



BAKKEN OIL REPORT

FALL/WINTER 2020

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Published by:
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Message from North Dakota Senator
JOHN HOEVEN

Helping ensure the success of America's energy producers by addressing market instability, providing COVID-19 relief and supporting infrastructure development

Earlier this year, we held a roundtable with U.S. Secretary of Energy Dan Brouillette here in North Dakota with our local energy industry, including oil and natural gas producers from the Bakken. This was a tremendous opportunity for a key member of the administration to hear directly from our producers about the challenges they face and the opportunities to continue growing America and North Dakota's global energy leadership. From the global oil price war to the Coronavirus disease 2019 (COVID-19) pandemic, this year has brought significant difficulties. That's why we've worked in partnership with Secretary Brouillette and our colleagues in the Senate to address the needs in the oil patch and ensure the continued success of our producers.

Among these concerns, one of our primary efforts has been to bring stability to energy markets and end this spring's oil price war. We worked closely with Secretary Brouillette in directly pressing the Saudi leadership to stop shipments of crude from flooding the global energy market. Our efforts are making a difference, and according to recent reports, Saudi Arabia has dramatically cut its oil exports to the U.S. to less than 200,000 barrels per day in August compared to nearly 1.6 million barrels per day in May. We also introduced bipartisan, bicameral legislation to provide \$3 billion to purchase domestically-produced crude for the Strategic Petroleum Reserve. Our bill would provide an important boost to local producers and benefit taxpayers while helping to relieve supply pressures impacting the price of oil.

At the same time, we have worked to provide the resources the oil and natural gas industry needs to weather COVID-19. In the Coronavirus Aid, Relief and Economic Security (CARES) Act, we funded the Paycheck Protection Program (PPP) and Economic Injury Disaster Loans and Grants to help small businesses keep employees on payroll and cover essential costs during the pandemic. I have supported another round of PPP funding in additional relief legislation recently considered by the Senate.

Further, I have been urging Federal Reserve Chair Jerome Powell and Treasury Secretary Steven Mnuchin to work with Secretary

Brouillette to ensure energy producers have access to sufficient credit. Over the course of this year, the administration has announced multiple enhancements to the loans available under the Main Street Lending Program to benefit small and mid-sized businesses, offering deferred interest and principal payments, expanding the minimum and maximum loan amounts and extending the length of the loan terms.

While we continue advancing these kinds of efforts to assist energy producers through the current challenges, we are also working to support investment in the infrastructure our nation needs to strengthen its capacity for energy production. Projects like pipelines, transmission lines, and gas-gathering lines are essential to safely bringing energy to market, which is why we've worked to streamline oil, gas and infrastructure permitting, give states regulatory primacy over energy development within their borders and address burdensome rules by:

- Securing federal pre-emption of the 2019 Washington state law that would have effectively banned the transportation of Bakken crude by rail.
- Repealing the 2015 Waters of the U.S. (WOTUS) Rule.
- Modernizing National Environmental Policy Act (NEPA) infrastructure approvals.

For more than a decade, the energy development in the Bakken has been a key part of North Dakota's growth. Achievements like this don't just happen – it takes the hard work of private sector workers and companies, as well as a business and regulatory climate that encourages investment and innovation. That's exactly what we continue working to build in our joint efforts with Secretary Brouillette and through strengthening federal partnerships with North Dakota businesses and institutions, like the University of North Dakota's Energy & Environmental Research Center. These efforts are all about sustaining the growth we've attained through these difficult times, while setting the stage for the continued success of our energy producers. ▀



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Federal access critical to long-term economic growth and energy security

By Lem Smith

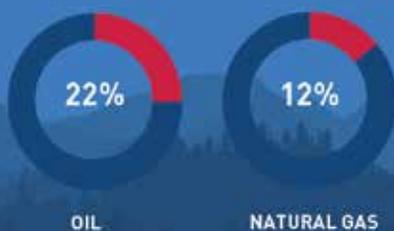


A new analysis from API, released in September and prepared by OnLocation, shows that a federal leasing and development ban would eliminate good-paying jobs, expand U.S. dependence on foreign oil and increase greenhouse gas emissions.

Federal Land & Waters

In 2019, total U.S. oil production was 12.3 million barrels per day and total marketed natural gas production was 36.2 trillion cubic feet.

The energy produced on federal lands and waters accounted for 12% of U.S. natural gas production and nearly a quarter of U.S. oil production.



The Coronavirus pandemic has claimed hundreds of thousands of American lives, cost jobs and devastated businesses from coast to coast, including those in the U.S. natural gas and oil industry. Operators in the Bakken Shale remain resilient, but in June, the demand collapse reduced active drilling rigs to 20 percent capacity compared to last year and pushed the region's unemployment rate above 11 percent.

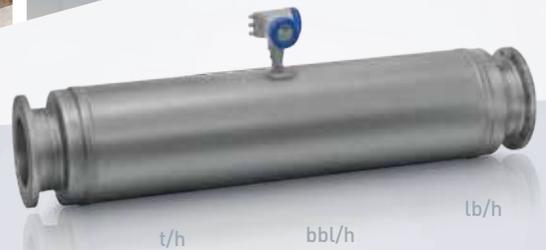
Despite the challenging circumstances, the natural gas and oil industry continues to provide the affordable and reliable energy powering America's economic recovery, while preparing for the world's long-term energy needs. Of course, this requires continued – and expanded – access to our homegrown natural resources.

