Trenchless TECHNOLOGY®

SPECIAL REPORT
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TRENCHLESS NEW INSTALLATION COMES OF AGE

FROM THE EDITOR

BY MIKE KEZDI

UPGRADING SYSTEMS WITH NEW INSTALLATION METHODS

When it comes to getting new infrastructure underground, system owners — regardless of product type — are faced with determining how much disruption their customers will have to endure for this improved infrastructure. Trenchless new installation methodologies including auger boring, pipe ramming, microtunneling, horizontal directional drilling (HDD) and Direct Pipe, to name a few, can help reduce a project's impact on those living, working and playing near these important projects.

To help acquaint readers with some of these new installation technologies, how system owners are using these technologies and delve into what industry associations are doing to promote new installation methodologies, we've compiled this resource, "*Trenchless Technology* Special Report: New Installation Comes of Age."

I'd like to thank Akkerman Inc. and Elgin Separation Solutions, whose sponsorship made this report possible, as well as the National Utility Contractors Association (NUCA), Distribution Contractors Association (DCA), the Regional Municipality of Wood Buffalo and Williams for their contributions.

Looking beyond this report, if you're looking for more information on new installation trenchless methodologies, I encourage you to bookmark *trenchlesstechnology.com/category/applications/new-installation*. This is where you'll find all the new installation-focused content from *Trenchless Technology* and *Trenchless Technology Canada* magazines.

You can also find more new installation information — special reports, white papers and our annual HDD Guide by visiting *trenchlesstechnology.com/white-papers*. And to get all this information monthly to your mailbox or email inbox, head to *trenchlesstechnology.com/subscribe* to sign-up or renew your free subscription.

Closing Thoughts

Trenchless Technology is the go-to resource for the North American trenchless industry. We rely on our readers to make this possible. To that end, whether you are a distributor, contractor, engineer or manufacturer, my door (well in this case email inbox) is always open at *mkezdi@benjaminmedia.com*. Feel free to reach out to me with news and story ideas or other ways in which we can improve the magazine. If you prefer to call, my direct line is 330-752-1916.

Or, we can connect virtually whether it be Microsoft Teams, Google Meet or any of the other video conferencing applications. I am always available to chat about this growing, and ever-changing industry.

Cheers!

Mike Kezdi
Managing Editor

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PROMOTING TRENCHLESS FOR NEW INSTALLATIONS

Associations' Efforts Educate Members and Public

By Bradley Kramer

The use of trenchless technology for new installation projects provides several benefits related to cost, efficiency and environmental impact of underground infrastructure. Trade associations, including the Distribution Contractors Association (DCA) and the National Utility Contractors Association (NUCA), have made concerted efforts to promote the use of trenchless installation methods to their members and the public alike.

From the development of reference tools to community outreach initiatives, these groups provide the educations resources to ensure the benefits of such methods as horizontal directional drilling (HDD), auger boring, microtunneling, pipe jacking and many others are available to all. These benefits help support contractors seeking the best solution for a project, as well as members of the community impacted by the construction in their neighborhoods.

DCA has a dedicated Trenchless Committee to promote trenchless installation methods, but the association has also developed a microsite — *DCATrenchless.com* — dedicated to providing information on machinery, methodology and other various resources.

The primary goal of the DCA Trenchless Committee is to create awareness for both the home owner and the industry, according to committee co-chairs Dustin Kraft and Rob Hotz.

"Generally, we try to promote the use of trenchless technology through a few different resources," says Kraft, who is a regional manager at Vermeer. "We have the website and other literature that we've worked on to promote the overall benefits of trenchless compared to other installation methods, such as cost and the fact that yards aren't being torn out. We put factual information in the public space as a way to combat some of the fictitious information out there. We think the facts speak for themselves overall for how good trenchless is."

DCA members cross a broad spectrum of contractors and manufacturers that work in utility construction, Hotz adds, and the Trenchless Committee aims create a positive representation of the industry.

