to be neighbors to an industrial use, you are going to have a lot of issues that you should want to address, like what could happen, how we can prevent it from happening, how I can make sure that I am not going to lose my farm or ranch over this."

Falen continues, "And the law mistakenly assumes that you are already

So, the surface use issues that involve pipeline, roads, drilling, you know, seismic research, all of those can create a lot of impact for a land owner—impact that takes time and expense for a landowner to deal with.

up-to-speed on that and that you don't need to hire a lawyer, or go through quite a bit of expense to try and have those issues covered. It comes with risk and expense, but under the condemnation law, they just get paid for the value of the property interest that they are giving up."

DEALING WITH SURFACE USE AGREEMENTS

If that isn't enough, there are also surface use agreements for landowners to contend with. A surface use agreement come into play in an area where a landowner—often a farmer or rancher—owns the surface land but not the minerals below. So, the mineral owner leases the minerals out through a development company, which can come in to do the necessary work to access those minerals. That, says Falen, produces another set of issues.

"It can be hard for a landowner because they don't have a lot of say in what goes on, or certainly they don't have any say in whether or not it is going to go on. So, the surface use issues that involve pipeline, roads, drilling, you know, seismic research, all of those can create a lot of impact for a land owner—impact that takes time and expense for a landowner to deal with."

Falen says one solution to these issues would be legislative changes, but those can take years to come into play. In the meantime, though, he says that one of the ways he has been most successful is to gather as many landowners as possible with the same issue in a group, to spread the costs as they fight to create change.

"And not only can they spread their costs," says Falen, "but if there is a whole group of them, then they can begin to have a little more clout, or even a lot more clout. With one of these pipelines, we have had

landowner groups representing 300 miles of the pipeline, which is approximately half. So, if we get that many of them together, not only can they spread costs, but that is a big enough portion of a company's pipeline that they concede; they have to come deal with the concerns," he continues.

"We have found that we have been able—when we approach it that way—to talk to somebody from the company that has the power to put some things in their easements that are otherwise pretty hard to get."

LIMITING RISK

One example of that, he says, would be things that limit a landowner's risk. For example, having a provision in there that says if an employee of the company harms the landowner's property, the landowner is not going to be liable for it. With the way the law currently works, typically, the landowner would be responsible for any damages done by employees, licensees, even contractors.

"Our concern with that is that we are looking at a pipeline company and say, 'Look, you guys create a limited liability company that houses this asset.' And you normally have to invest in that LLC, whenever you choose to risk. So, your whole operation is not at risk, just that LLC. But the property where the project goes is essentially in that box; the landowner can create an LLC, and they have to put their property in it. And for many of them, their property is the majority of what they own, so they can't manage their risk in the same way, because everybody's else's risk—if a company is to be involved, they say, 'I'm willing to risk X amount of dollars,' and that risk is justified by whatever profit we expect to receive, whereas, the landowner doesn't have a choice. He doesn't get to participate in



TRIVIA TIME

INVESTMENT INKLINGS

- Since 2000, the oil and natural gas industry has invested \$2 trillion in United States capital projects to advance all forms of energy, including alternatives, while reducing the industry's environmental footprint;
- Between 2000 and 2008, the industry invested more than \$58 billion in new

low- and zero-carbon emissions technologies;

- The oil and natural gas industry delivers \$85 million per day in revenue to government; and
- Unconventional oil and natural gas (from shale deposits and other tight formations using hydraulic fracturing and horizontal drilling) supported 2.1 million jobs in 2012, and is projected to support 3.9 million jobs in 2025, including 515,000 manufacturing jobs.

Source: www.ndenergyforum.com/expert-facts/#sthash.mkNsv55.dpuf



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the project, so his risk is not measured in terms of what he expects to receive because he doesn't expect to receive anything. His risk is made in terms of what he has to lose, which would be the equity in his property."

SPREADING THE WORD

Falen says that is one of the things he tries to explain to the people in these companies who have policy-level authority, with the goal of having them put clauses in the contract that limit the landowner's risk and, ultimately, modify how the law applies.

"What I usually explain to people is, for example, if someone has an irrigation ditch crossing his property, then he has a property interest. If you harm the ditch, then you are responsible to them, and if the ditch harms you, it is responsible to you. The pipeline is the same way, but the law doesn't consider if there is an issue later. The law doesn't consider that you didn't have a choice, other than to sell that property. It assumes you were a willing participant and it assumes that you had the opportunity to fully negotiate all of the terms and conditions, and that you were fully aware of what you were doing," say Falen.

"But that's not necessarily how property law works, so when we get a landowner group put together, what we have found is that when we can explain those issues to someone with policy level authority in a company, then they will usually understand that and they will work with us on those issues. It is very hard for any individual landowner to be able to talk to somebody with that policy level authority, but when we get a fairly good sized group of landowners together, we have more political clout and we can spread our resources. The landowners have a lot of issues, if they're going to be neighbors with industrial use for 10, 20, 30, 40 years, ideally we want for the company to make it worth their while."

GET TO KNOW OUR EXPERTS

FRANK FALEN

Frank Falen is an attorney based in Cheyenne, WY. He grew up ranching, and then worked for the Washington



Cattlemen's Association before going to law school. That was 20 years ago. Since then, he has been working on environmental and landowner rights issues related to agriculture and property rights all over.

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Calling All EMS Personnel

By Jennifer Ryan

Cities across North America face growing pressure from their citizens to provide quick and effective emergency aid. Add to that a burgeoning population of unprecedented proportion, and North Dakota's towns and cities are feeling the pressure more than most.

If populations rise and the medical infrastructure is inadequately equipped to handle the growth, an increase is also seen in the average wait times for medical

procedures, emergency room wait periods and response time by emergency vehicles. North Dakota faces the seemingly insurmountable challenge of serving its growing population while keeping these wait times in check.

A COMMITMENT FROM THE STATE

On November 13, 2013, the Board of University and School Lands (Land Board) awarded \$12.2 million in Energy Impact

Grant funds to help fund enhancements for emergency services and fire districts throughout the state's 20 oil and gas producing counties.

"These grants are an important part of a larger state commitment to help the oil and gas region meet the challenges created by rapid growth," says Gov. Jack Dalrymple, chairman of the five-member state Land Board.

"The Energy Impact Grant Fund allows us to address a wide range of challenges



but we must always be prepared to adapt our response to help meet the region's dynamic and ever-changing needs."

Approximately \$7 million of that allotment is earmarked for rural fire districts, while the remaining \$5.2 million is to be used to enhance the region's emergency medical services.

WHAT ABOUT THE WORKERS?

From the citizens' perspective, the major concern is that the quality of emergency services will decline. The Energy Impact Grant funds will provide significant aid in this area. However, another problem that must also be solved comes from the opposing perspective: how are those workers who are providing the emergency service faring? While they work over-time to ensure patient care and emergency calls are attended to, their own well-being could be in jeopardy. Among emergency personnel, "our main concern is burnout," says McKenzie County Commissioner Ron Anderson.

He and Kerry Krikava, the county's ambulance leader, along with members of the North Dakota Association of Oil & Gas Producing Counties, met in December 2013, following the Land Board's announcements, to discuss this and other issues facing the medical services force due to the rapid population growth in the region.

Anderson expressed that the meeting was a great opportunity to discuss the issues that matter to the state. Though he is optimistic that a plan can be put into place to tackle the problems that North Dakota faces, population growth has resulted in some numbers that are very concerning for the state—now, and in the future.

For example, the emergency room at one hospital currently sees about 500 patients in one month. Five-hundred is more on-pace with the number of patients a busy mid-sized city hospital would see. In 2011—before the population boom—that same hospital's average was 10 or 11 patients in a month.

In just over two years, this hospital has had to handle 50 times its usual capacity. It is an isolated case, but without imminent change, this hospital's experience could become the norm. Medical and emergency services around the state are experiencing similar challenges. Without some major changes taking place, two years is not enough time to adapt to such rapid growth and still be able to provide exceptional patient care.

In just over two years, this hospital has had to handle 50 times its usual capacity. It is an isolated case, but without imminent change, this hospital's experience could become the norm.

LOOKING FOR A LONG-TERM SOLUTION

One solution that's been floated is to set up another service station in a region like Alexander, ND.

"It's an under-served area," says Anderson. Setting up there would alleviate some of the demand experienced by emergency personnel in surrounding regions. At first glance, this seems like an ideal solution, particularly after factoring in the grant money allocated from the Energy Impact fund. Each new station would cost one million dollars per year to operate.

"For one year, grant money can easily cover it, but that's not the problem," says Anderson. "What about next year?"

New service stations would then be relied upon as a necessary part of the network of emergency care, but it would also struggle for funding year after year. It is not a viable or long-term solution, even though it may look good in the very short-term.

"We would be better served by a transfer service," says Anderson. "The present ambulance squad would be able to handle it."

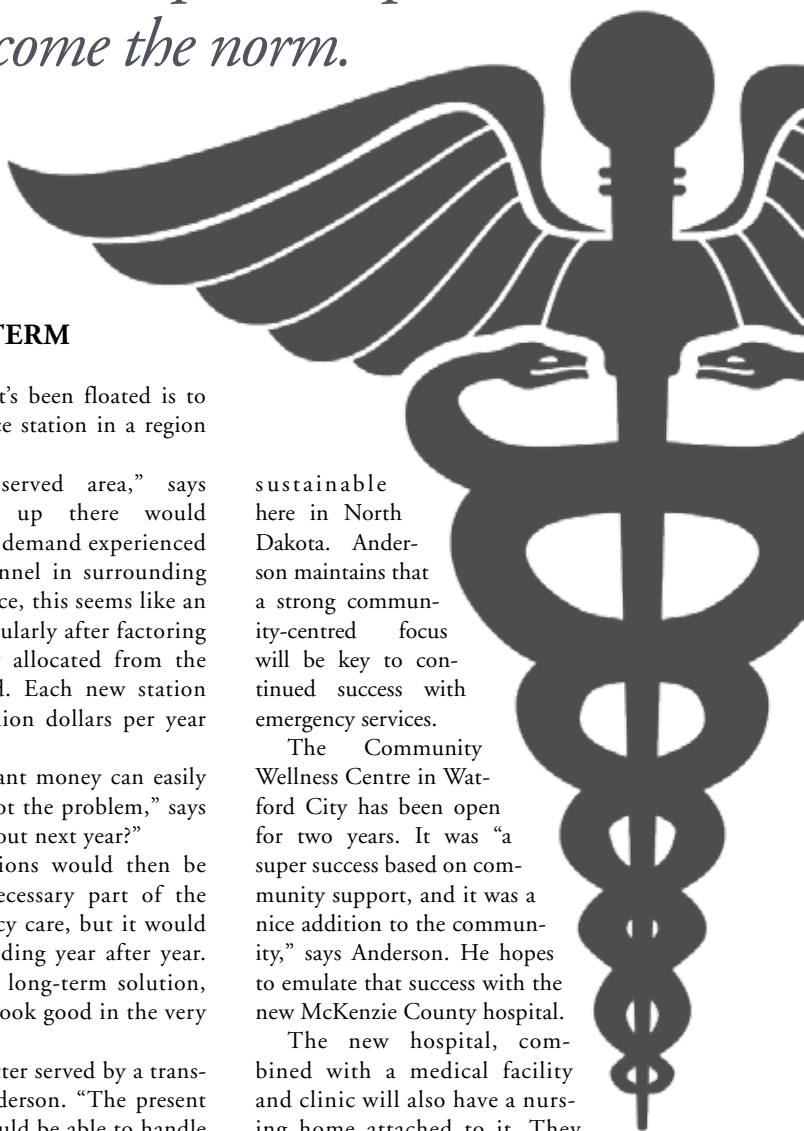
Sparsely populated states like Wyoming and Montana have similar systems in place. "We're not creating something brand new here in the United States. This exists elsewhere."

Now, the plan is to leverage off those established practices to build something

sustainable here in North Dakota. Anderson maintains that a strong community-centred focus will be key to continued success with emergency services.

The Community Wellness Centre in Watford City has been open for two years. It was "a super success based on community support, and it was a nice addition to the community," says Anderson. He hopes to emulate that success with the new McKenzie County hospital.

The new hospital, combined with a medical facility and clinic will also have a nursing home attached to it. They will be breaking ground in the spring of 2014. The hospital was funded entirely by public community support, the oilfields, private funding from banks of North Dakota and the USDA. Sizeable donations allow donors to name a portion of the hospital, which helped boost funds.



NORTH DAKOTA MAKES THE GRADE

Though North Dakota has its fair share of obstacles to providing optimal patient care, the state excels in some areas. A 2014 report from the American College of Emergency Physicians entitled *America's Emergency Care Environment, A State-by-State Report Card* credited North Dakota's "solid performance" and ranked it eighth in the nation overall. The high ranking was mostly due to the state's high grades in "Disaster Preparedness" and "Medical Liability Environment." Where North Dakota lacked was in its grades for "Quality and Patient

Safety Environment" and "Public Health and Injury Prevention."

"The state lacks funding for both an emergency medical services (EMS) medical director and quality improvement of the EMS system," the report says.

It continued: "North Dakota's grade in 'Access to Emergency Care' reflects a mixture of positive and negative results... The state fares excellently regarding hospital capacity, with 514.3 staffed inpatient beds per 100,000 people and 37.2 emergency departments (ED) per one million people. ED wait times are third-best in the nation, averaging 189 minutes from ED arrival to ED departure for admitted patients."

The report recommended that North Dakota could improve its grade by funding an EMS medical director. Additionally, it could "consider legislation aimed at reducing traffic fatalities, which are much higher than the national average (14.2 versus 9.0 per 100,000 people)."

Traffic fatalities are yet another problem partly caused by the influx of population putting great demand on the region's existing infrastructure. Lieutenant Jody Skogen, the safety and education officer for the North Dakota Highway Patrol is not surprised by numbers like these.

"Increased traffic numbers equates into higher probabilities of traffic violations, crashes and fatalities."

Over the 2013-2015 biennium, the Land Board will award a total of about \$2.6 billion to western North Dakota to address needs including city infrastructure, highway, county and township improvements. It has also committed to stationing more Highway Patrol troopers. Strategic planning and allocation of the Energy Fund Grant money will hopefully alleviate many of these issues facing North Dakota and its EMS personnel.

For a complete list of grants approved by the Land Board, visit www.nd.gov/energyimpact. 

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GET TO KNOW OUR EXPERTS

RON ANDERSON

Ron Anderson has been a part of the McKenzie County Commission since 1998. Before his appointment to the commission, he served three years in the United States Army, including one year in Vietnam. He followed his military career up with a career in state politics: he was a member of the North Dakota House of Representatives for 12 years, including one year in which he served as Speaker of the House. But in 1992, he quit the House to pay more attention to two of his greatest passions: his family and his ranch.

The family ranch was started by his grandfather in 1909, and then passed on to Ron's father. Ron worked on the ranch until 2009, and continues to live there with his wife, Myra, who taught senior English at Watford City High School for 34 years. In their spare time, Ron and Myra love to travel and spend time at their lake home in Detroit Lakes, MN. They have two sons and four grandchildren.

On the Road Again

By Paul Adair



As oil and gas production in the state of North Dakota continues to boom, the roads and highways which weave through the Bakken are paying a heavy toll. The 28th Annual Local Roads Conference recently met in Rapid City, SD, to bring together local road supervisors, engineers and road maintenance staff from six states to discuss new ideas and new practices for building and maintaining local roads throughout the Midwest region.

"Local road conferences are great things," says Mike Dollinger, engineering assistant with McKenzie County's Engineering and Road & Bridge Department. "It helps to get all the people that are involved in the day-to-day county road operations together, and any time you can get those people together where they can just talk about specific problems and what they did about them, it's a good thing."