In 2019, energy development on federal lands, onshore and offshore, accounted for nearly a quarter of the crude oil and 12 percent of the natural gas produced in the United States. But by restricting access to America's energy resources, our lawmakers could reverse decades-long progress toward U.S. energy security, threaten economic growth and disrupt our broader energy mix.

Politically motivated and anti-industry approaches that limit energy production are short-sighted and costly – during an era of economic uncertainty, no less.

A new analysis from API, released in September and prepared by OnLocation, shows that a federal leasing and development ban would eliminate good-paying jobs, expand U.S. dependence on foreign oil and increase greenhouse gas emissions.





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The study projects that U.S. GDP would decline by a cumulative \$700 billion through 2030, and more than \$9 billion in government revenue would be at risk, including funding for education and conservation programs. Additionally, nearly one-million industry jobs would be lost by 2022, and carbon dioxide emissions would increase 5.5 percent in the U.S. power sector by 2030.

The study also projects significant consequences for the Bakken region, including more than 13,000 jobs lost in North Dakota by 2022 and \$94 million in state revenue at risk. And in Montana, more than 3,300 jobs would be lost and \$30 million in state revenue would be at risk, according to the analysis.

This assessment follows recent polling by Morning Consult showing that two-thirds of voters in key battleground states would be more likely to vote for

Additionally, nearly one-million industry jobs would be lost by 2022, and carbon dioxide emissions would increase 5.5 percent in the U.S. power sector by 2030.

candidates who support domestic energy production, with most agreeing that it is important to avoid dependence on other countries.

Earlier this year, API released a related study – “America’s Progress At Risk” – addressing the impacts of a combined ban on hydraulic fracturing and federal leasing, which found that such a proposal could trigger a U.S. recession marked by 7.5 million jobs losses in 2022 – including 76,000 in North Dakota.

When it comes to natural gas and oil development on federal lands and waters, U.S. policymakers and voters have a choice between domestic energy or foreign energy, American jobs or overseas

jobs and cleaner-burning natural gas or coal-fired power generation. For those who value energy self-sufficiency and environmental progress, the choice is clear.

Federal energy leasing from the Gulf of Mexico to the Bakken Shale will be essential to the nation’s post-pandemic recovery and long-term economic growth. Producing affordable, reliable and cleaner natural gas and oil on U.S. lands and waters benefits businesses and families, and ensures a better energy future.

Lem Smith is vice president of Upstream Policy at the American Petroleum Institute. ▸

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North Dakota TENORM disposal options to be considered

Recommendations for the regulation and disposal of TENORM (technologically-enhanced naturally occurring radioactive material) were released this fall based on a study commissioned by the Western Dakota Energy Association (WDEA).

The WDEA executive committee received the report which suggested that state regulatory agencies and oil-producing counties look at a consolidated process for the siting, permitting, and monitoring of facilities that will handle the oilfield waste product. TENORM in the oil industry is typically found in filter socks used at saltwater disposal wells, tank bottom sludge, and scale that forms inside well pipes and equipment.

WDEA authorized the study in January shortly after Williams County rejected an application for a landfill north of Williston. County commissioners were concerned that additional landfills may be needed in the future, and if any failed, the county would be liable for the facility. The county reached out to WDEA, which contracted with AE2S Nexus to perform a regional study to get a better handle on the issue.

North Dakota is the only oil-producing state that does not have a permitted landfill or other disposal facility for handling the material, according to Brent

Bogar, AE2S senior consultant. Bogar said the state generates an average of 92,000 tons of TENORM per year, which is the equivalent of about 2,300 truckloads. Based on information from the North Dakota Department of Mineral Resources, Bogar and AE2S developed a map with locations of future drilling activity and infill drilling, to show areas where TENORM is likely to be produced. The material is currently hauled by truck out-of-state, with most going to a landfill just across the border near Lindsey, Montana.

Landfills are the primary means of TENORM disposal, but Bogar said slurry wells are another option being explored. The state of North Dakota has permitted three such wells that would grind the material into a powder that could be injected underground in a slurry along with produced water from drilling operations. None of the wells are in operation yet, although one is under development in McKenzie County.

"The slurry well process has been in use for decades in other states and has been a proven method for the industry to properly dispose of TENORM," Bogar said. "The wells allow for the disposal of the material in the region it is produced, and are also capable of handling higher radioactivity levels than a landfill while still being required to maintain proper

safety protocols for the workers handling the material."

Bogar said slurry wells have the potential to handle large volumes of material, potentially a significant portion of the TENORM produced currently in North Dakota. As for TENORM disposal in landfills, Bogar suggests consolidating the permitting authority under the state Department of Environment Quality, with considerable input from counties, similar to the manner in which pipeline siting was consolidated under the Public Service Commission by the 2017 Legislature.

A key component of WDEA's study includes producing educational materials so the public understands there is very little public health risk from TENORM's low-level radioactivity.