"The organization as a whole aims to support the membership and provide information on what the best solution is for both members and end users," says Hotz, who is vice president of Laney. "Trenchless is the most common methodology used by DCA members because it is far less disruptive to communities. How DCA promotes the use of trenchless goes into all of the initiatives we support, including workforce development, safety and our lobbying efforts. At the end of the day, we want to help member companies be more successful in what they do, which in turn helps the local distribution companies and the public."

The development of the *DCATrenchless.com* website started with a flyer, Kraft says. DCA members were struggling to combat a common misconception of HDD and hydraulic fracturing for oil and gas.

"We were hearing from contractors who said they were getting confusion from home owners. When they'd hear directional drilling, they immediately think of drilling down for oil and gas," Kraft says. "Obviously, they're not the same thing. We wanted to create a resource to show here's what HDD is used for and here are the materials we use. The idea was for the website to serve as a factual source of what is being done and how it's being done. We wanted to give more awareness to the general public for when they see a large machine in their front yard."

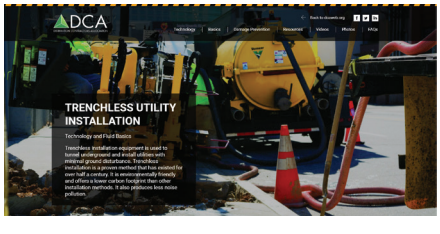
Hotz adds that the website not only helped clear up the confusion between HDD and hydraulic fracturing, but it also provided broader information about the different aspects of trenchless technology.

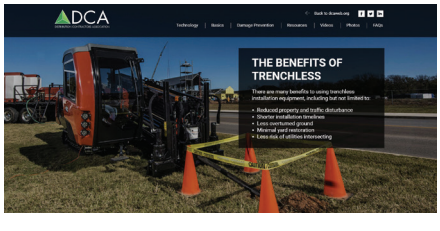
"The goal of DCATrenchless.com wasn't necessarily targeted at DCA members," Hotz says. "It was to serve as an educational resource for the general public that DCA members could refer customers to for them to get more information."

Like DCA, NUCA also has a Trenchless Committee, which is active in educational and lobbying efforts on behalf of its members, according to David Howell, who is division manager at Midwest Mole and the Trenchless Technology Committee chair for NUCA, as well the association's vice chair for the Central Region.

"NUCA represents all utility contractors, both open cut and trenchless," Howell says. "What NUCA does in regards to trenchless is it set up a dedicated committee. We have a large group that does focus on trenchless, and the committee helps us to be represented and bring forth our concerns and our needs as trenchless contractors."

NUCA's Trenchless Committee advocates to municipalities, private owners, engineers, universities and other groups about the benefits of trenchless installation, as well as the needs of contractors. Part of that advocation effort resulted in the development of a manual, NUCA's *Trenchless Construction and New Installation Methods,* the fifth edition of which was published in April 2022.





"We wanted to make sure that when we put the manual together that we were giving information from the contractors' perspective," Howell says. "We wanted to show what we can do, show what we need and explain how a project works with the technology we use as contractors."

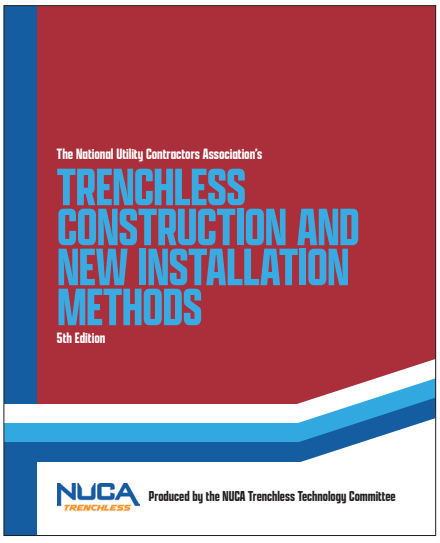
Originally published in the 1990s, the manual had not been updated since the early 2000s. While the fourth edition included trenchless rehabilitation, Howell says that the fifth edition focuses primarily on new installation.

"I just presented at the Louisiana Tech Trenchless Technology Center Auger Boring School," Howell says. "This was my third time presenting, but I've been involved for the past five years. NUCA always tries to be involved, but this year they gave out copies of new manual so they can take it forward. Even if they may or may not be a NUCA member, they gave out the manual to municipalities and engineers as a tool that they can use to help better understand trenchless construction."