McKenzie, Dunn, Mountrail and Williams Counties are situated in the heart of

We are where the 'sweet spot' of the Bakken is located. And we are the ones who are getting all of the activity—the trucks, the traffic and the influx of people . . . Here is where all of the industrial work comes into play.

the Bakken and are considered to be the four main oil producing counties in the state. As such, they have experienced more than their fair share of the negative factors associated with the region's heavy oil and gas production, including excessive volumes of traffic.

"We are where the 'sweet spot' of the Bakken is located," says Dollinger. "And we are the ones who are getting all of the activity—the trucks, the traffic and the influx of people. The surrounding counties also get it to some degree but, really, that's just where the oilfield goes to sleep. Here is where all of the industrial work comes into play."

WREAKING HAVOC ON ROADWAYS

All of this industrial activity is wreaking havoc on the roadways of McKenzie County, which was once used to seeing up to 20 trucks per day passing by. Since the oil pads were first laid, the county has seen an amazing escalation of heavy traffic—up to 1,400 percent more.

"We went from having roads that would have maybe 20 trucks per day to having up to 300 trucks per day," says Dollinger. "These trucks are each loaded just as heavy as they can possibly be and are driving along our dirt roads. These trucks are grinding our gravel into dust and throwing it off the road. The roads are not designed to take this kind of wear and are degrading down, getting wider and getting broken up. It's a losing battle and we're going backwards."

Coupled with the increase to traffic volume, McKenzie County has been facing an increasing challenge in retaining staff as employees, who tend to be drawn to the oilfields and the high wages paid out by contractors working in the Bakken. Last year, the road department lost nine employees out of a crew of 23, in spite of already paying higher wages than could be found in other counties. This has changed the way that McKenzie County has approached new hires within the road department.

"We had to give up on training and hiring younger people," says Dollinger. "What we found was happening was that they were just using us as a training ground, and as soon as they felt comfortable on our equipment, they jumped ship to go to the oilfield. Because of this, we started looking for specific types of employees."

McKenzie County is counting on the already trained and more experienced workers returning the oil patch, who have perhaps been disenfranchised by the promises made that brought them into the Bakken in the first place. Each season, one or two of these workers gets picked up by the department and, more importantly, stays with the county road crews.

"We're looking for those who are sick and tired of working six days straight at one hundred hours per week out in the oilfield," says Dollinger. "These workers want job security, benefits, insurance, paid holidays and the family life back, instead of a big cash payment at the end of the week."

GETTING THE GREENBACKS

Ultimately, the solution to the issues facing the counties in the Bakken will come down to one thing.

"We need obscene piles of money to fix our problems," says Dollinger. "Don't get me wrong; our revenues are increasing, and as things go, the county is getting richer. But right now, the percentage that we are getting back from the government is not keeping pace with the activity or the money that's going out of our county. Not even close."

The deteriorating condition of the roads and highways throughout North Dakota is something that the state's legislators are not blind to and they are well-aware of the challenges facing local road departments such as those in McKenzie County.

"I would say that funding in road infrastructure is insufficient to handle the growth, considering that we are still growing," says Congressman Kevin Cramer of North Dakota. "However, I am of the belief that a place like North Dakota—specifically the Bakken—is contributing so much to gas tax dollars to the federal government and highway use funds that they ought to get a bigger return."

In response to the infrastructure crisis in the Bakken, federal and state governments have been increasingly funding new highway construction projects, subsequent maintenance and working out formulas to get more state money back into the counties and municipalities through various mechanisms and triggers.

"Federal and state governments are using excess funds to not only build up the state and federal highway system, but to also to get money out to local governments for their priorities," says Cramer. "Some would argue that it's not enough—and it may not be—but at least there has been some progress in that regard."

HIGHWAY OF CHOICE

To more efficiently move goods and services through the Bakken, the state and federal government is looking to work with local jurisdictions to develop the trade corridor known as the Ports to Plains Alliance, with a priority of four-laning Highway 85—the most relevant point for the Bakken and those living throughout North Dakota. Law-makers see the widening of Highway 85 as a way to help relieve traffic congestion on the county roads and as a way to bill Highway 85 as a "highway of choice" for shippers and travelers.

"North Dakota now is the fastest growing state in the country, and with that

economic growth, we do have leverage to develop infrastructure,” says United States Senator John Hoeven of North Dakota. “It is a commitment by our state—and rightly so—to make this happen.”

The commitment for the completion of the corridor is strong; however, there are still bureaucratic challenges to overcome. At the end of this fiscal year, the current highway funding bill expires, leaving law-makers with the task of securing a new multi-year authorization bill that will allow the Highway Trust Fund to continue being funded—a task that is especially arduous considering that the nation is going through a period of tax reform. Because of this, plans are being promoted to help ensure that infrastructure projects are undertaken.

“One of the ideas that we are putting forward is to do more energy development on federal lands, both onshore and off,” says Hoeven. “We feel that this will help generate additional revenues without the need to raise taxes. More activity can then be used to generate revenues, which could be used to help fund a strong highway bill and provide additional infrastructure spending as would be needed for four-laning Highway 85.” 

GET TO KNOW OUR EXPERTS

SENATOR JOHN HOEVEN

Senator Hoeven earned a bachelor's degree from Dartmouth College in 1979 and a master's degree in business administration from Northwestern University in 1981. He served as executive vice-president of First Western Bank in Minot, ND from 1986 to 1993 and established a strong position of service in many civic, community and economic development activities prior to elective office. From 1993 to 2000, he served as president and CEO of Bank of North Dakota. He served as governor of North Dakota from 2000-2010 and has been serving as a United States senator since 2011.

“We have to make sure we have the infrastructure in place—including four-lane roads—to meet the needs in western North Dakota.”



REPRESENTATIVE KEVIN CRAMER

Kevin Cramer was elected to the United States House of Representatives on November 6, 2012 and he serves on the House Committee on Natural Resources and the Science, Space and Technology Committee. He was appointed to three sub-committees, including Energy and Mineral Resources, Public Lands and Environmental Regulation and Indian and Alaska Native Affairs.

Cramer has a bachelor of arts degree from Concordia College in Moorhead, MN, a Master's degree in Management from the University of Mary in Bismarck, ND, and was conferred the degree of Doctor of Leadership, honoris causa, by the University of Mary on May 4, 2013.



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Legislative Line: New Pipeline Rules in the Works

By Paul Adair



Becoming the first state in the nation to regulate gathering lines is going to be a significant change and is one that we fully support as an industry.

Already equipped with some of the most stringent oil and gas regulations in the nation, North Dakota will once again be tightening the rules which govern the oil and gas industry operating within the state. The changes will be made on April 1, 2014. It will then be the responsibility of the state to regulate all gathering pipelines that carry oil, gas, water or carbon dioxide from a well site to larger collection areas, or to pipelines governed by the Public Service Commission, which, until now, have gone largely unregulated.

"Becoming the first state in the nation to regulate gathering lines is going to be a significant change and is one that we fully support as an industry," says Ron Ness, president of the North Dakota Petroleum Council. "In the future, we will need to put substantial amounts of pipeline in the ground, and in order for us to do this, we will require quality sound pipeline systems to prevent against leaks and other mishaps. This is certainly a major initiative moving us in that direction."

GIS DATA FOR PIPELINES

One particular rule of note will have North Dakota's Industrial Commission develop a program in which every pipeline put down since August 1, 2011 will be required to be registered into a state Geographic Information System (GIS) map with pertinent pipeline information, such as location and depth, provided by the oil and gas pipeline companies.

"The requirement to submit GIS data for pipelines put in place since August 1, 2011 will be a great help to the surface owner" says Alison Ritter, public information officer for the North Dakota Department of Mineral Resources. "Having the GIS data on-hand for those who may purchase or inherit the land

will help them fully understand what it is that they have buried there."

Although, the new rules concerning the regulation of gathering pipelines seems to be getting much of the press, it was only one of several administrative changes that were brought before the Industrial Commission for approval back in December.

"We are in a larger rule changing process," says Ritter. "We have over 40 different sections of code that we are adapting the rules of, ranging from small things such as definitions, to major overhauls, like the addition of these gathering pipeline rules. It really runs the gamut."

MAKING A WORKABLE RULE

As the only state looking to have rules in place for the regulation of gathering pipelines, officials from the North Dakota Department of Mineral Resources were forced to look north toward Canada for a template to base their changes on. Many of the rules now being used in North Dakota are modeled on an 86-page document from Alberta that covers gathering pipeline regulations, particularly those sections that deal with self-certification.

"Historically, the states just don't regulate gathering pipelines," says Ritter. "So, we are kind of leading the way when it comes to getting those gathering pipeline regulations into place." The process of bringing Bill 1333 to law has been a nearly year-long endeavor for the Department of Natural Resources. Officials have taken into account a great deal of input during the public comment period from concerned stakeholders—citizens, industry and environmental groups—with all input being weighed into the final result.

"The biggest challenge that our department faced was in just making sure that every comment that we received was carefully reviewed and taken into consideration before responding back to each one," says Ritter. "The challenge then became taking those comments and trying to fashion them into a workable rule."

THOUSANDS OF MILES OF PIPELINE TO COME

Although the implementation of the new rules concerning gathering pipelines was not precipitated by any single event, it was felt that now

was the time to bring these changes to the industry in order to help stay ahead of the ever-increasing production occurring in the Bakken. Currently, North Dakota has approximately 18,000 miles of gathering pipeline crisscrossing the state, with some estimates anticipating an additional 12,000 miles of pipeline to be added in the future.

"I think that the issue is that we are just getting to have a lot of pipelines in North Dakota and there are going to be a lot more pipelines yet to come," says Ness. "We just want to make sure that the parties putting them in are doing them properly."

When pipelines are not installed properly, incidents—like the large spill in Bottineau County that began as a pinhole leak and was determined to be caused by shoddy construction practices—highlight the importance of having rules in place to regulate the installation and placement of gathering pipelines.

"These rules will hopefully make companies slow down a little and perhaps be more cautious about what they are putting in the ground," says Ritter. "It will be more beneficial for the industry to certify what it is doing, because it allows for more accountability and encourages to not put some of these pipelines in quite so hastily. If we can require these companies to say what they are doing—and then certify what they are doing—we will then be able to limit the possibility of having some sort of event on their pipeline."

COMPANIES COOPERATING

The oil and gas industry has been very responsive to the new rules for gathering pipelines and they have been eager to submit their GIS data to the system prior to the April 1, 2014 date of effect. One of the positive measures in the new rule is that the Department of Mineral Resources is not imposing restrictions on companies, such as maximum pipe thickness or minimum burial depths. This will allow companies to retain some autonomy and flexibility in regards to how they wish to install pipelines and where they wish to place them.

"One thing that people may need to understand about this rule is that it's a self-certification rule, where the company simply needs to certify what they have done to that pipeline," says Ritter. This way, if there is an issue with the pipeline, we can go back and say that a company

claimed that it was buried six feet when it was only buried at three feet. Then we can better identify the problem. It's not really limiting the industry; it just requires companies to be more accountable for what they are doing."

REDUCING CONCERNS

Moving forward, there is hope that this rule for gathering pipelines will better open up communication between landowners and the industry, easing some of the understandable concerns that property owners may have toward pipelines being placed on their land.

"For them to have the sense of knowledge that there are some guidelines, procedures and

rules that were followed in the construction and the maintenance of these gathering pipelines, it will provide some peace of mind," says Ness. "Obtaining and establishing easements have always been a challenge for the industry and we are hopeful that rules such as this will help encourage those landowners to allow for more pipeline easements across their properties."

Ultimately, however, this new rules affecting gathering pipelines aims to benefit all North Dakotans, whether they are actively involved in the oil and gas industry or not.

"These rules will benefit the entire state because companies will now be certifying what

exactly they are putting in the ground so as to avoid some kind of future environmental incident," says Ritter. "This is something to help secure the future, and I believe that everybody will win with a rule like this." 

GET TO KNOW OUR EXPERTS

ALISON RITTER

Alison Ritter joined the North Dakota Department of Mineral Resources in 2011 as the public information specialist after five years of work at KFYZ-TV in Bismarck, ND. While at KFYZ, she was a two-time winner of the Northwest Broadcast News Association's Eric Sevareid award. Alison is a 2006 graduate of South Dakota State University, where she majored in Communications.

When she is not busy trying to keep up with the ever-changing oil and gas industry, she is busy trying to keep up with her husband, Bryce and their two sons, Boedy and Benson.

"I love the additional perspective I can provide to our decision makers and I enjoy the different challenges my job presents every single day. I literally leave work every day thinking, 'Wow, that was tough, but it was fun!'"

RON NESS

Ron Ness is president of the North Dakota Petroleum Council, serving as the industry spokesperson and managing the association. Ness was previously the president of the North Dakota Retail and Petroleum Marketers Association. Prior to that, he spent 10 years with the state of North Dakota, most of which were spent as the deputy commissioner of labor.

Ness is a Tolna, ND native and a graduate of North Dakota State University in business and economics. He received his masters in management from the University of Mary in North Dakota. He and his wife Becky have three children and are avid outdoorsmen who enjoy golfing and hunting.



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By the Numbers



By Andrea Danelak

Methods for tracking oil production recently received a facelift, thanks to the United States Energy Information Administration (EIA). In the past, oil production was tracked by simply calculating the number of rigs in operation. However, in the Bakken region, production numbers were flourishing while rig counts were going down—a trend that required the EIA to delve deeper into those statistics.

“All areas had the same issue. It was that very problem that prompted us to get a new technology and insight into productivity,” says Lynn Westfall, director of energy markets at the EIA, a statistical and analytical agency within the United States Department of Energy.

The EIA spent over one year gathering and analyzing data to find a way to better track the country’s oil production. To that end, it developed the Drilling Productivity Report (DPR), a monthly publication that looks at active development within the most prolific areas in the country, which were included based on their recent drilling activity and rapid production increases. The report does not distinguish between oil-directed rigs and gas-directed rigs.

USING NEW INSIGHTS TO DETERMINE PRODUCTION

The rig count remains an important factor in oil and natural gas production changes, so the DPR examines recent data on the total number of drilling rigs in operation. It also factors in estimates of drilling speed and efficiency, the expected yield from new wells and

the change in production from existing wells, all of which can help to determine regional oil and natural gas production.

“In a nutshell, our report covers six of the largest shale formations—large by means of production,” says Westfall. Using the EIA’s new insights, the DPR provides a summary of the previous two months of production, as well as the next two months in relation to the month in question. “Having that short-term view can be very valuable,” he adds.

The completion rate of wells in each play is a critical factor in assessing new production. “It is about understanding, ‘How many more wells will we have in this basin? If we bring in one extra rig, how quickly can we see new wells and how quickly can they produce?’” says Jozef Lieskovsky, a senior analyst at the EIA who designed the report.

“Production from a well typically declines over time, so the report separates the wells within a region into two groups—newly drilled and legacy—and measures them separately.”

Completing new wells not only affects the timeline of bringing the oil to market, but it also releases the rigs to drill more wells at other locations. “All of these dynamics are brand new and really came to light over the past five years or so—particularly over the past two or three years,” says Westfall.

In addition to using metrics to show production from new wells, the DPR also reports on production lost from legacy wells. For every 100 barrels of oil produced in the Bakken shale, for example, 70 barrels replace the declining production from older wells. Production from a well typically declines over time, so the report separates the wells within a region into two groups—newly drilled and legacy—and measures them separately.

On a monthly basis, the group of newly drilled wells from the prior month is moved into the legacy group. Separating new wells from legacy wells helps the EIA to track the improvements in drilling and production efficiencies, due to more precise drilling and completions. “If you just look at one side, you don’t get the whole picture,” says Westfall.