"We want to make sure the public understands low level amounts of radioactivity can be found literally everywhere," Bogar said. "It's in bananas, coffee grounds, kitty litter and granite counter tops. TENORM is no different, but because it's regulated, we have to provide for its safe disposal." ▀



Brent Bogar, AE2S senior consultant.

"The slurry well process has been in use for decades in other states and has been a proven method for the industry to properly dispose of TENORM," Bogar said.



The BDWLP was developed to create and enhance working agriculture lands and wildlife habitat near energy sites, among many other things.

Conservation work in the Bakken continues

While travel and face-to-face meetings in western North Dakota have reduced significantly due to COVID-19, the Bakken Development and Working Lands Program (BDWLP) has continued to roll in the prairie. Since the program was funded in 2018 through the Outdoor Heritage Fund (OHF), landowners and public entities have been able to improve soil health, restore grasslands and wildlife habitat, and enhance farming and ranching on public and private lands. The OHF, overseen by the North Dakota Industrial Commission, plays a key role in providing opportunities for landowners and agencies to create innovative approaches to conservation and land management.

The BDWLP was developed to create and enhance working agricultural lands and wildlife habitat near energy sites, as well as throughout the broader landscape; create urban nature/interpretive sites, and coordinate and facilitate energy site reclamation where no current responsible party exists. The Forest Service and McKenzie County Grazing Association were also able to improve public lands through vegetation management, restoring native plant communities, and installing range infrastructure.

Through local soil conservation districts and conservation organizations, BDWLP has provided options and program support to over 60 landowners. This includes the establishment of 2,175 acres of new native grasslands, 1,480 acres of tame grass

seeding, and over 2,155 acres of cover crops to improve soil health. Establishment of cross fence and water developments, such as tanks and pipelines, has also been very popular with landowners wanting to implement a rotational grazing system. Local NRCS/SCD and conservation offices have provided the technical support to design these development projects and provided their expertise on seed mixes and grazing management plans. At the time of this writing, all program funds have been committed.

During a year of a pandemic and significant disruption in the economy, the OHF has continued to provide opportunities not only through the BDWLP, but several other programs that benefit the state. The BDWLP is truly a team effort and would not be as successful as it is without organizations and agencies working together. The NRCS and SCDs provide valuable coordination and technical expertise for landowners. Thank you to our conservation partners and ranchers who are working through these times of uncertainty. The OHF provides funds to support agriculture, public access, and community improvement through conservation.

If you have questions on the Bakken Development and Working Lands Program, please contact your local NRCS/SCD office, or call Jesse at the North Dakota Natural Resources Trust at 701-223-8501. ▀

A not-so-wonderful life for the Bakken and North Dakota

By Bette Grande

In the movie *It's a Wonderful Life*, George Bailey is given the opportunity to see what would happen if he had never been born. While not quite the same, a recent analysis from ICF commissioned by API shows the potential impacts in North Dakota if the Dakota Access Pipeline (DAPL) is shut down. The analysis paints an ugly picture for producers, mineral owners and the state. Even more so given the impact that OPEC and COVID-19 has already had on the Bakken.

The issues surrounding DAPL only compound the significant challenges for operators in the Bakken in 2020. OPEC actions in February pushed oil prices lower, followed by the demand destruction caused by the COVID-19 pandemic, forced producers to idle over

7,000 wells by May 2020, according to the North Dakota Department of Mineral Resources (DMR). Daily oil production in North Dakota dropped from 1.4 million barrels/day in February to under 900,000 barrels in May.

COURT ACTION

On July 6, 2020, the U.S. District Court in Washington, D.C. ordered DAPL to be shut down and required an additional environmental review of the project. But, by August 6, 2020, the U.S. Court of Appeals for the District of Columbia ruled that the pipeline could remain open for the time being. The legal wrangling continues and DAPL may still be forced to shut down.

The U.S. Army Corps of Engineers (ACE)

announced the start of its environmental impact statement process on September 10, 2020 and the process is expected to take at least 13 months. ACE is considering whether DAPL should remain in operation while the study is ongoing and a decision on that may come before year-end.

UNCERTAIN FUTURE

With oil production rebounding from early summer, North Dakota officials believe current production is back above one million barrels/day. If DAPL is shut down, even temporarily, producers will face difficult, and costly, decisions.

The ICF analysis commissioned by API looked at the impacts of a 16-month DAPL shutdown and concluded that the new economics of a post-DAPL world would result in 115 million barrels of Bakken crude left in the ground over the period studied. The analysis determined that the lower drilling activity would lead to 7,400 direct and indirect jobs lost.

Whatever oil that was produced would cost producers an additional \$5.88/barrel in transportation costs, significantly lowering the already depressed netbacks. Higher transportation costs will impact Bakken production even if world oil demand picks up based on information from DMR.

In preparation for the 2021 legislative session, officials in North Dakota are developing projections of oil production and pricing for the next biennium.



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Projecting the future of oil production, demand and pricing is always a challenge, but today, with uncertainties related to the pandemic and a possible loss of DAPL, budget shortfalls and cutbacks are certain.