Howell adds the NUCA Trenchless Committee aims to publish a separate manual dedicated to rehabilitation methods, as that sector has experienced a lot of change in the last 20 years. NUCA is also looking to develop a series of webinars for 2023 based on the manual, offering continuing education credits for those who attend.

"We're trying to get more contractors involved, and we're continuing to push to give contractors a voice," Howell says. "We have to put aside our differences and competition so that we can come together to push the industry forward. The last thing we all want is failed jobs, where they used the wrong methodology and it give industry a black eye. We want everyone to be able to do a quality job."

Another organization that provides resources and education about trenchless installation is the North American Society for Trenchless Technology (NASTT). In addition to organizing the annual No-Dig Show, the society frequently hosts short courses and publishes technical papers and books related to trenchless technology. The NASTT website (*nastt.org*) also features robust resources for those interested in learning more about trenchless installation methods.



With the Infrastructure Investment and Jobs Act (IIJA) providing trillions of dollars for infrastructure development, Howell says that trenchless methods will play a crucial role in future underground construction projects that take advantage of the federal funding available. He adds that it's important for contractors to understand the best methods available to them and to get involved with trade organizations to ensure their voices are heard.

"The biggest thing with various trade organizations is just being involved," Howell says. "It gives everyone a larger voice. With NUCA, it gives us more clout when we go talk to politicians. The more involvement we have from members to help support our thoughts and beliefs, the more we are able to get others to take us more seriously. It's not just about getting involved with fellow contractors, but getting involved with other disciplines, as well, such as engineers and municipalities, to get them to understand our needs, but it also helps us better understand their needs. Being involved in trade organizations is critical to better understand each other."

Bradley Kramer is a contributing staff editor for *Trenchless Technology*.

ROCKING IN PHOENIX – DROUGHT PIPELINE PROJECT

By Jason Holden

As we look ahead into 2023, Akkerman will be celebrating its 50th anniversary as one of North America's premier manufacturers of trenchless equipment. The first Akkerman TBM was developed in 1963 by Don (D.H.) Akkerman out of necessity to install road crossings safely and efficiently. For the next decade, D.H. continued to refine the pipe jacking process through his own contracting efforts. Industry demand for the equipment rose, and Akkerman Inc. was established as a trenchless equipment manufacturer in 1973 with Maynard Akkerman at the helm. Today, Akkerman offers multiple product lines for new trenchless installations including pipe jacking, slurry microtunneling, tunnel boring, guided boring, auger boring, and earth pressure balance equipment.

Akkerman TBMs were popularized by trenchless contractors for their

ability to direct install product pipe on line and grade in non-pressurized soil conditions. The new series of Akkerman TBMs can accommodate rock, while maximizing clearance through the bearing for removal of obstructions in soft ground like their predecessors. This TBM design was recently selected by Horizontal Boring LLC and outfitted with a rock disc cutterhead for the City of Phoenix's Drought Pipeline Project.

HWY SR-51 TRENCHLESS CROSSING

Horizontal Boring LLC recently completed the Hwy SR-51 crossing

SR-51 Launch shaft setup.

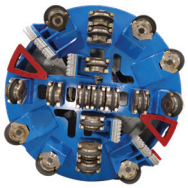
with an Akkerman WM720-II TBM. This crossing was part of the City of Phoenix's Drought Pipeline Project that will convey 60-MGD of treated water from the 24th Street Water Treatment Plant to the north Phoenix area. Serving more than 400,000 north Phoenix residents, the new pipelines will be used to alleviate the effects of drought by ensuring that water supplies from the Salt and Verde Rivers are available during future shortage on the Colorado River. The successful completion of the Hwy SR-51 crossing is an example of the versatility and cost savings this trenchless method offers municipalities seeking new installation solutions.