FORECASTING THE FUTURE

In the past, rigs had a lengthy projected life, but new shale developments in the Bakken region decline by approximately six percent per month. “Historical declines were very, very predictable, so you only had to worry about the number of rigs, and you would then estimate new production based on the number of new rigs,” says Lieskovsky. “Now, we identify what a rig used to do five years ago—and it’s very different than what it does now. Old wells decline slowly and predictably, while newer wells decline much faster.”

Analyzing those factors—among others—allows the EIA to better forecast what will happen in the near future. “Production data can lag anywhere from three to nine months, so the industry has always looked for ways to fill in that gap and know what’s happening

today,” says Westfall. Indeed, filling in those gaps can offer an earlier view as to why production begins to change rapidly in either direction. “What we know today can forecast two months ahead and fill a very important need.”

OVERCOMING CHALLENGES

One of the main challenges associated with this measuring model is the sheer amount of data involved. “We have data by well at the county level and since the information is collected by state, we can’t just look at North Dakota for the Bakken,” says Westfall. “We had to go county by county—we looked at hundreds of counties. All of the metrics have to be multiplied thousands and thousands of times.”

The data also has great variability, thanks to significant differences in the performance of individual wells. “You can’t drill two exact wells, even if they’re right next to each other. We have to ask ourselves, ‘How can we dissect the data, look at underlying trends and filter out the important factors?’” explains Lieskovsky.

“Right now, we can drill twice as many wells as we could four years ago with a rig, and each well produces twice as much, or more, as it has produced in the past. If we can identify numbers and put a trend to them, then our production forecast becomes so much more accurate.”

Though the EIA is currently limited to the data it receives from each state, Westfall and Lieskovsky say they will update the measuring model and add new data as it becomes available in the future.

BARRELING UP THE CHARTS

The Bakken shale now accounts for almost 12 percent of total United States oil production, and Westfall does not expect that number to drop in the near future. “The Bakken is now in the top two in the United States (in terms of production),” he says. “We have a few fields that produce over one million barrels per day. I don’t think we’ll be seeing it level off anytime

soon—the growth has been pretty constant. Our tool will help in the future to see when the production will start to plateau.”

The massive increases in production in the Bakken and other areas have amazed some industry experts. According to Lieskovsky, there have been a number of skeptics who have voiced their opinions about unconventional drilling, but “they’re getting proven wrong year after year and are surprised by the oil production in these areas.”

To view the latest Drilling Productivity Report, visit the EIA website at www.eia.gov. 

GET TO KNOW OUR EXPERTS

LYNN WESTFALL

Lynn Westfall is director of energy markets for the United States Energy Information Administration. Having



spent 38 years in the oil business, he is no stranger to the industry. With a degree in chemical engineering and an MBA, Westfall has worked a variety of roles during his career, including executive vice-president for consulting firm Turner, Mason & Company, senior vice-president with Tesoro and vice-president with Valero.

Though he had recently retired, Westfall returned to work as director of energy markets at the United States Energy Information Administration and has held the role for almost a year. He enjoys seeing how technology has changed the industry over the past few years.

“I really enjoy analyzing and seeing how that affects not only the country, but worldwide balances, as well.”

JOZEF LIESKOVSKY

Jozef Lieskovsky is a senior analyst for the United States Energy Information Administration.

Prior to joining the group about a year-and-a-half ago, Lieskovsky spent his time focusing on natural gas markets. With an MBA from the Massachusetts Institute of Technology (MIT), Lieskovsky previously held positions at Bentek Energy, BO, UBS and Enron.

His favorite part of his current position as senior analyst at the EIA? “I have access to lots of data.”



TRIVIA TIME

Six Facts About ND Oil

1. Oil production in North Dakota has increased more than 600 percent in the past several years, from 35.7 million barrels of oil in 2005 to 237 million barrels in 2012. In 2005, North Dakota was the No. 8 oil-producing state in the nation, and in just seven years has moved up to become the No. 2 state for oil output in 2012, behind Texas.
2. North Dakota provides about 11 percent of United States oil production, and the Bakken accounts for 40 percent of the nation's increase in domestic oil production in recent years.
3. North Dakota has been an oil-producing state for about 60 years, and there have been some past boom cycles but the present one is entirely different from the previous ones. In past years, the success rate was around 30 percent; with horizontal drilling and hydraulic fracturing, there is a 99 percent success rate.
4. As of last February, the state had 8,500 wells and was producing about 779,000 barrels of oil per day. With the current technology, each well is expected to produce for about 30 years, and each one will produce about 550,000 barrels of oil.
5. To drill a new oil well in the Bakken, it costs about \$10 million, and each well will generate about \$20 million in net profit. Each well pays about \$4.4 million in taxes, \$7.6 million in royalties, \$1.6 million in salaries and wages.
6. An economic impact study in 2005 estimated that the oil boom had a \$4.4 billion impact on North Dakota's economy, but that has increased now by almost 600 percent to \$34.4 billion. There are about 40,856 petroleum industry jobs in North Dakota; along with the roughnecks, truckers and other employees working directly with the

drilling operations in the oil patch, there are an estimated 18,000 indirect jobs supporting the petroleum industry that include workers in legal services, administrative, communication professionals and human resources.

To put the economic impact of oil on the North Dakota (and United States) economy into perspective, it's as if there are now 8,500 "small businesses" (wells) operating in the western part of the state, and each of those "small businesses" are paying millions of dollars in royalty payments to local landowners and farmers, they are employing hundreds of

workers and paying good salaries and benefits, they are generating millions of dollars of profits for the owners of the oil companies, and they are paying millions of dollars in taxes to local and state governments. With 8,500 profitable "small businesses" (wells) operating in the state, double the number three years ago, and increasing at the rate of about five new "small businesses" every day over the last year, it should be pretty easy to understand why North Dakota is frequently referred to as "America's economic miracle state."

Source: www.aei-ideas.org/2013/04/north-dakota-oil-facts

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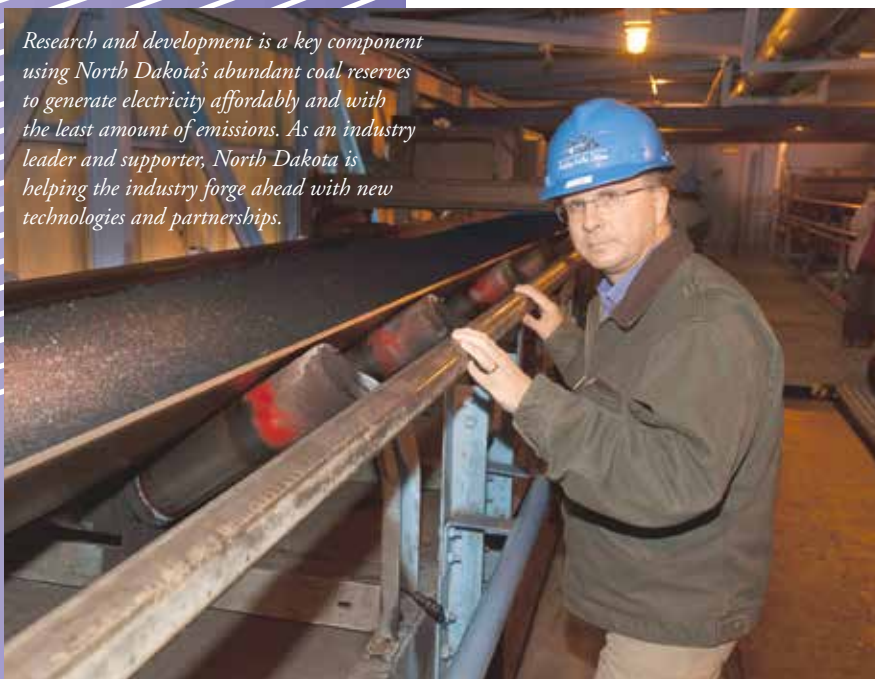
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North Dakota lignite mines work hard to maintain a positive and mutually beneficial relationship with landowners and neighbors. The mining companies and landowners work side-by-side to ensure that every effort is made to maintain or improve things like soil quality and habitat variability to enhance quality of life, health, safety and the economy.



Research and development is a key component using North Dakota's abundant coal reserves to generate electricity affordably and with the least amount of emissions. As an industry leader and supporter, North Dakota is helping the industry forge ahead with new technologies and partnerships.

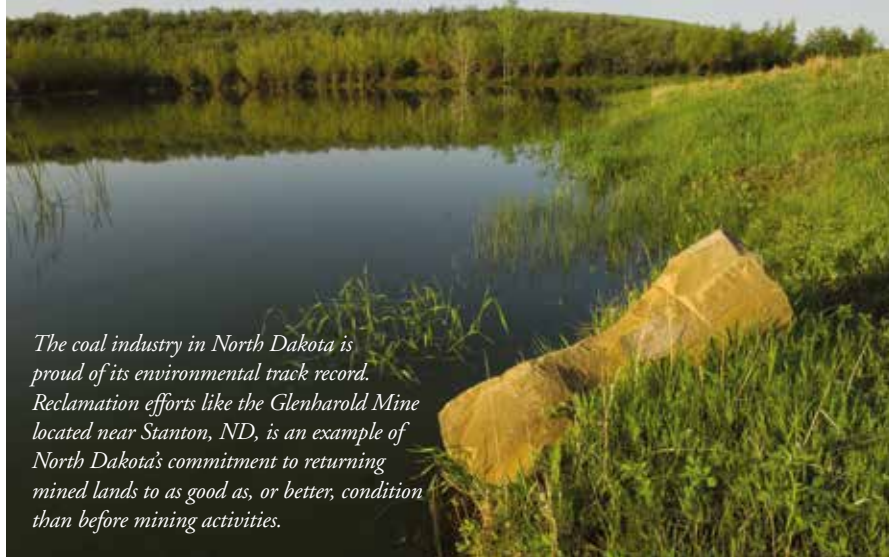


By Jarrod Tully

For many years, coal's reputation has taken a beating. It has been labeled as bad for the environment and blamed for contributing to global warming. But since the early days, the logistics of coal mining have changed a lot in an effort to minimize the environmental impact. But changing public perception has been tougher. Jason Bohrer, North Dakota's new coal lobbyist, is working hard to educate people on the new way of doing business.

Bohrer is also the president of the North Dakota Lignite Energy Council. He is philosophical when explaining why coal gets the bad rap that it does. "One reason is that we have been so successful and so reliable for so long that coal slid off of the public's radar screen," he says.

"Look at Apple and Microsoft. Microsoft was the powerhouse of the computer world for so long that its continued improvement was overshadowed by newer industries like



The coal industry in North Dakota is proud of its environmental track record. Reclamation efforts like the Glenharold Mine located near Stanton, ND, is an example of North Dakota's commitment to returning mined lands to as good as, or better, condition than before mining activities.

Apple or even Google,” he continues. “And I think we have missed a few opportunities—like Microsoft did—to reshape our image as one of industry leaders and technology innovators, and we need to regain that mantle.”

REVERSING THE RAP

Changing a broad, long-standing stigma can be challenging. The coal industry is cleaner than it has ever been but many people still hold onto the idea that it is a dirty fuel that is an environmental hazard. But with new practices and procedures, the use of coal for energy is expected to grow throughout the United States and around the world. The process of using coal for energy is complicated, and that makes it difficult to change opinions on a large scale.

“The biggest misconception is that we are the dirty fuel of the past,” says Bohrer. “The biggest challenges are getting people to understand the complex nature of the electricity generation, transmission and distribution systems, intermittent load vs. base load, and to think of fuels like coal, nuclear, wind or hydro not as competitors but as partners in building the best energy portfolio possible.”

Bohrer also notes that there is no perfect energy source. Any source of energy generation has environmental impacts. In North Dakota, every effort is made to make the environmental impact of extracting lignite coal as minimal as possible.

“Our mines, over their lifetimes, have an extremely small environmental footprint—they do an amazing job at environmental remediation,” says Bohrer. “At the power plants, we have actually done an amazing job of removing so much of the pollutants, such as sulfur dioxide or mercury, that about the only thing you hear about now is the CO₂, which we are working to reduce as well, even though it isn’t a pollutant in the strictest sense of the word.”

EXPANDING DOWN UNDER

As lobbying efforts continue, Bohrer says North Dakota officials are very supportive of the coal industry. It provides close to \$100 million per year to the State treasury. “The state’s bountiful water and lignite resources made this a great place to develop coal conversion facilities,” he says. “Our lobbying efforts are geared toward providing accurate information on the benefits of the lignite industry, and answering any questions that officials might have.”

An important development in the global coal industry has been the partnership between the North Dakota Lignite Energy Council and Brown Coal Innovation Australia. The two organizations signed a reciprocal



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membership agreement on October 28, 2013. The agreement will see the partners harness their complimentary resources and expertise.

"The partnership with the Australians was initiated out of a desire on our part to become more involved in the global coal industry," says Bohrer. "Coal will actually increase in importance as an energy resource as the world develops and industrializes. We have the technological resources and expertise to ensure that North Dakota becomes a leader in the global lignite world, just as it is becoming a leader in the global oil and gas industry. Australia has a large supply of lignite coal and it makes sense for them to partner with us so that we can jointly work on some of the biggest challenges the industry sees."

FACING GLOBAL CHALLENGES

Phil Gurney is the CEO of Brown Coal Innovation Australia. He maintains that the long-distance partnership made sense on many levels. "Brown Coal Innovation Australia (BCIA) is Australia's major funder of research and development targeting the future, environmentally responsible uses of brown coal (lignite)," he says. "Recognizing that these are global challenges, BCIA has sought to partner with leading organizations worldwide to help accelerate the development of cost-effective, low-emissions coal technologies."

"BCIA and the North Dakota Lignite Energy Council (LEC) share a common view of supporting the development and deployment of technologies that will lead to a brighter future for businesses and communities based on local lignite resources," Gurney continues. "The partnership between the North Dakota LEC and BCIA was therefore a natural fit."

The aforementioned research and development plays an integral part in the advancement of the coal industry. In North Dakota, projects are underway to explore new ways of generating electricity from lignite affordably, while reducing the carbon dioxide that is released directly into the atmosphere. Getting regulatory approval on new techniques is difficult but the pursuit of new methodology is vital.

"What we fear is that when the Environmental Protection Agency has signaled a desire to prohibit new construction in the entire coal industry, it results in people walking away from a lot of good ideas that could provide stable jobs and low-cost power to a lot of people," says Bohrer.

PREPARING FOR UNPRECEDENTED GROWTH

The United States Energy Information

Administration provides independent statistics and analysis of the energy industry. Looking to the future, they project that 10 years from now, coal will still play an important part of the energy portfolio in the country. Jason Bohrer, looking forward, is positioning the LEC to be as vital as ever.

"I hope to have a partnership with the industry in the Bakken—not just to serve the new loads that will be created but to also extend the life of the oil play by using our products for enhanced oil recovery efforts," he says. "Most critically, 10 years from now, I hope we are still providing the reliable, low-cost electricity that provides such a great quality of life for those of us in the Upper Midwest."

Bohrer speaks passionately about his role in advocating for coal as an energy source. It was a major decision for him to uproot his family and move them to North Dakota, but it was a decision that he felt was vitally important.

"I firmly believe that the way this country approaches energy policy over the next 10 years is critical," he says. "If we, as a nation, embrace our natural resources and make wise energy choices, we will see unprecedented economic growth. But if we get it wrong, and enact policies that transform electricity into a luxury good, like it is in Germany or other parts of Europe, it will mark the beginning of a long, slow decline for this country that will end our days as an economic leader and the world's only superpower."

"But it will also mean we have taken good paying jobs out the hands of thousands of workers," Bohrer continues. "We can afford to be comfortable when it is -20°F because of the hard work the men and women in the mines and plants do in order to keep our quality of life the highest in the modern world. Maintaining that quality of life for the families of North Dakota and the region is why this industry is so important and why I love going to work every day."