According to information from the DMR, North Dakota requires 70 to 80 well completions each month to maintain production of 1.2 million barrels/day. Monthly well completions in from April through September were half of that number. The current inventory of drilled but uncompleted wells (DUCS) in the Bakken has dropped in recent months to 793 and the further completion of these DUCS could help reach that monthly completion target. But North Dakota officials do not expect significant well completions until WTI holds at \$45 to

\$50, and with WTI at around \$40 as I write, thus an increase in completions is unlikely.

Drilling activity in the second half of 2020 has focused on leases potentially impacted by any changes to federal permitting process. This seems to have been a smart move given the likely outcome of the election.

It is important to point out that these projections are based on current circumstances. If DAPL is shut down, the discount for Bakken crude would likely widen due to the increased cost of alternative transportation. The ICF analysis showed a net drop in Bakken prices of over \$5/barrel, which effectively moves the WTI price target to \$50 to \$55 before producers will begin to work down the inventory of DUCS.

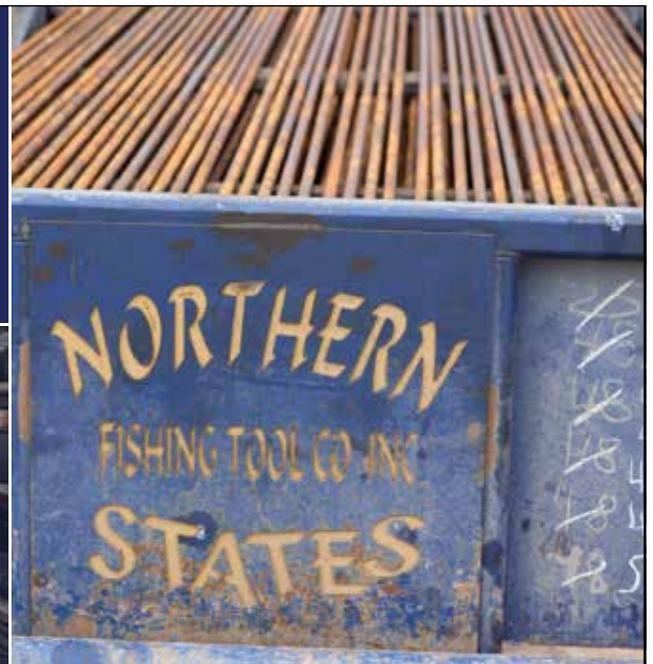
North Dakota, like other oil-producing states, is already facing an uncertain future from economic impacts related to the pandemic and headwinds from Washington, D.C. Add to that the challenge of logistics in the Bakken, the distance from markets, and the shutdown of DAPL could be the proverbial light switch.

The Bakken is not Bedford Falls, but producers and mineral owners are hoping for a Hollywood ending. Stay tuned...

Bette Grande is CEO and president of Roughrider Policy Center, North Dakota's Think Tank (roughriderpolicy.org). She can be emailed at bette@roughriderpolicy.org. She also represented the 41st district in the North Dakota Legislature from 1996 to 2014. ▀

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The handshake between AG AND ENERGY – IT REALLY CAN WORK

By Lance Medlin, EVP and chief operating officer at Meridian Energy Group, Inc.



If I were to tell you that the relationship between agriculture and energy was older than the energy industry itself, it's not likely that anyone reading this article would be surprised, or for that matter, even interested. It's something we've heard before, spun from different angles with different agendas all with the aim to show how the two largest industries in North Dakota have co-developed to harmonize into a perfect family.

A HISTORICALLY DYSFUNCTIONAL RELATIONSHIP

For those of us who have lived through one or more oil booms, you might be more apt to take the stance of "this town ain't big enough for the two of us!" assuming there either aren't enough resources to support both industries, or those resources aren't shared and matured in a sustainable manner. More

than once, North Dakota has seen the energy cycle hit in such an unsustainable manner that the entire infrastructure became overwhelmed. There were not enough resources to share, nor the ability to share the civil and infrastructure resources that were available.

Schools were overcrowded, roads damaged, jobs created and then removed, and before you knew it, the crude market crashed and everyone left. That's not a handshake, that's a body slam. Energy just comes in, body slams the local economy and resources, then leaves.

HOW DO WE GET STARTED?

A mutually-sustainable relationship is much gentler, developed in a more future-thinking manner, requiring peer discussions from both agriculture and

energy, and then delivering the end result with both parties in mind. While the oil booms of 2000 and 2008 brought their own form of positive economic stimulus, the growth rate simply was not sustainable and the long-lasting effect on the residents and the state had many adverse effects.