The 330-lf crossing of 86-in steel casing was originally designed to be constructed by either hand-mine operations or slurry microtunneling, due to the geotechnical report anticipating 15,000-psi rock including clasts up to 35,000-psi. Since no ground water was present in the formation, Horizontal Boring LLC selected an Akkerman TBM with a disc cutterhead designed for the alignment. This method would prove to be safer and more efficient than hand-mining, while more cost-effective than slurry microtunneling.

Pipe jacking is done from a launch shaft to a reception shaft with advancement provided by a hydraulic jacking frame located in the launch shaft. Excavation is controlled at the face by the operator as the TBM is advanced by thrust forces transmitted from the jacking frame through the product pipe. Excavated material is transferred into an electrically powered haul system that carries the material back to the launch shaft for removal. At the end of each section of pipe, a new section of pipe along with tunnel provisions are connected for continued advancement.

An Akkerman 5200 pipe jacking system was used in the launch shaft with 37.5-ft of rail. This configuration allowed Horizontal Boring LLC to setup and launch the TBM in one section and accommodate the 20-ft long pipe. The pump unit serves as the jacking frame and hydraulic power supply for the pipe jacking sequence and can accommodate TBMs ranging from 48-in. to over 100-in. OD with proper setup.

Each Akkerman TBM is shipped with a standard dirt bar and carbide bar cutterhead to suit ground conditions ranging from soft ground to weathered rock (UCS < 4000-psi). These standard cutterheads can be changed underground if necessary. Closed face cutterhead attachments that can mechanically control unstable ground conditions with hydraulically closeable doors require installation prior to the tunnel construction. Due to the rock conditions on the SR-51 crossing, a disc cutterhead was required to complete the alignment, and installed at the factory prior to shipping.



WM720-II Cutterhead – SR-51 Crossing

To efficiently fracture the breccia and schist rock formation, the cutterhead was designed with 11.5-in. single disc cutters as well as bolt-on carbide tipped scrapers to remove soil and other debris. For maximize disc cutter life, the overall thrust applied was monitored and regulated through the load applied to the articulation joint of the TBM. Removable grizzly bars enabled the operator to adjust the cutterhead opening ratio (COR) or allowed access the face for potential obstruction removal. Since no pressurized ground conditions were exhibited in the geotechnical report, closed mode tunneling or costly compressed air interventions, would not be required on the SR-51 crossing.

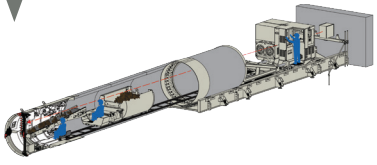
Tunnel guidance is provided by a simplified laser-to-target system. The TBM operator assesses the position of the tunnel laser at the cutterhead every 10-14 inches of advancement. Based on the position of the laser, the operator makes steering adjustments with the three-point steering system to maintain the desired line and grade. While enhanced guidance systems can be added to Akkerman TBMs to meet engineering specifications such as electronic data logging or remote monitor-

Akkerman TBM at the reception shaft. Hwy SR-51 Crossing.

ing, the conventional laser-to-target guidance system has been proven for decades, and effective at distances exceeding 1,000 ft.

In order to maintain efficient pipe jacking operations in the hard ground conditions displayed on the SR-51 crossing, the overcut was designed to 1-in. (per radius). This design provides clearance on the annulus of the pipe to maintain low thrust forces while allowing steering corrections along the alignment in hard ground conditions. If the overcut diameter is too small in hard ground, the tolerances of steel casing will stack-up, causing high jacking loads along the pipe string where steering corrections are required to maintain line and grade. This can potentially lead to sudden spikes in jacking forces, pipe failure, or a seized tunnel.

General Layout – TBM Pipe Jacking



Bentonite injection was used to fill the annulus between the steel casing and rock to support the pipe jacking process. Lubrication is critical in all trenchless pipe jacking methods, as the proper engineered mix maintains the annulus, reduces risk of settlement, and lowers overall thrust requirement of the installation. The proper lubrication mix should always be engineered based on the actual ground conditions and adjusted accordingly if ground conditions change along the alignment. A distinct advantage to conventional pipe jacking is that the operator can monitor the interaction of the cutterhead, so changes in ground conditions are evident in real time.