GET TO KNOW OUR EXPERTS

JASON BOHRER

Jason Bohrer is president of the North Dakota Lignite Energy Council. He graduated from high school in Aberdeen, ID, and later went to North Dakota State University. He got a degree in history but eventually started working in politics, which eventually took him to Washington, DC.

For roughly 10 years, Bohrer worked on energy policy until the opportunity came up to join the NDLEC team in Bismarck, ND. "Seeing an opportunity to come back to North Dakota and raise my family in 'the real world' outside of Washington was something that I couldn't resist."



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Capital Communities for the Family:



By Kim Babij-Gesell

It's a pretty good gig these days, being Mayor of Bottineau, North Dakota. Holding the post since mid-2012, Ben Aufforth has watched his city of 2,200 citizens flourish over the past number of years.

A self-proclaimed four season playground, Bottineau has seen construction of new houses, duplexes, townhouses and apartments, the emergence of a new hotel, and the continued vibrancy of a thriving business district.

And as if that isn't enough, the icing on the cake was being named one of the Top 10 cities in North Dakota for young families by finance company NerdWallet.

"It's awesome; any kind of recognition like that is great," says Aufforth. "I think it goes to show we know what we're doing out here, too. But, definitely, seeing it in print is nice."

NerdWallet released its Top 10 list in December 2013, based on a study which aimed to find the North Dakota communities with the best financial mix for young families looking to move to the state.

The study was a data driven comparison of the cities in North Dakota, looking at three main factors. The first factor was schools: NerdWallet used a national, non-profit education evaluator called GreatSchools for their information. A number between one and 10 compares the schools to the state average.

The second factor was affordability, where they looked at the cost of living in the city and the typical salary there, and the third factor was growth. NerdWallet looked at the average household income and income

growth over the last decade; a higher income and a higher growth would lead to a higher overall score.

Thirty-four North Dakota cities and areas designated as "places" by the U.S. Census were included in the analysis, and only places with a population greater than 1,500 were considered.

Once they began compiling their research, NerdWallet Senior Analyst Divya Raghavan says they discovered something they didn't necessarily expect: on a whole, North Dakota is quietly exploding, more than just about anywhere in the United States.

"We've been doing this for all the states," says Raghavan. "We found that most states, most cities don't have a growth rate like this. Most cities have a growth rate between five and 20 percent, so these growth rates in North Dakota are well above the average."

What exactly are those above-average growth rates? Take the city atop the North Dakota list, Horace. It boasts an incredible 95.8 percent growth rate. But Horace certainly isn't alone. Raghavan says their data showed the top three cities on the list—Horace, Watford City and Stanley—all have a growth rate above 95 percent. The reason Horace was ultimately named the best city for young families is because it's so well-rounded.

"For reference for those who don't know, Horace is near Fargo. It got such a high ranking because it did well in all of the three main factors we're looking at. Firstly, Horace's schools have a rating of nine out of 10 from GreatSchools, which was the highest on our list. Next, it's more expensive, with higher median home values, but there's also a higher median income in that city," says Raghavan.

The list of Top 10 cities in North Dakota for young families looks like this:

1. Horace;
2. Watford City;
3. Stanley;
4. Carrington;
5. Rugby;
6. Harvey;
7. Oakes;
8. Valley City;
9. Bottineau; and
10. Beulah.

Beyond the Top 10, the next five cities include Dickinson, Jamestown, Bowman, Grafton and Hazen. Raghavan says the growth in the state is interesting, not only because it's going so quickly, but because it has been happening on its own.

"North Dakota has had a recent economic boom because of oil. But we found that a lot of these cities were not affected by that

Raising Your Kids in the Oil Patch

What exactly are those above-average growth rates? Take the city atop the North Dakota list, Horace. It boasts an incredible 95.8 percent growth rate. But Horace certainly isn't alone.

oil boom," she says. "A lot of these cities don't have economies that are solely based on oil; a lot of the cities on the list have very diverse economies. They have, for example, large hospitals in the area and great schools in the area. I thought it was interesting that a lot of these places have rich, diverse economies based on several factors, not just the oil boom."

Bottineau is definitely one of those diverse cities. Located approximately 85 miles northeast of Minot, ND, and 10 miles south of the Canadian border, Ben Aufforth says he thinks the reason his city is so strong is that its citizens have embraced the weather and the most popular pastimes of the people living in the area.

"It's pristine outdoor living, more or less. We are busy all year long with activities going on," says Aufforth. "With sports, you've got college and high school happening. The arena is busy with hockey, we've got people from all over the place coming here, even coming down from Canada, all the time. One of the best things right now is, as mayor, I have a very proactive council. We're really attacking projects. Things are getting built. We have more housing, more apartments, and we've got businesses looking to come in. It's just a really good time to be here. It honestly does feel like there's something going on here every single day of the year."

Bottineau's Chamber of Commerce emphasizes hunting, camping, fishing, cross country skiing, and snowmobiling among the main attractions of the area.

Although Bottineau's growth happened largely separate of the oil boom, Aufforth says they're close to having a piece of that action as well.

"We do have some activity going on out there," he says. "We have a few oil drills, and

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I understand there are a few more that are going to be drilled this summer. So we do have some oil activity going on here, too. I would definitely think that would help attract people, being on the fringe of the oil patch. I think that's what some people might be looking for, to get out of the hustle and bustle but not be too far away from the oil activity. I think that's a big player there."

And from all accounts, it looks like the growth in North Dakota will only get stronger moving forward.

"The trend in North Dakota is growth, just very fast growth," says Raghavan. "And since it's happening so quickly, North

Dakota still has pretty low costs. The median home value is still low, even though it's getting such an influx of growth. I would predict that in the future, the homes—just with supply and demand, with more people moving into these cities—the costs are going to go up and that means median home values are probably going to go up. The salaries will probably go up, as well. I think people are really underestimating how much North Dakota is growing right now. I personally am from Ohio, so I love the Midwest. I love all of the Midwestern states, and I think the entire Midwest is underrated, but North Dakota especially."

GET TO KNOW OUR EXPERTS

Divya Raghavan is a senior analyst with finance company NerdWallet, a financial literacy website based in the San Francisco Bay Area. According to their website, NerdWallet uses quantitative analysis to provide transparent personal finance advice for consumers. Their data-driven tools provide clear and unbiased information helping people make smarter decisions about their personal finances, travel plans, healthcare costs, retirement savings and higher education expenses.

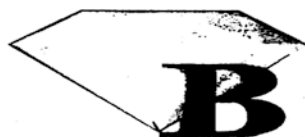


TRIVIA TIME

JOBS AND REVENUE

- The oil and natural gas industry supports more than 46,000 jobs in North Dakota, contributing more than \$6.4 billion to the state's economy and representing 12.3 percent of the state's GDP;
- North Dakota boasts the nation's lowest employment rates at 2.7 percent;
- The average wage, as of 2011, in the oil and gas extraction industry was \$90,225, 141.5 percent higher than the statewide average of \$37,353;
- In 2010, the industry paid nearly \$750 million to North Dakota in oil and gas production and extraction taxes, \$85.2 million in royalties and another \$295 million in lease bonuses to trust funds managed by the North Dakota State Land Department; and
- A recent North Dakota State University study reports that the petroleum industry paid \$821.8 million in state and local taxes in 2009.

Source: www.ndenergyforum.com/expert-facts/#sthash.mkNsv55.dpuf



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HDR Engineering: A Long-Standing History in North Dakota

By Paul Adair



Rugby Wind Farm has set the standard for permit applications as one of the first renewable energy generation projects of its kind in the state of North Dakota.

For almost a century, HDR Engineering has been putting its stamp on projects all around the world, from right here at home in North Dakota, to as far away as Sydney, Australia. In 1917, H.H. Henningson founded the civil engineering firm, Henningson Engineering Company. At the time, Henningson believed there was a need in America to help communities lift themselves out from the frontier status of yesteryear by developing water, electricity and road infrastructure across the nation.

Henningson situated his company in the city of Omaha, NE, where it remains headquartered to this day. Operating under the philosophy, “Work Well Done,” Henningson soon found that his reputation for integrity

and dedication to quality resonated with his clients, opening up new business opportunities across the nation and abroad.

In 1939, Willard Richardson and Charles W. Durham joined the firm as interns and, by the 1950s, they had purchased shares in the company, changing its name to Henningson, Durham and Richardson, Inc. Today, HDR consistently ranks among the world’s top firms in several categories. The company has been involved with projects in all 50 states and in 75 countries worldwide. It was instrumental in Arizona’s Hoover Dam Bypass, Virginia’s Fort Belvoir Community Hospital and the Roslin Institute in Scotland.

LEEDING THE WAY

In 1994, HDR was the first architecture/engineering firm to join the United States Green Building Council and further showcased its commitment to sustainable building strategies by being actively involved in the development of the Leadership in Energy and Environmental Design (LEED) green building rating tool, which is held up as a benchmark for high environmental standards. HDR is also taking a leading role with Envision—the new rating developed by the institute for Sustainable Infrastructure—and had the world’s first Envision-rated project in the William Jack Hernandez Sport Fish Hatchery in Anchorage, AK. The project received a Gold rating.

To better meet the ever-changing needs of clients, HDR employs over 8,500 professionals in nearly 200 offices across the world, encompassing dozens of disciplines in the architecture, energy, federal, industrial, mining, oil and gas, private land development,

resource management, transportation, water and waste markets.

“From leading environmental permitting and compliance, to designing roadways, bridges, waste management, power generation, power delivery facilities and solving complex water resource challenges, our custom-fit teams do it all,” says Darryl Shoemaker, resources business group director for HDR.

“Our employees are the best in the industry, and as an employee-owned firm, we are empowered to find the best solutions for our clients and for our own company. We do the right things for the right reasons, and we take personal responsibility to see things through.”

TAILORING TEAMS FOR SUCCESS

As the engineering consultation market becomes increasingly global, the competition is becoming ever-more fierce for the types of services HDR provides. The company stands above its market rivals by relying on its well-deserved reputation for excellence and by working alongside its clients to find solutions.

“At HDR, it is our approach that sets us apart from the crowd,” says Shoemaker. “Our industries are moving faster than ever before, so we listen first to establish clear goals for our clients’ projects and then tailor our teams for certain success. In doing this, we are able to effectively leverage the top minds across our organization to stay ahead of the curve relative to industry regulations, best practices and trends. We deliver smart solutions to some of our clients’ toughest challenges and always hold ourselves accountable for our actions.”

The Bakken Area Program Management project, once completed, will boast 165 miles of new transmission, 300 to 500 miles of distribution and nearly 30 substations for Mountrail-Williams Electric Cooperative's service area.



HDR has been active in North Dakota for more than 40 years. From first opening its doors in Bismarck, ND, up through the 1990s, the company had performed much of its work for regional cooperatives within the state. It was during the 1990s, however, that HDR expanded its services to support utilities with transmission and distribution infrastructure build-outs.

"Because we think global, yet act local, the expansive services we have provided for completed projects in more than 60 countries around the world are the same services that our clients in North Dakota can expect from us," says Shoemaker.

With offices in Bismarck (and plans to expand that location in the spring), Fargo and Minot, ND, HDR has more than 55 employees presently calling North Dakota home. As

proud North Dakotans, these employees are intrinsically involved in their communities, through the support of charitable activities and volunteering with local organizations.

COMMUNITY COMMITMENT

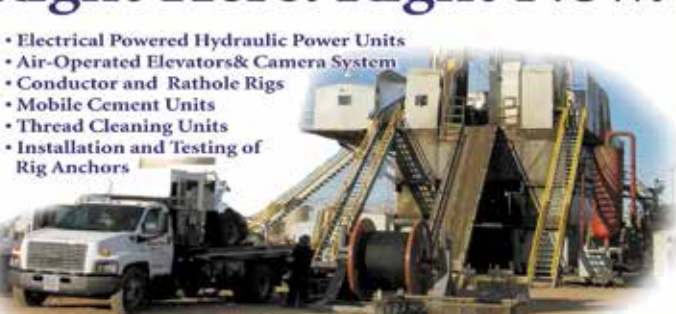
HDR is honored by its long-standing history of work within North Dakota. The company has successfully delivered projects

Continued on page 114

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“Because we think global, yet act local, the expansive services we have provided for completed projects in more than 60 countries around the world are the same services that our clients in North Dakota can expect from us.”

Continued from page 113

for communities throughout the state. The following are just a few of the company's hallmark experiences that help to highlight its commitment to the Bakken region.

As the lead for the Bakken Area Program Management project, HDR executed work by using a design-build model where environmental compliance, engineering, land acquisition and construction occur almost simultaneously. Once completed, 165 miles of new transmission, 300 to 500 miles of distribution and nearly 30 substations will be added to Mountrail-Williams Electric Cooperative's service area in support of growth demand related to oil and gas development.

HDR completed the permitting, design and construction management of a unit train crude loading facility in the Bakken region. The facility is served by Canadian Pacific Railway and has been operational since 2011. The facility has provided takeaway capacity for Bakken crude oil.

The firm's environmental scientists have led the environmental and permitting process for the Rugby Wind Farm, which has set the standard for permit applications as one of the first renewable energy generation projects of its kind in the state of North Dakota.

A team of transportation engineers was responsible for preparing an analysis that considered rehabilitation of the old Memorial Bridge in Bismarck, ND and provided

preliminary design of alternatives for new structures. The resulting bridge is now an iconic structure that provides a vital connection between the cities of Bismarck and Mandan, ND.

Working with Ritterbush-Ellig-Hulsing, HDR designed the Bank of North Dakota (BND) in Bismarck. The building is a result of a collaborative process among various groups and organizations to address the needs of the bank, which has become a landmark for the community adjacent to the iconic Memorial Bridge.

As a primary team member of the Houston-Moore Group, HDR's engineering and design services for the Fargo-Moorhead Metropolitan Area Flood Risk Management Project led the Diversion Authority to establish permanent flood protection measures along the Red River of the North to reduce flood risk.

NDAOGPC, A VITAL COMMUNICATION CHANNEL

HDR greatly values its membership with the North Dakota Association of Oil & Gas Producing Counties, and acknowledges the many benefits that come from being members—for both the company and its clients.



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"The association provides a vital communication channel to better understand the needs and topics of interest for our clients," says Shoemaker. "Legislative updates during biannual sessions have also provided us with valuable information regarding rule-making that impacts our clients and communities."

Looking ahead, HDR sees a bright future for itself in North Dakota as the Bakken play

only seems to be growing in terms of production. In HDR's Bismarck office alone, the company expects to be reaching 70 employees over the next three years. Additionally, by 2017, HDR anticipates finishing design for more than \$80 million in transportation infrastructure projects throughout the state.

"We are growing," says Shoemaker. "We've been here in North Dakota for over 40 years. We're staying, and we'll be here for the future. We appreciate what is unique about the state and that is what distinguishes us from the boom crowd."