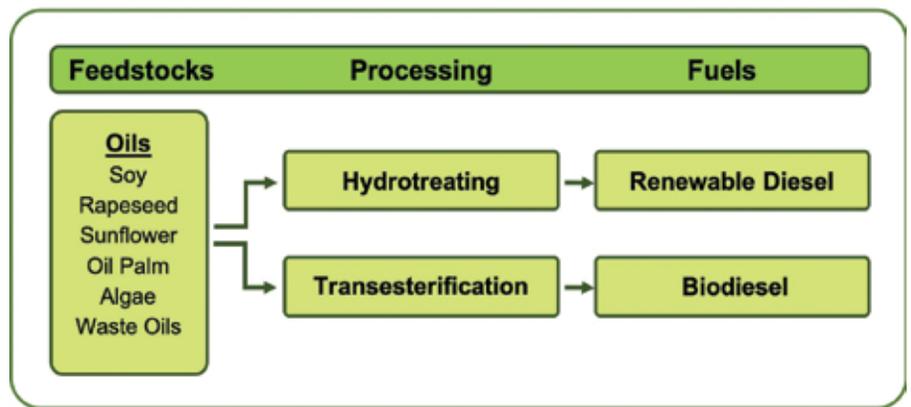
Now, here we go again. Crude price is trading at <\$40/bbl and unless there is some significant and strategic federal intervention, it looks like we'll be clawing our way out of this slump once again as we've had to do so many times in the last few decades. Have no fear for the future though, the jobs will come back and so will the panic and madness that accompanies a mass rush to the market when crude prices skyrocket and everyone in the nation wants to be a 'friendly neighbor!' That doesn't however do much for you now. If you're not feeling the squeeze from today's crude market, give it time. You will.

So, between now and then why don't we focus on strengthening the relationship between agriculture and energy, where we know the connections already exist, and begin recognizing opportunities for new relationships that may not have previously existed but have significant potential?

MUTUAL SUCCESS: FORMERLY ONE INDUSTRY'S TRASH IS TODAY ANOTHER INDUSTRY'S TREASURE

Specifically, let's focus on the relationship between North Dakota's agriculture and energy industries. What does a handshake between agriculture and energy look like? It starts and ends with

Renewable Fuels Creation Process



Using renewable oils in the refining industry is beneficial to the agricultural producer because it provides another outlet to market commodities, and without heavily relying on the export market.

environmental and social sustainability. It's thoughtful, responsive to the needs of both industries, and creates positive benefits to both industries. Modern energy sources like Meridian's Davis Refinery is a first step toward extending a 'well thought-out handshake' to the agriculture industry and here's why:

The Davis Refinery will produce 100 percent renewable diesel, reformulated gasoline, and other refined products. This is accomplished by co-processing renewable oils such as distillers corn oil (DCO), soybean oil, and canola oil and blending ethanol. This is where the handshake begins, as the byproduct of one local industry becomes the feedstock of another, but it's also where the threat of unsustainability begins. Using DCO as an example, there are currently less than 800 barrels per day (bpd) of DCO produced within the state of North Dakota, and approximately 1,800 bpd in the nearest state of South Dakota, contributing to the total of 26,000 bpd produced in the United States. As you can see, the vegetable oil feed of 2,000 bpd necessary for successfully operating the Davis Refinery cannot be supplied as DCO sourced solely from the local market in North Dakota would consume approximately eight percent of our country's supply.

Using renewable oils in the refining industry is beneficial to the agricultural producer because it provides another outlet to market commodities, and without heavily relying on the export market. A clear example of this is the

soybean market, which has historically relied on exports that typically go to China. Upsets in world trade have had devastating effects on both the price and ability to move commodities.

Greg Kessel of Arrow-K Farms in Belfield, North Dakota, views agriculture as a crucial link in the supply chain to support energy production.

"Production agriculture needs a balanced approach to provide the ingredients necessary for food, as well as energy production," states Kessel. "Agriculture needs diverse markets, with each market serving as a partnership between agricultural supply and end-use manufacturing. Supplying renewable oils from crops to the energy manufacturing sector results in a long-term sustainable partnership that provides economic and social stability for both agriculture and energy. This partnership assists in reducing the peaks and valleys that can impact both sectors, and demonstrates to the cities and towns that co-existence of agriculture and energy is beneficial to all parties involved.

FORWARD-THINKING AND A FRESH PERSPECTIVE WILL ENSURE A BRIGHTER FUTURE

To ensure a responsible and sustainable renewables program, both agriculture and energy will need to continue to work closely together to develop a local supply chain that provides additional resources from agriculture to energy, cost-effective fuels from energy to agriculture, and jobs and additional

revenue streams for the community. Both current and future generations need to recognize, embrace, and establish the vital, mutually-beneficial link between agriculture and energy. Long-range sustainable production within agriculture is an important supplier of product to the energy sector. This partnership helps both agriculture and energy grow businesses that can survive. One of our most valuable assets are our young people in the state, and it is imperative that these two industries complement each other, rather than compete, to keep the jobs and the interest that retains the upcoming generation.

The hands are being extended, let's shake on it...

Lance Medlin, a veteran of the United States Marine Corps, has an extensive background in the oil and gas industry, having led successful projects for Shell, BP, Exxon, Petrofac, KBR, and Pemex. In such roles, he has served as vice president of engineering and projects, project executive, project director, and commissioning and start-up manager. Medlin is an engineer with a degree in mechanical engineering and organizational management, bringing with him over 20 years of industry experience in project management for chemical, petrochemical, oil and gas facilities design, construction and operations. Medlin has led the management, planning and direct supervision of day-to-day civil, mechanical, industrial construction and process engineering. ▀

Solid online foundation helps power BSC Energy students through COVID



On campus, energy students use interactive labs and simulations as part of their instruction. Having access to high-quality online resources helped students and faculty transition to an online environment to complete the spring 2020 semester.