The overcut and bentonite proved to be an important factor as Horizontal Boring LLC was required to stop tunneling for approximately 60-days, awaiting the completion of the settlement monitoring system along the crossing's right-of-way. With the TBM advanced nearly 50-ft into the alignment, crews monitored the shafts for the risk of flooding as Arizona was inundated by early season rain events. Once green lighted to commence operating again, Horizontal Boring LLC experienced a break-out jacking force of around 350-ton but dropped to around 100-ton after pipe advancement and additional bentonite injection.

Horizontal Boring LLC achieved around 15 to 20 ft of 86-in. OD steel casing per shift. A second shift was deployed to set and weld the 20-ft sections of steel casing in the launch shaft which can often require 8 hours to complete.

Akkerman Inc. is proud to have been a part of the infrastructure solution that is essential to the economic health and vitality of Phoenix and wants to congratulate Horizontal Boring LLC, The City of Phoenix, and all others involved in the Phoenix Drought Pipeline Project.

Jason Holden is the vice president, chief revenue officer for trenchless equipment manufacturer Akkerman in Brownsdale, Minnesota.

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THE APPLICATION OF WASTE SOLIDS MANAGEMENT VERTICAL CUTTINGS DRYERS AS AN INTEGRAL ELEMENT OF A SUCCESSFUL SOLIDS CONTROL SYSTEM

By Michael Rai Anderson / President (Elgin Separation Solutions)

Figure 1: CSI-D4™ Vertical Cuttings Dryer

Today's trenchless drilling contractors are continuing to set new standards by drilling larger diameter bores, faster rates of penetration, and longer lengths. As such, the trenchless industry has seen a substantial increase in the volume of waste solids and liquids being generated from the solids control system. There has never been a more critical time to manage drilling fluid and the associated wastes as an integral and inherently inseparable element of an effective solids control system. This is especially the case, when a properly deployed Vertical Cuttings Dryer ("VCD"), can significantly reduce waste disposal costs, dramatically lower whole mud loses within those wastes, and improve the overall quality of the drilling fluid by allowing the shale shakers and centrifuges to be used at their full operating potential. All of this can be done for about the same investment as a typical small-bowl decanter centrifuge system.

The most common solids control equipment being utilized by drilling contractors is known as a packaged mud recycling

system. These systems are an all-in-one unit equipped with a linear motion shaker, hydrocyclone desilter/desander manifold, dedicated centrifugal pumps, and centrate fluid processing tank. Designed to process the used drilling fluid and remove solids down to 30 microns for recirculation back to the active rig. The discharged solids from the packaged system typically have a moisture content as high as 25%. Disposal costs of the waste cuttings is high as the waste solids requires more trucks for disposal and increased land fill charges due to the nature of the moisture content. In addition to high disposal costs, the drilling fluid being lost means operators have to make down more fluid to complete the project. By deploying a vertical cuttings dryer into operation, waste cuttings moisture can be reduced down to 2.5%, in most cases, recovering thousands of gallons of drilling fluid. Disposal costs are greatly reduced as fewer trucks are needed for disposal and dryer solids equates to lower landfill costs.

APPLICATIONS OF VCDS

Common scalping shaker cuttings can maintain a Water-On-Cuttings ("WOC") moisture content as high as 25%. As such, and on a conservative basis, an average well will lose approximately 5 gallons a minute of drilling fluid with the discarded shaker cuttings. Over a 10-hour day, this would equate to 3,000 gallons (71 barrels).

VCDs are designed to recover the drilling fluids that are found on the drill cuttings discarded from the scalping shaker. The intent is to have the VCDs installed in a manner that the shaker cuttings are immediately injected to a VCD to recover the lost drilling fluids. The lower the cuttings "age" (i.e. the amount of time by which the formation solids have been exposed to drilling fluid), the higher the performance that can be achieved by the VCD.

Decanter centrifuges and VCDs share a number of similarities. However, their objectives are quite different. Centrifuges are deployed in order to "cut" waste solids from the liquid stream. We typically consider the cut to be the "underflow" (a.k.a. "solids discharge" or "cake") and the cleaned liquid stream (a.k.a. "centrate") to be the "overflow".