FOR MORE INFORMATION

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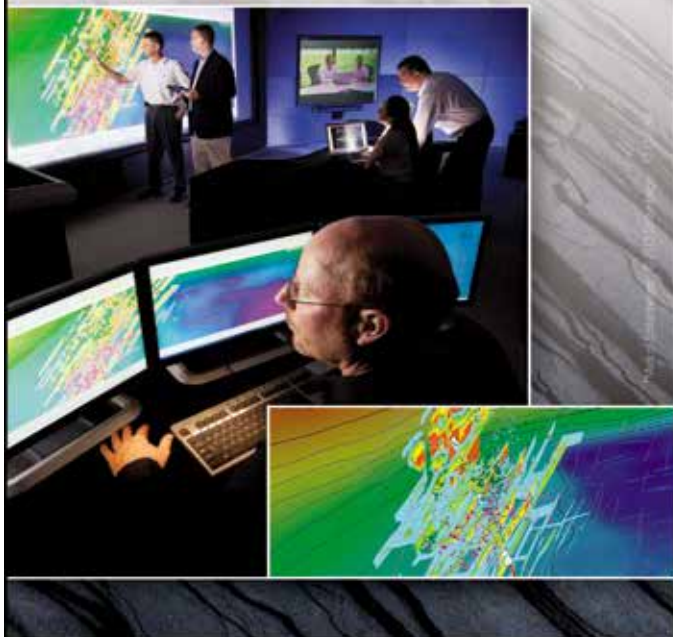
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Hart Energy: Focusing on the Global Energy Industry

By Kim Babij-Gesell

At the beginning of April this year, more than 2,000 professionals from the oil and gas industry will descend upon the Colorado Convention Centre in Denver for the 2014 DUG Bakken and Niobrara conference.

The organizer of the conference, Hart Energy, expects it to be the biggest gathering of its kind.

"We are very proud of what we're doing in this area. These DUG conferences are the largest unconventional resource events in the world. I think last year, in total, we had somewhere around 20,000 attendees at our various DUG conferences," says Peggy Williams, Hart Energy's editorial director and a certified petroleum geologist.

Hart Energy is an international publishing, information and consulting company focusing on the global energy industry. Based in Houston, TX, Hart Energy has offices in Bogota, Brussels, Sao Paulo, Singapore, and closer to home, in Denver, Houston, New York, San Diego and Washington, DC.

"We have quite a few different lines of business," explains Williams. "We do magazines, newsletters, directories, websites, research and consulting. We are a business-to-business information company, so we're talking to predominantly people in the oil and gas industry and people on the financial investment side of the business."

For nearly 35 years, the company has serviced oil and gas producers, midstream operators and refiners, as well as



The exhibit floor at the DUG Bakken and Niobrara conference.

professionals in the the engineering and automotive industries, utilities, leading NGOs, and the world's major governments.

"We're very much an oil industry company. We also have bio-fuels and alternative fuels, so we cover all phases of transportation fuels. We have upstream, midstream and downstream products. So,

we're following the oil and gas modules for transportation fuels, from the very beginning of drilling exploratory wells or shooting seismic, to big field development, to sales, to transport through the various pipelines, railroads, barges and ships, to the end point, where it gets picked up by the utility or a refiner," says Williams.

Hart Energy doesn't operate in retail, so it's not involved in gas stations. The company's service extends as far as the refining area, or the local distribution for natural gas. In other words, Hart Energy follows the value chain across all of the oil and gas industry and liquid transportation fuels.

Although the company is worldwide, following developments across the globe, it has a heavy focus in North America. Hart Energy's print products are primarily United States- and Canada-based, though its digital offerings go all around the world.

The digital media segment of Hart Energy produces premium, members-only and site licensed websites, as well as specialized e-newsletters, and sponsored and pay-per-view webinars, podcasts and white papers.

The company's website, www.ugcenter.com, is targeted toward those involved in the markets for unconventional crude oil, natural gas and associated liquids, while www.oilandgasinvestor.com and www.a-dcenter.com focus on energy investors. The *E&P Buzz* e-newsletter and www.epmag.com offer exploration and production content, and The Hart Store, www.store.hartenergy.com, is a transaction site offering directories, maps, playbooks,

As a real vibrant and vital part of the oil patch, we've always followed activities in North Dakota...

transcripts/tapes of Hart Energy conferences, and multi-client research reports.

To produce all of this content, Hart Energy employs about 170 employees worldwide. Although most operate out of the Houston office, Williams says the company has a long-time interest in the activity happening in the northernmost areas of the United States.

"We've always followed activities in the Williston Basin," she says. "In fact, the very first issue of *Oil and Gas Investor*, which is our flagship magazine, was in 1981 and it featured the Williston Basin as the cover story, so we've always followed the activity in North Dakota. Our

editor-in-chief, Leslie Haines, was a resident of Williston, ND for a couple years back in the 1980s, so we've had a long and familiar association with it."

Williams says she and other editors in the company have been writing and reporting on the Bakken formation since its earliest days.

"As a real vibrant and vital part of the oil patch, we've always followed activities in North Dakota and been very interested in reporting on it for various magazines, websites and newsletter products, so we provide that editorial coverage," she says. "We have sent editors up at various times

Continued on page 120

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Continued from page 119

for field trips to visit Bakken locations and look at Bakken processing plants, so we definitely get up there on the ground.”

And of course, there's the DUG Bakken and Niobrara conference in Denver every spring, which is part of Hart's Developing Unconventional Oil and Gas series.

This year, there are 39 scheduled speakers and 200 planned exhibitors, many of whom are key operators and analysts working in the Bakken play.

The DUG series is just one of many conference and exhibition series Hart Energy puts on. The company also hosts the Energy Capital Conference; the A&D Strategies and Opportunities Conference; the Executive Oil Conference and Exhibition; the Marcellus-Utica Midstream Conference and Exhibition, the Crude in Motion Conference, monthly Executive Energy Club breakfasts, and World Refining and FUEL events.

But as successful as the conferences have become, Hart Energy's cornerstone business continues to be publishing; with two primary monthly offerings, *Oil and Gas Investor* and *E&P*, the company is a leader in the industry.

Oil and Gas Investor has been at the forefront of in-depth coverage of the North American petroleum industry; the company says its strongest readership is among financial analysts, investors and C-suite executives (CEOs, CFOs, etc.) with independent oil and gas producers.

E&P is Hart Energy's monthly technology and operations management journal, targeting 50,000 exploration, production and oil and gas professionals worldwide.

In 2011, the company launched another monthly called *Midstream Business*, with a focus on oil and gas infrastructure markets, and also produces a quarterly magazine called *FUEL*, which covers global refining and fuels markets.

Hart Energy is also well involved in mapping and data services, providing solutions for a wide range of data visualization challenges, from mapping to geospatial security applications.

This mapping and data services group was established in 2008 and grew significantly with the acquisition of Rextag Strategies in 2010 to document North American pipeline infrastructure; the company offers GIS database services, digital mapping software and wall maps.

Hart Energy is a privately-owned company with annual revenues of approximately \$50 million and a future that remains extremely bright.



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The DUG Bakken and Niobrara conference draws about 2,000 professionals from the oil and gas industry.

“Just this last year, we’ve expanded into Australia,” says Williams. “In August 2013, we did our first conference there. We brought some people from North America to Australia because they’re in the very early stages of development there, and they’re very curious about what’s been happening in the United States and places like North Dakota. It’s a worldwide technology transfer. We consider ourselves the leader in information about unconventional resources. Our conferences, our

publications, our research, our consulting—that’s a big area of focus for us.” 

FOR MORE INFORMATION

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AN INTEGRATED ASSESSMENT TO 2017

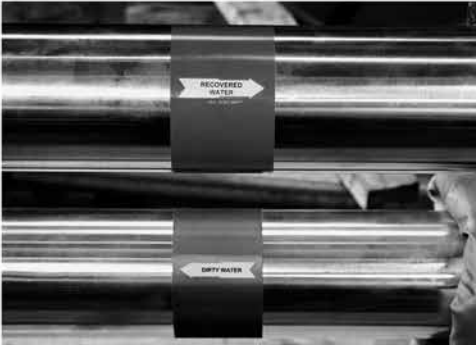
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Kadrmass, Lee & Jackson: Improving Community Infrastructure

By Jarrod Tully

An historic courthouse would seem to be an unlikely office space for a start-up business. But that's exactly where Louie and Mary Ellen Veigel got their start. From the basement of Stark County Courthouse in Dickinson, ND, a small consulting engineering services company was founded in 1938. The husband and wife team began serving clients in North Dakota and eastern Montana. Over the years, they grew the company while building a reputation as a client-committed, hard-working team. In 1984, the company, which was still expanding, adopted the name Kadrmass, Lee & Jackson, and in 2012, embraced the name KLJ.

KLJ has been in business for over 75 years. There have been many changes over that time but the initial core values that shaped the company at its inception are still just as important today. The KLJ management group places great value in developing quality relationships with their local communities, as well as their own employees.

"KLJ is committed to improving the health, safety and welfare of each employee," says the corporate communications coordinator, Jill Furaus. "We offer a flexible schedule, allowing employees to maintain a healthy balance between work and personal life."

This dedication to their employees is recognized in the state as KLJ was recently named 2013 runner-up for the Best Place to Work award, which was presented by the North Dakota Young Professionals Network. "Work ends up consuming the second largest amount of our time, led only by sleeping," says KLJ



KLJ's experience in the oil and gas industry.

CEO Niles Hushka. "We try to create an environment where people are challenged and encouraged to make decisions. An empowered individual then enjoys their job and then takes that joy forward and applies it to the customer relationship. Our customers win."

One of the keys to success for the storied company is its ability to work directly and efficiently with clients right in their own

backyard. "KLJ has evolved into an industry leader by excelling locally. Our office locations and local knowledge offer our clients a strategic advantage through understanding and knowing the communities in which we live and work," says Furaus.

What started as a small family business has grown into a large, multifaceted company

Continued on page 124

Four Bears Bridge is an historic project for KLJ, which served as the prime consultant for the planning, environmental assessment, design and construction inspection for the replacement of the Four Bears Bridge. This structure is located in a picturesque setting spanning 4,500 feet over Lake Sakakawea on the Fort Berthold Indian Reservation in northwestern North Dakota.



KLJ proposed an emergency plan to construct clay plugs in three of Mandan's marina inlets to protect 250 residences and \$70 million of public infrastructure during flood events in 2011. Above, Niles Hushka, KLJ's CEO, oversees construction of the clay plugs.

Continued from page 123
operating in several locations throughout the central United States. KLJ employs more than 750 professionals in a variety of markets. The company spans 22 office locations throughout North Dakota, Minnesota, Montana, South Dakota and Wyoming. It is that expansive reach that has allowed the company to take on diverse and integral projects, such

as reconstructing airport runways, raising-up flood-risked roadways to act as dams and correcting critical land slopes that pose public safety hazards.

These tangible operations to improve community infrastructure are only one part of what the company does. But giving back and making a difference is a core component of the KLJ mandate. In 2011, North Dakota

experienced catastrophic flooding throughout the state. Roads, businesses and homes were at risk for severe damage and destruction. KLJ proposed an emergency plan to construct clay plugs in three marina inlets in the city of Mandan, ND to protect 250 residences and \$70-million worth of public infrastructure. Their quick response salvaged a substantial portion of the city, circumventing the massive pending damage from unprecedented floodwaters.

During this time, KLJ encouraged employees to assist local residents throughout the state. While helping residents in their flood fighting efforts, employees were paid their usual eight-hour day.

The employee-owned firm supports the communities they serve through corporate sponsorships, charitable giving and employee volunteer efforts. Each year, the company's internal charitable contributions committee identifies a variety of charities to support through employee donations. The firm matches employee donations dollar for dollar, benefiting organizations such as Hospice, the United Way and the American Cancer Society. Management believes there is substantial value in developing and reinforcing a sense of community involvement.

"I have always believed that those with strong technical backgrounds bring communities unique perspective," says Hushka. "This really applies at the local community level. KLJ is committed to donating

our time to bring our unique perspective to the communities that we live and work within. Strong communities mean economic growth.”

Today, KLJ is headquartered in Bismarck, ND, and is recognized as one of the nation's Top 500 Design Firms by Engineering News Record. Their association with other key players in the industry plays a vital role in their continued growth.

KLJ's relationship with the North Dakota Association of Oil and Gas Producing Counties has been especially valuable. Today, all of KLJ's divisions have been impacted in some way by the demand for projects in the oil and gas industry. Many of these projects were, and continue to be, directly related to the effects that rapid growth in the region have had on surrounding communities and infrastructure.

The future looks bright for the engineering and planning services company, with several big projects on the horizon. Traffic along US Highway 85 between Watford City, ND and Williston, ND has increased in recent years due to oil and gas production, and the increased road congestion has prompted safety concerns. KLJ was awarded two projects pertaining to the highway; the projects represent a significant investment by the state of North Dakota to complete a vital link in meeting the region's growing transportation needs.

In the aviation sector, KLJ has just been awarded multi-year contracts at airports in North Dakota, South Dakota and Minnesota. These aviation contracts have been a big part of the company's portfolio for many years. Many airports have established consistent working relationships with KLJ for consulting and general engineering services. KLJ has recently signed a contract to serve as Bismarck Airport's engineering consultant for the next five years. The company has served as Bismarck's airport consultant since 2009, leading multiple capital improvement projects in collaboration with airport staff.



An aerial shot of Bismarck Airport. KLJ was recently selected to serve as Bismarck Airport's engineering consultant for the next five years. KLJ has served as their airport consultant since 2009, leading multiple capital improvement projects in collaboration with airport staff.

KLJ was also recently awarded a study that will provide a five-year projection regarding the oil and gas industry in North Dakota. This study will be an integral part of a legislative session in 2015, during which, elected officials will use the data to structure long-term tax policies. It will identify potential changes to oil industry practices, production, infrastructure and environmental impacts. For this study, KLJ will partner with the Energy & Environmental Research Center and the North Dakota State University Department of Agribusiness and Applied Economics.

The company has grown exponentially from its small courthouse origins, and KLJ continues to expand operations, having recently opened an office in Casper, WY. The new office space is their second location in the state.

“The company is committed to growth,” says Furaus. “We will continue to seek

opportunity to expand within the company's current operating region, and we will continue to explore new geographic locations to offer additional resources and comprehensive services to meet client needs.”

From \$250-million superstructures, to county highway and municipal airport projects, KLJ maintains a vast and important foothold in the central United States. The award-winning company takes its community impact seriously and is committed to creating sustainable environments through lasting infrastructure. 

FOR MORE INFORMATION

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Regional Roundup

WHY WE OPPOSE THE PROPOSED CONSERVATION AMENDMENT

There are several reasons why the North Dakota Association of Oil & Gas Producing Counties (NDAOGPC) has decided to oppose the proposed Clean Water, Wildlife and Parks Amendment ballot measure. One of the most important is because it is a constitutional amendment that mandates spending on conservation. This would be the first-ever spending measure enshrined into our constitution. There is a reason we don't dictate spending in the constitution; it would require that funds be spent for a specified area, whether the need is there or not. We already have a system in place to determine funding needs and levels, and that is our legislative process.

This measure would commit five percent of North Dakota's oil extraction tax, conservatively estimated at \$300 to \$400 million per biennium, to a massive new conservation fund. It also dictates that anywhere from 75 to 90 percent of the fund must be spent each biennium. "The money mandated for this fund is money that could otherwise be spent on schools, our children's education, infrastructure, emergency services, tax relief and more," says Steve Holen, NDAOGPC president and McKenzie County Public School District superintendent.

"Our opposition to this measure has nothing to do with conservation. It is about the lack of flexibility and the large amounts of money that will be required to be spent, whether there are legitimate conservation needs or not."

The spending requirement in this initiative means that whether or not there are conservation needs, the group must spend over \$3 million per week on average on projects. Spending by mandate is not a North Dakota value. This type of earmark has no place in our state's constitution.