The Bismarck State College National Energy Center of Excellence (BSC) has been delivering online energy education for more than 20 years. That experience helped ensure a successful transition of classes during the spring 2020 semester, as the COVID-19 pandemic forced all

on-campus classes at the college into an online environment about halfway through the semester. In the energy department, instructors were able to tap into pre-existing animations, simulations, and interactive learning tools, allowing for a smooth transition.

While it was challenging to teach some hands-on course components, Thomas says she is confident students were still able to master the same content they would in the classroom.

“My spring Steam Generation class typically uses the campus boiler as a part of the hands-on labs for that class. Due to COVID, I moved them to the online simulator with several Teams meetings with my class to be sure everyone was understanding how to use the online simulations,” says Erin Thomas, assistant professor, NECE. “The only challenge for the students seemed to be maneuvering Teams but once they used it a couple times, we were able to meet virtually for class discussions and lectures during the same time the class was normally held on campus.”

While it was challenging to teach some hands-on course components, Thomas says she is confident students were still able to master the same content they would in the classroom.

“The lab impact to the students was altered slightly by using the online simulator but the students were still able to learn the overall process of starting up and shutting down a boiler to produce steam,” she says.

Other professors such as Reynold Miller who teaches in the Energy Services & Renewable Technician program at BSC also incorporated virtual elements into their courses, including those produced by industry partners.

“To make the students’ online experience more personal, I added many interactive media presentations that were leased from Amatrol. These allowed students to not only get a presentation, but also to watch animations on the subjects being studied.”

While many of the 12 degree and certificate programs in the energy department have an online offering, students who choose to take the program on campus typically prefer an in-person environment with hands-on components. When the initial shutdowns due to COVID



On campus, energy students use interactive labs and simulations as part of their instruction. Having access to high-quality online resources helped students and faculty transition to an online environment to complete the Spring 2020 semester.

were slowly lifted, students were able to return to campus throughout the summer in small groups and complete the lab components in person.

As the fall 2020 semester begins, Bismarck State College is planning to provide the best possible in-person classroom and experience while maintaining a safe and healthy environment for students, employees and the public. Professors have been preparing and learning from the spring experience to continue to provide robust curriculum this fall,

regardless if conditions require limited on-campus or online instruction only for a period of time.

“On the chance we must transition again, I am adding more interactive presentations and trying to plan different ways we can accomplish hands-on skills training,” Miller says.

Courses in the BSC Energy programs begin every three to eight weeks year-round. To learn more about the degree and certificate programs, or to apply, visit bismarckstate.edu/energy. ■

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Game-changing flare measurement technology

Solving the flare gas EPA compliance challenge

By Scott Rouse, Sierra Instruments



A refinery at full capacity produces far more gas than it needs. It is not economical to capture it, clean it, compress it, store it, and finally transport it, so it is flared off. Stringent federal, state, and local laws govern the flaring process. As time has gone on, the laws have become stricter and with heavier fines for non-compliant companies.

The new EPA Petroleum Refinery Rule 40 CFR Part 63 rule, effective February 4, 2020, now requires oil & gas engineers to provide flow measurement data on 20 percent of reading at velocities from 0.1 to 1 ft/s and five percent of reading greater than 1 ft/s.

For plant engineers in the field, this is a very challenging application due to several factors:

- Very high turndown from 0.1 fps to 1000 fps during an emergency shutdown
- Constantly changing gas composition

- Very low pressure drop (five psig)
- Asymmetric flow profile, stratification, turbulence, pulsating flow (60-inch pipe header)

Multipath ultrasonic meters for flare gas measurement have been the traditional flow meter used to report flow data to the EPA. However, there are issues with ultrasonic meters for flare gas measurement that make it an unreliable choice to meet the new EPA 40 CFR Part 63 rule. First, most of the installed base of ultrasonic meters have been calibrated to 1 fps, so they can't meet the ultra-low flow requirements of this new regulation. Second, stratification causes reflection/refraction at the layer. Third, flow turbulence reduces signal strength so the reading is not reliable. Additionally, CO₂, H₂ attenuate the signal so ultrasonic meters cannot read to low flows in these gases. Finally, very low velocity is difficult for ultrasonic flow meters based on