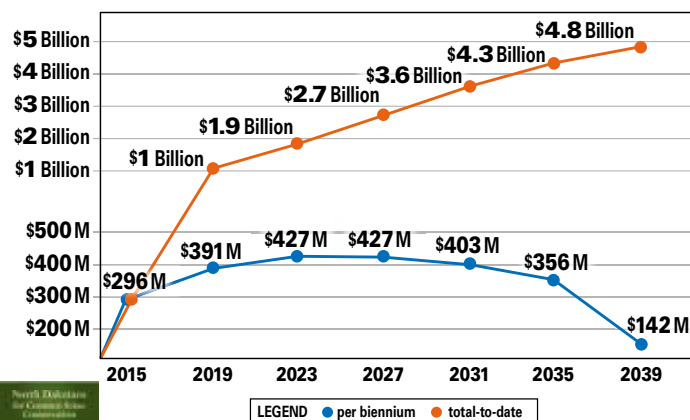
As stated by Supt. Holen, the issue here isn't about conservation. We all care about taking care of our natural resources, environment and wildlife. However, this measure, which is largely funded by out-of-state special interest groups, legally requires conservation to have funding precedence over education, infrastructure, health and human services, water needs and other important areas. And, any changes to this constitutional amendment could only be corrected by another statewide vote.

Consider the consequences of signing onto a proposed 25-year government mandate to spend billions of dollars. It is difficult to predict what our funding needs will be in 10 years, much less 25 years.

We shouldn't take away the Legislature's ability to address the most urgent needs as they arise. Funding priorities should be targeted toward immediate needs, not bound by constitutional earmarks.

We are among more than 20 diverse groups that are part of the coalition backing the North Dakotans for Common Sense Conservation. We support a common sense and smart approach to conservation, where spending is not mandated through the constitution. North Dakota already invests more than \$130 million per biennium in conservation and related efforts across the state. We don't need a measure that mandates more spending in our constitution. We can't support a measure that doesn't measure up.

Clean Water, Wildlife and Parks Amendment Funding 2015-2039



Attorney General Wayne Stenehjem shares his support for the proposed drilling permit review policy with Governor Dalrymple's amendments. The motion to pass the amended policy was passed unanimously by the Industrial Commission.

POLICIES ON DRILLING PERMIT REVIEW, FLARING REDUCTION

The three-member North Dakota Industrial Commission (NDIC), made up of Governor Jack Dalrymple, Attorney General Wayne Stenehjem and Agriculture Commissioner Doug Goehring, met at the Capitol in early March for its regular monthly meeting. A packed house awaited the NDIC, concerned with two main topics: a proposed drilling permit review policy and recommendations on policy that the NDIC could implement to reduce natural gas flaring in the state.

The drilling permit review policy, which was originally proposed to require a review process for all drilling permits near listed "places of extraordinary significance," was noted by commission members to have received a large amount of public comment since first being introduced by Attorney General Stenehjem.

Governor Dalrymple proposed an amendment to the original policy proposal that eliminated private lands from the policy altogether. The governor indicated that there is value to such a policy in assuring the public that places of significance would be protected over the long-term, though he did not feel that private lands should be included at this time. He added that a potential policy dealing with those private lands was better suited to be handled by the North Dakota state legislature.

The NDIC voted and passed the policy with the governor's amendment. The commission met again in April to discuss the technical aspects of the policy, which will go into effect on May 1, 2014.

DISCUSSING INDUSTRY STUDY, COUNTY ROAD BILL DRAFT

An update on a legislative study covering oil and gas industry impacts was presented in early March 2014 by Kadrmas, Lee & Jackson, the study's consultant. Mike Wamboldt, KLJ engineer, shared the progress that had been made so far in the first phase of the study, which Wamboldt says, is focused on data gathering in an effort to establish commonalities and identify key indicators that show reliable trends that can be used to better anticipate how the oil and gas industry will develop over time.

Wamboldt was clear that the data collected so far, gathered largely from 28 state and federal studies relevant to the Bakken oil play, as well as discussions with industry members, is not conclusive. The data gathered in this initial phase will be used to develop an analysis of oil industry practices, production, impacts and tax policy. Phase two was expected to be complete by April and was reported to the committee at its next meeting, which was held on April 8 in Minot, ND.

A bill draft that would give the North Dakota Department of Transportation (ND-DOT) authority to take on county road maintenance was also discussed. Terry Traynor, assistant director of the North Dakota Association of Counties, presented some county perspective on the issue and the response he had received from county engineers and commissioners. Those responses, according to Traynor, were "thoughtful but somewhat confused," especially on the problem the bill draft was supposed to be solving.

Traynor explained that the problem is not so much the fact that counties don't have the capacity to get their road maintenance projects done, but that it has more to do with having the financial resources to commit to them. He also pointed out that many county roads, especially in the western portion of the state, are benefiting the state system by relieving traffic from state routes. Those county roads, he says, could be characterized as having regional or statewide significance. These issues, Traynor adds, could merit serious discussion and formal consideration of whether those routes warrant reclassification as state routes, "or some special consideration for funding improvements."

Grant Levi, NDDOT's director, also adds that the state system was not designed to handle the stress added to it by the oil and gas industry. He says that traffic counts in the nineteen oil producing counties showed increases from 2010 to 2012, but that the numbers had "balanced out" in 2013.



Dickinson, ND city administrator, Shawn Kessel (left), joined by the NDAOGPC executive director, Vicky Steiner (right), talks about how the energy impact needs are not sufficiently addressed by the current funding model.

NDAOGPC REPRESENTED ON VALLEY NEWS LIVE'S POINT OF VIEW

Chris Berg, *Point of View* television show anchor, interviewed Shawn Kessel, Dickinson, ND city administrator, and Vicky Steiner, executive director of the North Dakota Association of Oil & Gas Producing Counties (NDAOGPC), about a *Fargo Forum* letter to the editor that was published on March 4, 2014. The letter was written by the NDAOGPC on western city, school and county issues.

Kessel talked about the sunset provision in *House Bill 1358* and how it is impacting cities' abilities to get dollars for much needed infrastructure from lending institutions. Steiner emphasized that the energy industry is too important not to get the numbers right. The oft-quoted \$2.5 billion number for the biennium contains state highway dollars and some dollars that are for non-oil county projects. Western North Dakota received \$522 million annually for oil-impacted political subdivisions.

MARK YOUR CALENDAR FOR THIS YEAR'S BAKKEN ROCKS COOKFEST!

Make sure to attend one of the year's greatest barbecues at the North Dakota Petroleum Council's (NDPC) CookFest! Mark down these dates and join in on the fun! CookFest barbecues will take place July 15 in Kenmare, ND and July 17 in Dunn Center, ND. More information will be posted on the NDPC's website at www.northdakotaoilcan.com/events/CookFest as it becomes available, so be sure to check back for updates as the CookFest approaches.



SAVE THE DATE !

The NDAOGPC 2014 Annual Meeting date has been set for Thursday, September 18, 2014 at the Grand Williston Hotel in Williston, ND. Be sure to mark your calendars for another exciting meeting lined with speakers, information and networking opportunities! More details on hotel arrangements, room blocks, the registration process, and sponsorship opportunities will be shared closer to the event date.

NDAOGPC ACCEPTING APPLICATIONS FOR 2014 SCHOLARSHIP AWARDS

Attention North Dakotan students! The North Dakota Association of Oil & Gas Producing Counties (NDAOGPC) is once again sponsoring a scholarship program for students in North Dakota focusing on energy-related degrees. Students who have completed 12 credit hours or more are welcome to apply for one of six scholarships that will be awarded in August 2014.

Applicants should be pursuing degrees in engineering, chemistry, geology, petroleum sciences or other studies directly related to the oil and gas industry. Invitations to apply for the association's 2014 scholarships were recently sent to all North Dakotan colleges, universities and vocational schools. We strongly encourage all readers to share this opportunity with anyone who they believe may qualify.

The application can be downloaded at www.ndenergy.org. The deadline for application submission is June 15, 2014. Don't miss out on this great opportunity to gain financial assistance for an industry-related education!



VISION WEST ND REGIONAL PLAN APPROVED BY CONSORTIUM

The Vision West ND Consortium met on March 6, 2014 in Williston, ND to put the finishing touches on the Vision West ND Regional Plan. Over two years in the making, the regional plan is designed to provide an outline of the issues being dealt with in western North Dakota and detail strategic and actionable ways in which those issues should be addressed.

The regional plan, enhanced through hard data and community-driven perspectives, will give those responsible for carrying out its action steps guidance on how to proceed with resolving issues like affordable housing shortages, lack of child care providers, proper EMS coverage and adequate infrastructure funding.

In review of the regional plan, the consortium added a section dealing with local public health districts. The added section recommends increasing state aid for disease outbreak prevention, funding a public education and service campaign, and establishing a statewide septic code. It also recommends that funds dedicated specifically to local public health districts be allocated to counties to be distributed to those public health districts.

Now that the regional plan has been approved by the consortium, the task will be to market the regional plan to other key stakeholders. The Vision West ND administrative team will be meeting to develop a marketing strategy, with the objective of "selling" the regional plan to legislators, state government agencies/departments, non-profit organizations like the North Dakota League of Cities, the North Dakota Association of Counties, and the North Dakota Petroleum Council, and the nineteen county commissions within the project area.

The regional plan, which was edited to include the changes approved by the consortium, was released in late March. The NDAOGPC looks forward to promoting the regional plan as a reliable guide for moving the region toward its goals of becoming a quality place in which to live, work and raise a family.

EDUCATION PROGRAM ADDRESSES CONCERNS

The North Dakota Truck-Weight Education and Outreach Program addresses concerns from state, county, city and township transportation authorities, regarding damage from heavy trucks. Explanations are provided which explain road weights during various times of the year. The program promotes voluntary truck-weight compliance, to reduce damage to public roads and highways from overweight vehicles.

The program provides information and explanations to attendees on how to haul the most legal weight, without violating the truck-weight laws. How you configure your truck, with proper axle spacing and tire size, makes a difference.

Topics covered by the event, which was presented in Williston and Mandan in March, included updates on road-weight limits, classroom exercises to help attendees identify legal weights on their own trucks, road damage issues, and laws governing a variety of different weight considerations. For more information, contact Janet Sanford, truck permit operator, at (701) 770-1632.



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HOUSING CONFERENCE EMPHASIZES NEED FOR AFFORDABLE HOUSING, INFRASTRUCTURE

The Statewide Housing Conference, sponsored by the North Dakota Housing Finance Agency, was held in early March in Bismarck, ND. Kicking off the event was a breakfast panel discussion with three members of the legislative interim Economic Impact Committee on what is working and what can be improved, in terms of getting affordable housing projects on the ground.

The Housing Incentive Fund (HIF) and the Flex PACE interest buy down program were funded by the legislature to aid in affordable housing investments. The HIF is funded through a combination of income tax credit contributions and a direct appropriation from the state's general fund. The total amount available in the incentive fund, \$35.4 million, has already been committed to projects in both the western and eastern regions of the state.

Discussion also took place on the need for adequate infrastructure to precede housing developments. KayCee Lindsey, community

development director with the Divide County JDA, says that often, developers want to know what the city will do for them before they commit to projects. Bob Humann with the Bank of North Dakota says his organization is doing some investigation on how local political subdivisions' public finance authority could be expanded in order for them to bond for different types of infrastructure.

Housing will yield employment, but having available housing won't necessarily yield economic development, according to nationally-acclaimed economist and keynote speaker Dr. Elliot Eisenberg. He suggested several ways to spur affordable housing developments. Getting the private sector to help supply affordable housing units and the possibility of imposing "impact" fees to help pay for those units were two methods he identified.

"You can't do impact fees forever," he says, but the tactic would help cover some large short-term affordable housing needs. On a broader note, Eisenberg gave advice to help continue the state's economic good fortune, including improving all types of energy transportation infrastructure, capturing/using natural gas, diversifying the economy with value-added industries, and focusing on attracting women, children and families to the boom regions of the state. When that is achieved, he says quality of life is also important to look at.

Scott Wegner from Arntson Stewart Wegner PC distributed a resource to break out session attendees entitled *Financing Options for North Dakota Cities and Counties*, which provides details on financing options from Certificates of Indebtedness to Revenue Bonds.

The two-day event was wrapped up with the Champion of Affordable Housing Awards Luncheon. Two awards were given to people involved in western North Dakota housing projects. The Housing Production Award was given to the Wolf Run Village in Watford City, ND and the Leadership Award was given to John Phillips, Lutheran Social Services Housing.

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WILLIAMS TRUCK REGS 24/7

As of March 14, 2014, the Williams County sheriff's department truck regulatory division began operating 24 hours per day, seven days per week. Prior to this, it operated during regular business hours, 8:00 a.m. - 5:00 pm.

DOLLARS APPROVED FOR WATER SUPPLY PROJECTS

The State Water Commission recently agreed to provide an additional \$32 million in state grant funds to support critical water supply projects in three western North Dakota cities. The commission will tap available funding within the Resources Trust Fund to provide cost-share grants for water supply projects in Dickinson, Watford City and Williston, ND.

In December, the Water Commission began work to expand a grant program so that more water supply projects qualify for state assistance. The expanded program recently approved by the Water Commission makes cities eligible for state grants for water supply projects based on population growth and financial need.

As part of the expanded grant program, the Water Commission agreed to provide state funding for 35 percent of engineering costs for pre-construction work, 60 percent of construction engineering costs, and 60 percent of the construction costs for approved water supply projects.

The grants approved by the Water Commission were:

- Dickinson: \$18.4 million for new water transmission lines, a pumping station, water storage facility and other water supply infrastructure;
- Watford City: \$6.7 million for two new water towers, new water transmission lines and other improvements; and
- Williston: \$6.95 million for new water transmission lines and engineering services.

COUNTY ROAD OFFICIALS TALK LOCAL ROAD ISSUES

Western county road superintendents and local officials exchanged ideas on best practice for gravel roads at the LTAP-organized roundtable meeting recently held in Killdeer, ND. State Department of Transportation (DOT) officials discussed federal grants that were available.

Bill Anderson, the west county road coordinator, talked about success stories in the field and the types of products being used. The North Dakota Association of Oil & Gas Producing Counties (NDAOGPC) has paid \$19,000 per year for three years as part of a matching grant to hire Bill Anderson to help counties learn from each other. Please take advantage of Bill's expertise.

Vicky Steiner, the NDAOGPC's executive director, spoke to the group about the March 12 Uniform County Truck permit meeting in Watford City. The trucking industry wants to know about spring load permit fees and if counties can work toward uniformity. The NDAOGPC runs a uniform county truck permit system year-round so truckers can go online, purchase a self-issuing permit and pay for an overweight, non-divisible load permit for use on a county road.

Dave Leftwich, DOT west coordinator, encouraged counties to learn from each other. Stark County highway superintendent, Al Heiser, says his county saved \$1 million by mixing a higher-grade gravel with existing stock. The wet weather, soil type, crush of the gravel, the application of water, and the use of health department-approved brine water were also discussed. Attendees were advised to work with your gravel crusher to do the job for the lowest cost. Some counties recognize they will need to bring gravel from greater distances as they compete with the energy and construction industries for aggregate.



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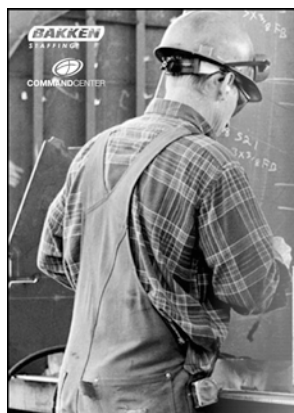
ND'S EXPORT MARKET

North Dakota sells more goods to Canada than to all other countries combined. The total Canada-North Dakota goods trade equals \$5.8 billion. Forty-five percent of North Dakota's exports to Canada are energy-related, with crude petroleum making up

\$1.1 billion in exports and fuel oil making up \$182 million. Here is a breakdown of North Dakota exports to Canada:

- Energy (45%);
- Agriculture (19%);
- Equipment & machinery (16%);
- Transportation (10%);
- Chemicals (7%);
- Minerals & metals (2%); and
- Other (2%).

Source: www.can-am.gc.ca/business-affaires/fact_sheets-fiches_documentaires/nd.aspx?lang=eng



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Kafko International has introduced a line of Oil Eater Flex Line parts washers that offer three tiers of features with add-on options. Each comes with six gallons of eco-friendly Oil Eater Original cleaner and a three-year limited warranty.

Each water-based system has a 440 lb. working tray, 26-gallon soaking capacity, adjustable “goose neck” spigot and thermal-ly-protected 350 GPH pump.

The other tier features include a low fluid level protection switch, high-impact HDPE lid, 20-piece cleaning brush kit and 10W moisture-resistant LED work light.

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Supplying United States' oilfield and shale gas plays with containment solutions requires ongoing R&D, technology transfer and pro-active service programs to meet the industry's diverse specifications by regional plays.

Specifications are ever-changing and driven by multiple factors, including state regulatory agencies; producers' best practices; individual company product and installation preferences; worker safety; climate and weather; and the ongoing focus for operational cost efficiencies.

ITL™ provides service companies and producers with a comprehensive approach, Advanced Containment Solutions™. This program encompasses working with E&Ps and their service companies to define well site challenges, applications and solutions. These challenges and solutions range from well pad containment to pit liners, impoundments to tank liners, and from secondary containment liners to containment system products.

ITL™ offers a diverse inventory of liners to meet specific applications by geographic play (Coated Woven Polyethylene (CWPE) Single Scrim, Double Scrim and Specialty Liners; LLDPE-R; LLDPE; HDPE; and Geotextiles).

Ongoing R&D programs are a primary focus at ITL™. ITL™ has developed a series of CWPE liners. These liners are multiple layers thick, featuring double scrim technology with an optional geotextile surface for worker safety. CWPE liners are stronger and lighter than traditional products and are designed for cross-over applications in multiple plays. Key manufacturing technical data include very high puncture and Mullen Burst values with reduced mass weight. Specific CWPE liners are manufactured and fabricated for both primary and secondary containment.

Custom tank liners are also designed and fabricated by ITL™. Liner specifications vary based on region, producer, service company and specific tank applications: fresh water, flow-back, and treated liquids. ITL™ works closely with customers in defining cost-effective project solutions for fabrication and installation. ITL™ customer resources include its AutoCAD department for tank liners and other custom project applications.

ITL™ also offers custom-fabricated insulated floating covers for customers with custom project AutoCAD renderings. These covers are used during winter months to protect liquids from freezing and during summer months to reduce evaporation. Product applications include above-ground or in-ground impoundment and steel tanks. Covers are installed on liquid surface and are also wrapped on the outside of the tank as an insulator.

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BLACKHAWK EXPANDS PUMP-MARKET OFFERINGS

Blackhawk Technology, a leader in piston pumps with above-wellhead motors, has adapted its popular and durable low-flow models for oilfield, offshore and process pumping, and has introduced innovations to its landfill and toxic remediation and recovery products.

Blackhawk's electric- and solar-powered oil pumps are low-profile (four ft.), lightweight (70 to 90 lbs) and quiet, designed around the reliable and simple principles of traditional pump jacks. They pump shallow oil economically in low-flow, micro-pumping environments, such as stripper wells. The Anchor Electric Oil Pump™ recovers up to 15 barrels per day to depths of 1,500 ft. The Apollo Solar Oil Pump™ recovers up to 37 barrels per day to depths of 400 ft. Both can be tuned to the yield of a formation without disturbing the column, meaning more oil and less water.

Electric-powered industrial-process models can pump virtually any liquid at any angle up to and including horizontal. Pump components can withstand both high and low pH.

In landfills, Blackhawk now offers low-cost solar pumps with high effectiveness and reliability in latitudes as northerly as Toronto, Ontario, Canada. Traditional pneumatic and electric models for remediation and recovery sites have been enhanced with new-generation seals, controllers, timers and oilers.

www.blackhawkco.com



WILDEN PRO-FLO® SHIFT SIGNIFICANT BREAKTHROUGH IN ENERGY EFFICIENCY

Wilden®, a leader in air-operated double-diaphragm (AODD) pump technology, recently announced its Pro-Flo® SHIFT was recognized as a 2013 Breakthrough Product of the Year, which acknowledges products, technologies and service solutions that made significant contributions in the process industry within the last year and are expected to have an impact for years to come.

“The Pro-Flo SHIFT’s advancement in not only performance but also energy efficiency addresses many of the concerns of the modern-day process industry,” says Chris Distaso, director of engineering for Wilden. “We hope this award will be the first of many recognitions for the Pro-Flo SHIFT.”

The Pro-Flo SHIFT represents a significant breakthrough in energy efficiency within the AODD pump category. Due to its revolutionary design, the patent-pending Pro-Flo SHIFT Air Distribution System (ADS) allows Wilden AODD pumps to achieve up to a 60 percent savings in air consumption over all competitive AODD pump technologies, while providing more product yield per standard cubic foot per minute (SCFM). While the Wilden Pro-Flo SHIFT dramatically improves energy efficiency, it also costs 50 percent less than an electronically-actuated ADS, is submersible and features plug-and-play operation. Its robust design makes it ideal for use in harsh operating environments and includes ATEX compliance for use in potentially explosive atmospheres. The Pro-Flo SHIFT has fewer operating parts, which equates to less downtime and simple maintenance.

The Wilden Pro-Flo SHIFT is available in 38 mm (1-1/2”), 51 mm (2”) and 76 mm (3”) sizes and features maximum discharge pressures to 8.6 bar (125 psig), maximum flows to 1,056 lpm (279 gpm) and maximum solid-handling size to 13 mm (1/2”). The Pro-Flo SHIFT is available with maximum suction lifts to 7.2 m (23.8’) dry and 9.0 m (29.5’) wet.

www.profloshift.com



MARTIN ENGINEERING’S VIBRATOR RENTAL PROGRAM FOR SCREENING AND DEWATERING EQUIPMENT

A leader in engineered vibration for bulk material handling recently introduced a new rental program for its line of industrial vibrators, designed for vibratory screens such as shale shakers and other solids separation equipment. The announcement from Martin Engineering represents the industry’s first factory-direct vibrator rental program for these applications, ensuring customers are protected from surprise repair costs and associated downtime.

The Guaranteed Rental Program includes replacements for all foreign vibratory motor suppliers and U.S. suppliers. It is intended to provide a cost-effective alternative to OEM motors or local shop refurbishment. Martin is currently the only United States manufacturer of large industrial vibratory drives (including explosion-proof models) for OEM and aftermarket use. The various models are engineered and manufactured in the United States and assembled domestically and in Martin facilities around the world.

All service and maintenance is covered by a monthly flat-fee agreement, with any failed units replaced by the manufacturer at no charge. Rental customers avoid the financial burden and potential production outages from sudden drive failures and are able to focus employees on core business activities, with Martin Engineering taking responsibility for vibrator upkeep and repairs. Rental customers benefit from direct access to the manufacturer’s expertise, saving time and money. All service is performed by qualified factory-direct technicians.

“The rental program gives customers greater flexibility in budgeting for replacement and maintenance. In the past, companies that couldn’t afford extended downtime were forced to purchase a backup motor for shale shakers and other vibratory equipment,” explains Brad Pronschinske, global product manager for Martin Engineering. “It’s nearly impossible to predict when a vibrator might fail, so it can be difficult for customers to budget expenses for spares or replacements. But few companies can afford to let equipment sit idle while repairs are being performed. A rental unit gives them the backup they need, without the large one-time cost.”

Depending on the number of units rented, Martin Engineering will provide customers with spare vibratory drives as part of the rental agreement. The rental option is expected to bring value to purchasers of used equipment, providing another way to improve equipment uptime and maintain system throughput and overall productivity.

All vibrators in the rental program are backed by the full replacement warranty throughout the life of the contract, with no limit to usage time. Pronschinske said the drives are likely to serve applications in high frequency screens, sizing equipment and dewatering operations in oil and gas industries, as well as processing of coal, iron ore, gold and other elements, silica sand, and even pharmaceutical and food applications.

www.martin-eng.com

Become an Associate Member of the North Dakota Association of Oil & Gas Producing Counties

Oil and gas industry members, economic development organizations and other private businesses doing business in the Bakken are welcome to sign up their organizations for an Associate membership through the NDAOGPC online signup site.

The \$500 yearly membership fee for Associate members offers a variety of advantages, including networking opportunities with county, city and school district officials of the oil patch at various association functions throughout the year. An Associate Member Committee was established during the 2011 NDAOGPC Annual Meeting, offering the opportunity for members involved with the oil and gas industry to meet and better interact with officials in the areas in which they operate. Associate members are also featured through member profiles (like the ones on pages 112, 118 and 123 of this magazine) in the biannual NDAOGPC publication, *Basin Bits*, which is distributed throughout the Bakken and the state.

More information on how to become an Associate member and its benefits can be found by contacting the NDAOGPC office at (701) 751-3597 or e-mailing brady.pelton@midconetwork.com.



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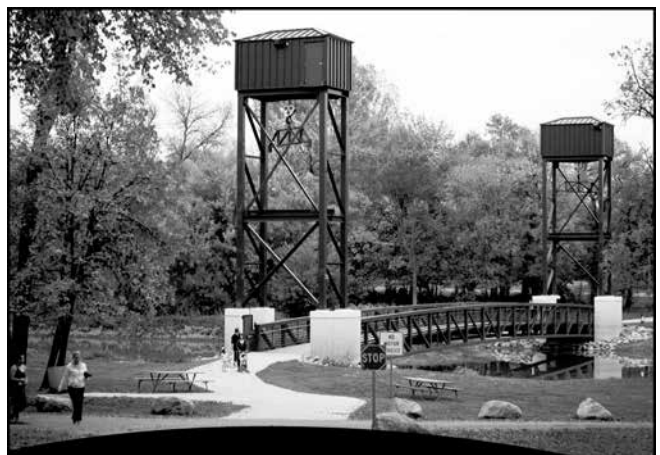
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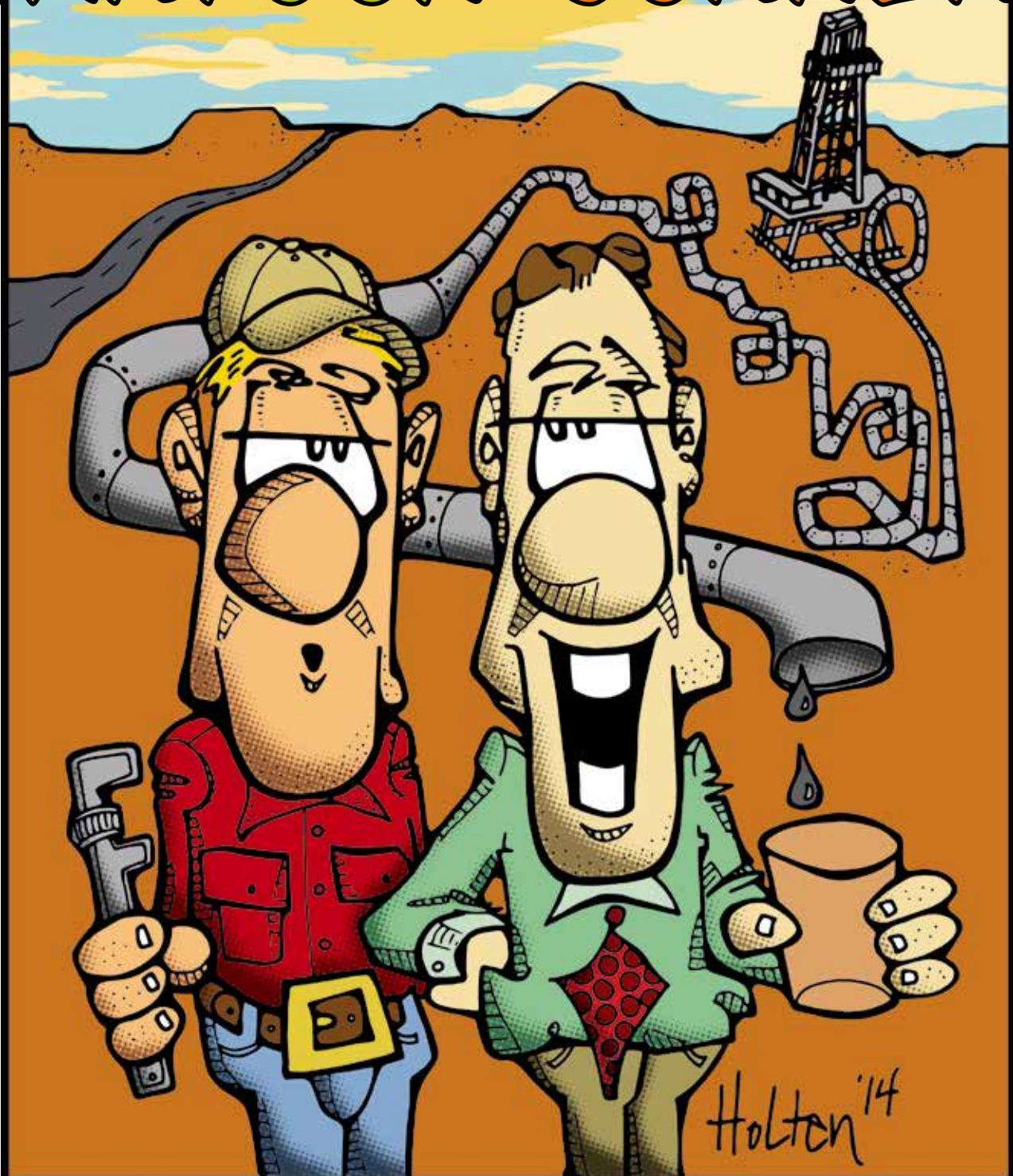


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THE TOP 50 BAKKEN

The following are the top 50 oil and gas producers in North Dakota as of the end of 2013. The list, which shows the cumulative amount of oil and gas that the top 50 companies in North Dakota have produced up to the present time and going back to the discovery of oil in North Dakota more than 60 years ago, was provided by the North Dakota Department of Mineral Resources. This list also reflects how many wells were in production for each of these top producers during the year of 2013.

As of March 2014, there are 189 rigs actively drilling in the North Dakota oil patch, according to the North Dakota Oil and Gas Division of the North Dakota Department of Mineral Resources. The number of producing wells in North Dakota as of January 2014 is 10,023, and over 95 percent of drilling still targets the Bakken and Three Forks formations. North Dakota is currently sitting as number two in oil production in the nation, and as the boom continues to shock the Bakken, our state will continue to strive for the number one position that Texas has been calling its own.