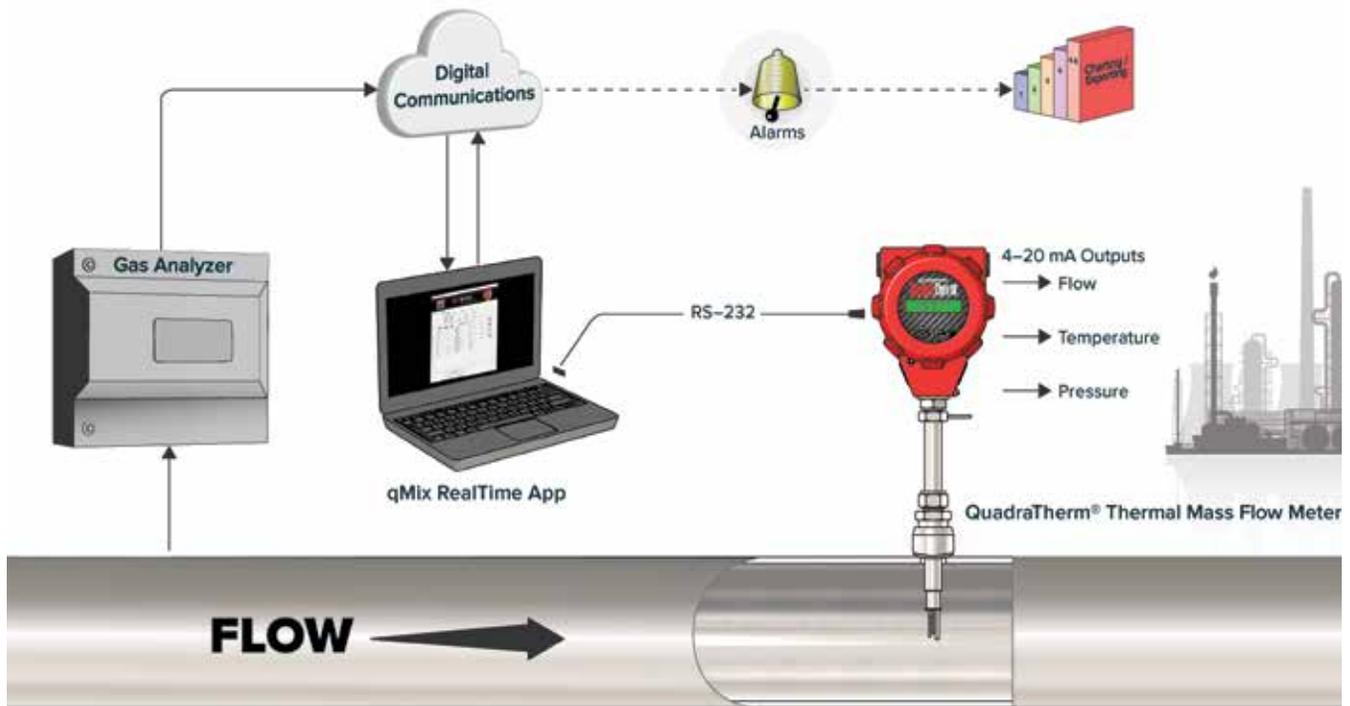
qMix RealTime FMS.

transit-time technology due to a small Delta T.

What plant engineers need is a flexibility solution to meet EPA regulations. QuadraTherm qMix RealTime Flare Measurement System (FMS) offers oil and gas engineers an ideal alternative to traditional ultrasonic flow meters to comply with the EPA's regulations for ultra-low flow measurement with changing gas compositions.

For the first time, a system based on thermal mass flow meters can adjust flow readings when flare gas composition changes within seconds to match real-time reading from a gas chromatograph-retaining accuracy without factory recalibration.

qMix RealTime FMS integrates with current infrastructure to meet the low end of EPA's CFR Part 63 for this challenging flare gas measurement application at a fraction of the cost. It accurately measures flow down to 0.1 fps and maintains accuracy even with changing gas composition — in real-time. Additionally, QuadraTherm qMix RealTime FMS provides a wide 1000:1 turndown to handle upset conditions at ultra-low flows with a high accuracy +/- 0.75 percent of reading through its four-sensor thermal sensor technology



and the on-board Raptor II operating system. It measures very-low pressure gas with variable temperatures with no pressure loss. Flare stacks generally have asymmetric and swirling flow. The 640i thermal mass flow meter has a Reynolds' number correction built in to smooth the flow profile.

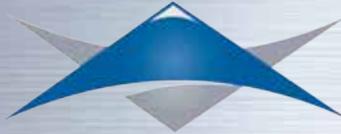
Another advantage of this new technology is it smoothly integrates with your current ultrasonic flow meters and gas analyzer. When the gas composition changes, the qMix RealTime App, loaded onto the supplied laptop, reads the outputs from your gas analyzer for updated flare gas composition, then creates a new gas composition that is automatically uploaded to the 640i/780i. With qMix RealTime FMS, oil & gas engineers can connect, read, and update new flare gas composition from a gas analyzer in real time with no recalibration need. Engineers will also be able to set update frequency by time or by the percentage change in the gas composition.

With this new technology, plant engineers now have the perfect solution to comply with EPA Refinery Sector Rule 40 CFR 63 rule which requires refineries to measure and report flare gas measurement at flow rates as low as 0.1

sfps (0.03 smps) where traditional multi-path ultrasonic flow meters can't operate.

Scott A. Rouse currently serves as director of product management TASI Gas Flow at Sierra Instruments, where he has

been employed for over a decade. Rouse obtained his bachelor's degree in Chemical Engineering from the University of Texas at Austin. He can be reached at s_rouse@sierrainstruments.com.



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COVID-19 and domestic violence

By Jeneen Klippel

Domestic abuse stems from power and control issues. Staying home together more often allows abusers the opportunity to exert more control over their partner.

In many places, stay-at-home orders have been lifted and cities are reopening. Even with these steps to normalcy, there is still an increase in outside stressors as a result of the pandemic.