1. **Continental Resources, Inc.**
Oil production (2013): 28,983,723 bbls
Gas production (2013): 38,695,225 mcf
Wells in production (2013): 801
Tel: (405) 234-9000
Toll-Free: (800) 256-8955
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Rhome: (701) 279-6688
Tioga: (701) 664-3001
Fax: (405) 234-9253
Web: www.contres.com
2. **Whiting Oil and Gas Corp.**
Oil production (2013): 28,560,212 bbls
Gas production (2013): 27,709,581 mcf
Wells in production (2013): 651
Tel: (303) 837-1661
Fax: (303) 861-4023
Web: www.whiting.com
3. **Hess Bakken Investments II, LLC**
Oil production (2013): 26,074,259 bbls
Gas production (2013): 35,158,203 mcf
Wells in production (2013): 714
Tel: (713) 496-4000
Web: www.hess.com
4. **EOG Resources, Inc.**
Oil production (2013): 22,298,402 bbls
Gas production (2013): 18,550,097 mcf
Wells in production (2013): 492
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Web: www.eogresources.com
5. **Statoil Oil & Gas, LP**
Oil production (2013): 17,164,812 bbls
Gas production (2013): 18,475,740 mcf
Wells in production (2013): 386
Tel: (512) 427-3300
Web: www.statoil.com
6. **Marathon Oil Co.**
Oil production (2013): 15,192,062 bbls
Gas production (2013): 12,015,607 mcf
Wells in production (2013): 391
Tel: (713) 629-6600
Web: www.marathonoil.com
7. **XTO Energy Inc.**
Oil production (2013): 15,167,878 bbls
Gas production (2013): 20,204,583 mcf
Wells in production (2013): 451
Tel: (817) 870-2800
Toll-Free: (800) 299-2800
Fax: (817) 870-1671
Web: www.xtoenergy.com
8. **Oasis Petroleum North America, LLC**
Oil production (2013): 15,111,858 bbls
Gas production (2013): 14,813,203 mcf
Wells in production (2013): 369
Tel: (281) 404-9500
Web: www.oasispetroleum.com
9. **Kodiak Oil & Gas (USA) Inc.**
Oil production (2013): 13,800,574 bbls
Gas production (2013): 18,877,307 mcf
Wells in production (2013): 251
Tel: (303) 592-8075
Fax: (303) 592-8071
Web: www.kodiakog.com
10. **Burlington Resources Oil & Gas Co., LP**
Oil production (2013): 11,831,050 bbls
Gas production (2013): 16,037,452 mcf
Wells in production (2013): 294
Tel: (432) 688-6800
Web: www.br-inc.com
11. **QEP Energy Co.**
Oil production (2013): 9,131,349 bbls
Gas production (2013): 8,147,135 mcf
Wells in production (2013): 154
Tel: (303) 672-6900
Web: www.qepres.com
12. **Halcón Resources Corp. Operating, LLC**
Oil production (2013): 8,787,433 bbls
Gas production (2013): 9,395,389 mcf
Wells in production (2013): 165
Tel: (832) 538-0300
Web: www.halconresources.com
13. **Williams Production RMT (WPX)**
Oil production (2013): 8,104,183 bbls
Gas production (2013): 6,966,308 mcf
Wells in production (2013): 123
Tel: (701) 837-2900
Web: www.wpxenergy.com

14. **Slawson Exploration Co. Inc.**
Oil production (2013): 8,071,858 bbls
Gas production (2013): 5,745,965 mcf
Wells in production (2013): 188
Tel: (316) 263-3201
Fax: (316) 268-0702
Web: www.slawsoncompanies.com/exploration.html
15. **Oxy USA Inc.**
Oil production (2013): 6,703,775 bbls
Gas production (2013): 2,644,032 mcf
Wells in production (2013): 207
Tel: (713) 215-7000
Web: www.oxy.com
16. **SM Energy Co.**
Oil production (2013): 6,610,306 bbls
Gas production (2013): 8,364,876 mcf
Wells in production (2013): 155
Tel: (406) 245-6248
Web: www.sm-energy.com
17. **Newfield Production**
Oil production (2013): 5,341,359 bbls
Gas production (2013): 9,278,424 mcf
Wells in production (2013): 119
Tel: (281) 210-5100
Fax: (281) 210-5101
Web: www.newfld.com
18. **Petro-Hunt, LLC**
Oil production (2013): 5,000,136 bbls
Gas production (2013): 8,146,985 mcf
Wells in production (2013): 117
Tel: (214) 880-8400
New Town: (701) 675-2467
Killdeer: (701) 863-6622
McGregor (Tioga): (701) 546-4601
Web: www.petro-hunt.com
19. **Enerplus Resources USA Corp.**
Oil production (2013): 4,558,255 bbls
Gas production (2013): 2,970,127 mcf
Wells in production (2013): 85
Tel: (701) 675-2135
Web: www.enerplus.com
20. **Fidelity Exploration & Production Co.**
Oil production (2013): 4,407,830 bbls
Gas production (2013): 2,128,865 mcf
Wells in production (2013): 110
Tel: (406) 359-7360
Web: www.fidelityepco.com
21. **Hunt Oil Co.**
Oil production (2013): 3,620,432 bbls
Gas production (2013): 2,375,525 mcf
Wells in production (2013): 106
Tel: (214) 978-8000
Fax: (214) 978-8888
Web: www.huntoil.com
22. **Murex Petroleum Corp.**
Oil production (2013): 3,340,105 bbls
Gas production (2013): 2,754,276 mcf
Wells in production (2013): 86
Tel: (281) 590-3313
Fax: (281) 590-3381
Web: www.murexpetroleum.com
23. **Zavanna, LLC**
Oil production (2013): 3,246,645 bbls
Gas production (2013): 3,467,493 mcf
Wells in production (2013): 57
Tel: (303) 595-8004
Fax: (303) 595-9847
Web: www.zavanna.com
24. **Samson Resources Co.**
Oil production (2013): 2,597,204 bbls
Gas production (2013): 3,156,720 mcf
Wells in production (2013): 95
Tel: (918) 591-1791
Fax: (918) 591-1796
Web: www.samson.com
25. **Triangle USA Petroleum Corp.**
Oil production (2013): 2,520,538 bbls
Gas production (2013): 2,681,259 mcf
Wells in production (2013): 45
Tel: (303) 260-7125
Fax: (303) 260-5080
Web: www.trianglepetroleum.com
26. **Baytex Energy USA Ltd.**
Oil production (2013): 2,099,601 bbls
Gas production (2013): 2,069,675 mcf
Wells in production (2013): 81
Tel: (800) 524-5521
Web: www.baytexenergy.com
27. **Crescent Point Energy US Corp.**
Oil production (2013): 1,204,820 bbls
Gas production (2013): 1,130,141 mcf
Wells in production (2013): 27
Tel: (888) 693-0020
Web: www.crescentpointenergy.com
28. **Sequel Energy, LLC**
Oil production (2013): 1,162,369 bbls
Gas production (2013): 1,617,472 mcf
Wells in production (2013): 38
Tel: (303) 468-2106
Web: www.sequelenegy.com
29. **American Eagle Energy Corp.**
Oil production (2013): 1,090,600 bbls
Gas production (2013): 752,129 mcf
Wells in production (2013): 25
Tel: (303) 798-5235
Web: www.americaneagleenergy.com
30. **Sinclair Oil & Gas Co.**
Oil production (2013): 742,647 bbls
Gas production (2013): 764,672 mcf
Wells in production (2013): 28
Tel: (801) 524-2700
Web: www.sinclairoil.com/exploration.html
31. **Abraxas Petroleum Corp.**
Oil production (2013): 671,714 bbls
Gas production (2013): 1,120,566 mcf
Wells in production (2013): 16
Tel: (210) 490-4788
Web: www.abraxaspetroleum.com
32. **Emerald Oil Inc.**
Oil production (2013): 444,105 bbls
Gas production (2013): 437,422 mcf
Wells in production (2013): 16
Tel: (303) 323-0008
Web: www.emeraldoil.com
33. **Cornerstone Natural Resources, LLC**
Oil production (2013): 381,701 bbls
Gas production (2013): 321,361 mcf
Wells in production (2013): 22
Tel: (303) 468-5860
Web: www.cornerstonenaturalresources.com
34. **Arsenal Energy USA Inc.**
Oil production (2013): 347,817 bbls
Gas production (2013): 149,840 mcf
Wells in production (2013): 7
Tel: (403) 262-4854
Web: www.arsenalenergy.com
35. **True Oil, LLC**
Oil production (2013): 250,604 bbls
Gas production (2013): 333,518 mcf
Wells in production (2013): 8
Tel: (307) 237-9301
Web: www.truecos.com
36. **GMX Resources Inc.**
Oil production (2013): 235,112 bbls
Gas production (2013): 303,216 mcf
Wells in production (2013): 10
Tel: (877) 600-0711
Web: www.gmxresources.com
37. **Mountainview Energy Ltd.**
Oil production (2013): 201,443 bbls
Gas production (2013): 142,519 mcf
Wells in production (2013): 5
Tel: (406) 873-2235
Web: www.mountainviewenergy.com
38. **Gadeco, LLC**
Oil production (2013): 101,879 bbls
Gas production (2013): 181,228 mcf
Wells in production (2013): 2
Tel: (303) 850-7490

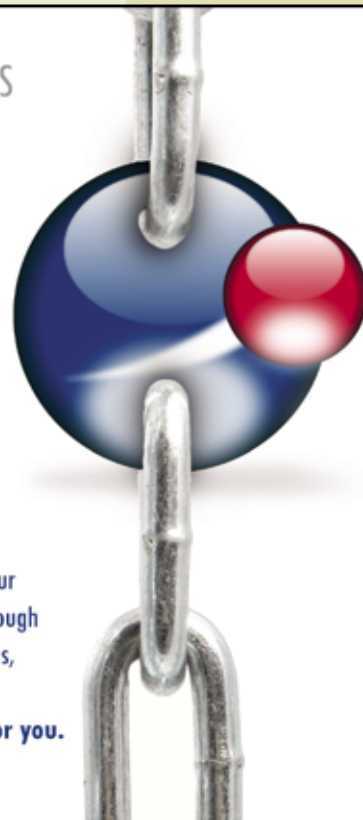
39. **Windsor Energy Group, LLC**
Oil production (2013): 78,355 bbls
Gas production (2013): 43,755 mcf
Wells in production (2013): 1
Tel: (405) 848-8807
40. **Bakken Hunter, LLC**
Oil production (2013): 71,607 bbls
Gas production (2013): 65,777 mcf
Wells in production (2013): 8
Tel: (832) 369-6986
Web: www.magnumhunterresources.com/operations_williston.html
41. **RIM Operating Inc.**
Oil production (2013): 57,591 bbls
Gas production (2013): 39622 mcf
Wells in production (2013): 5
Tel: (303) 799-9828
42. **Resource Drilling, LLC**
Oil production (2013): 46,187 bbls
Gas production (2013): 17,381 mcf
Wells in production (2013): 1
Web: www.resourcedrillingllc.com
43. **Hess Corp.**
Oil production (2013): 44,161 bbls
Gas production (2013): 41,164 mcf
Wells in production (2013): 2
Tel: (701) 628-3550
Web: www.hess.com
44. **Legacy Reserves Operating, LP**
Oil production (2013): 43,298 bbls
Gas production (2013): 37,717 mcf
Wells in production (2013): 9
Tel: (855) 534-5200
Web: www.legacyp.com
45. **Resolute Natural Resources Co., LLC**
Oil production (2013): 41,208 bbls
Gas production (2013): 49,009 mcf
Wells in production (2013): 4
Tel: (303) 534-4600
Web: www.resolutenaturalresources.com/bakken.html
46. **North Plains Energy, LLC**
Oil production (2013): 37,896 bbls
Gas production (2013): 32,263 mcf
Wells in production (2013): 1
Tel: (303) 800-5100
Web: www.northplainsenergy.com
47. **Spotted Hawk Development (SHD) Oil & Gas, LLC**
Oil production (2013): 30,181 bbls
Gas production (2013): 20,547 mcf
Wells in production (2013): 1
Tel: (703) 286-1448
48. **Texakota Inc.**
Oil production (2013): 15,272 bbls
Gas production (2013): 27,323 mcf
Wells in production (2013): 6
Tel: (713) 520-7600
Web: www.texakota.com
49. **Petro Harvester Operating Co., LLC**
Oil production (2013): 12,084 bbls
Gas production (2013): 3,686 mcf
Wells in production (2013): 2
Tel: (701) 756-6310
Web: www.petroharvester.com
50. **Tracker Resource Development III, LLC**
Oil production (2013): 9,771 bbls
Gas production (2013): 8,518 mcf
Wells in production (2013): 2
Tel: (303) 534-9513
Web: www.tracker-resources.com

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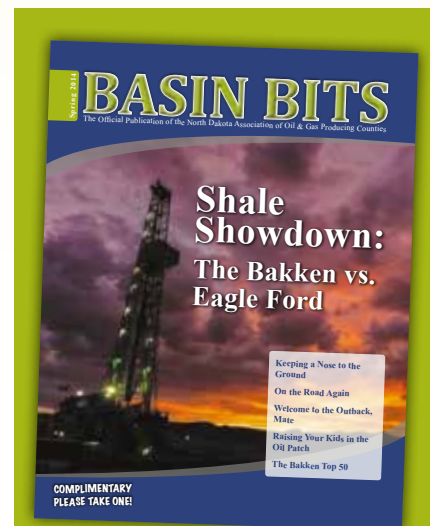
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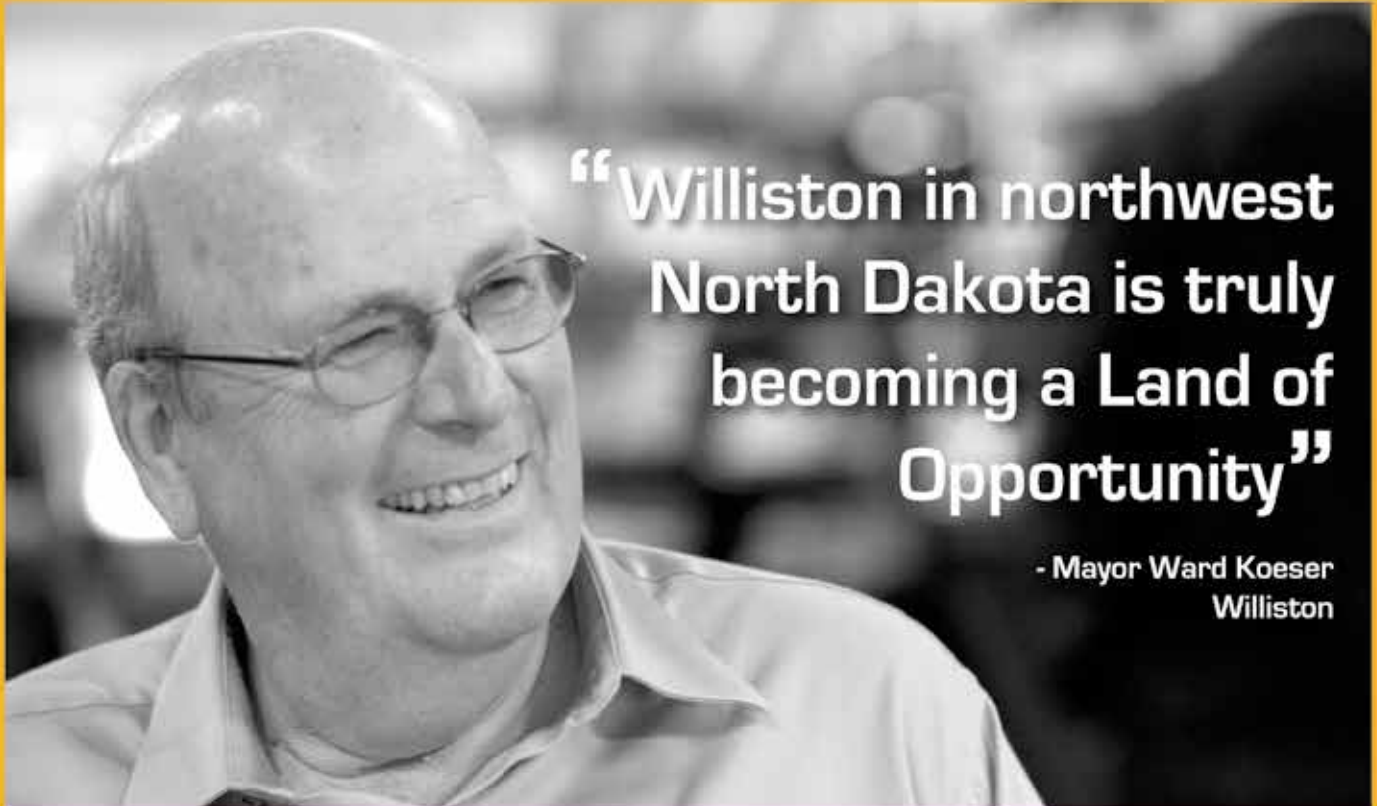
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