Many schools are closed for in-person learning, people are isolated from family and friends, and enjoyable activities are being canceled. We have added restrictions on routine tasks, making them more inconvenient and, in some cases, not possible; leading to further disappointments.

Further, the loss of financial security, fear of catching the virus, and restless children at home not able to spend time with friends give an open opportunity for abusers to feel justified to take advantage of their partners. Blaming these added stressors caused by COVID-19, abusers may seek to gain more control and consequently, choose to become more violent with their intimate partners.

Even families that aren't experiencing domestic violence report feeling like they need some space from their loved ones. This feeling may be magnified in homes where abuse is present.

Domestic abuse stems from power and control issues. Staying home together more often allows abusers the opportunity to exert more control over their partner. Abusers use many strategies to take away the power from their victims and this pandemic is just one more tool in their tool box.

Every survivor's situation is different and their unique circumstances present singular challenges. These are some of the tactics that abusers are using to control their victims during this current health crisis:

- Abusers may not allow their victims to seek health care if they are feeling sick. They may withhold their access to a telephone, computer and health insurance information.

- Abusers may withhold access to the news or obtaining important updates and information on the virus.

- Abusers who are sharing custody of the children are using the scare of the spread of the virus as a tactic to keep the kids away from their partner.

- Victims who are allowed to work outside the home have stated they have been beaten because their abuser accused them of trying to infect them with the virus.

- Travel restrictions, coupled with abusers not giving victims access to money, may keep them from being able to carry out a safety plan. For immune-compromised victims, flying and public transportation may not be safe.

- Abusers may withhold necessary safety items such as disinfectant wipes, hand sanitizer and face masks.

The new ways abusers are choosing to hurt and control their victims through

Abusers use many strategies to take away the power from their victims and this pandemic is just one more tool in their tool box.



the Coronavirus outbreak have risen to shocking and unconscionable levels.

Some warning signs of domestic violence include physical and verbal abuse, threats, explosive angry outbursts and harming your pets. If this is happening to you or someone you know, create a safety plan, which includes gathering important papers (birth certificates, social security numbers, emergency phone numbers, bank

account and insurance information), finding a safe person to confide in and creating a code word to alert them that you need help immediately, putting together a to-go bag that has medications, clothing, and comfort items for you and your children, and considering legal options like obtaining restraining and no-contact orders.

Services supporting victims of domestic violence are more important now than

ever before. Gateway Domestic Violence Services is committed to being here every step of the way to walk all victims through their journey to safety. We are here for victims – they are not alone.

Jeneen Klippel is the director of development and public relations for Gateway Domestic Violence Services in Aurora, Colorado. She can be reached at jklippel@gatewaysheelter.org.



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High productivity while maintaining quality with RD-6 Coating System

By John Strong, NACE Senior Corrosion Technologist #24198, NACE CIP II #33324



Heated tent in cold environment coating applications.



Applying two-part epoxy in cold weather environment.



Application of Polyguard RD-6 with wrapster.

The transition from summer to fall brings many changes to the environment that we work in. For a coating applicator it means that temperature will be a determining factor in coating specification. As we move toward fall, lower temperatures will also mean increased cure times for liquid coatings and therefore productivity will be slowed. In some cases, this can affect the project completion date and any deadlines attached to the job. The curing of the standard two-part epoxy for buried field joints begins to slow or even stop at 50°F. As the weather begins to change, the coating specification should also change to incorporate different strategies to keep the same level of production for the applicators.

Polyguard Products RD-6 Coating System will maintain efficiency in cold weather applications while performing as an excellent non-shielding corrosion coating. Unlike epoxy coatings, RD-6 can be immediately backfilled following application due to it not having a cure

schedule. The same cold weather pre-heat methods used prior to the application of epoxy coatings to the surface are to be used when applying RD-6. At this point of the project, the level of productivity has not been affected. Once the desired pre-heat temperature is reached, application of the RD-6 coating system can begin. Application will begin with a thin coat of liquid adhesive followed by spiral wrapping the RD-6 to the surface. The total time involved with application of liquid adhesive and RD-6 will be in the range of two minutes to four minutes for a field joint weld on an eight-inch pipeline. This time range is given assuming applicators are properly trained and there are no unusual circumstances. The RD-6 will quickly bond to the heated surface and be permanently adhered. Following holiday detection, the coated surface is ready for backfill. If holiday detection for the weld takes approximately one minute, then most field joint welds are ready to backfill in under 10 minutes from beginning of application. In comparison, a single weld with an epoxy coating can

take upwards of 10 hours at 50°F to reach a cure that will be suitable to backfill over. In 10 hours, 120 field joint welds, or close to a mile of welds along a pipeline right-of-way can be coated with RD-6 and inspected.

If the scope of work for the winter coating project you are completing does not include alternative coating options for when the weather changes, then it should be modified. The RD-6 Coating System is an excellent option for applicators with a need to maintain efficiency and get backfill ready. Polyguard Products offers free in-person training to all applicators of RD-6. This service is performed worldwide and free of charge.

Further information on the benefits of cold weather application of RD-6 can be obtained at www.polyguardproducts.com/pipeline/ or by calling directly at (281) 580-5700. Polyguard Products is an employee-owned company and proud to make all pipeline products in the United States. ▀

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