Conversely, VCDs are deployed to "cut" (i.e. recover) the valuable drilling fluid from the waste solids. For VCDs, the cut drilling fluids are considered the valuable centrate (a.k.a. "filtrate") and the waste solids are considered the underflow (a.k.a. "solids discharge"). Similar to decanter centrifuges, the centrate will contain most of the liquid and the finer solids. The solids discharge will contain limited liquid and the coarser solids. Like decanter centrifuges, the goal of a VCD is to have the solids discharge as dry as possible. Ultimately, the dryer the solids, the more effective the drilling fluid recovery.

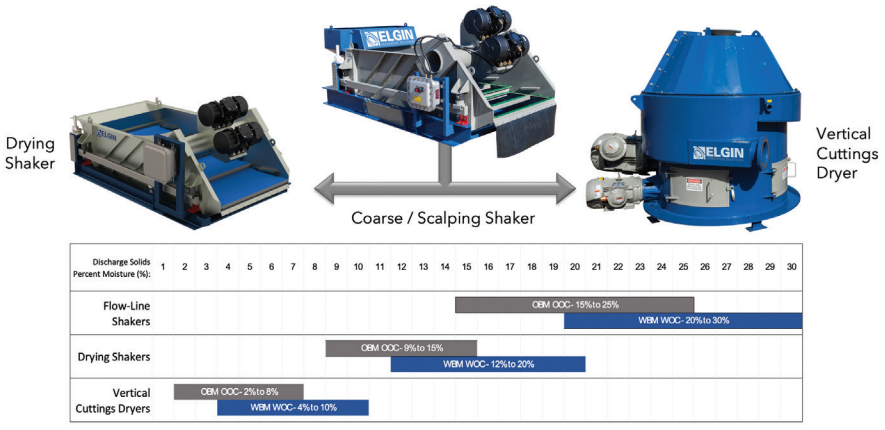

Figure 2: Vertical Cuttings Dryer Basics

Given the fact that the cuttings discharge from the scalping shaker are surface wetted, it will maintain the full range of solids, from colloidal to coarse. As such, when the cuttings are subjected to the VCD, approximately 90% of the surface wetting drilling fluid will be recovered from the cuttings via centrifugal force. It is not uncommon for VCDs to be able to reduce the OOC / WOC content from 25% by weight to 2.5% by weight. In doing so, the centrate slurry will maintain a high volume of "fines" that must be further treated by a dedicated high-speed decanter centrifuge prior to reintroduction to the active mud system.

VCD APPLICATION CHALLENGES

At present, only a handful of trenchless drilling contractors take advantage of VCD technology. Given the immediate return on investment achieved through the successful deployment of VCDs, the fact that VCD technology has not become a standard practice on all drilling rigs, is the direct result of four factors:

1. The WBM Challenge - Up until 2014, VCD technology was not well adapted for water-based drilling fluids. However, new proprietary screen media technologies have been developed that allow VCDs to operate in both WBM and OBM environments.

2. The Myth of The Colloidal Solids Monster - A great deal of unfounded historical stigma had been perpetuated relative to the development of colloidal solids via the use of VCD technology. Historically, there was potential foundation for this theory, as older VCD systems operated with a "cake-wall" in which a multitude of flites would carve away at the solids as they accumulated on the interior screen surface. However, the modern systems do not operate through the use of a cake-wall. Instead, the flites maintain a tight tolerance to the screen interface, which sweeps the solids from the screen with each pass.

3. VCDs are too Expensive to Deploy - Due to the higher capital cost, deployment of less expensive drying shakers is preferred. In reality, the operating cost of a vertical cuttings dryer is dramatically less than a drying shaker as the screen media on the VCD are less fragile and have a longer lifespan than the screens on a drying shaker which require constant replacement.

VCDs Generate Water-Based Value

Given the effectiveness to dewater water-based slurries, the ability to mitigate make-up costs and disposal costs has allowed VCDs to finally provide an equitable return on investment in water-based slurries.

VCD Concentrate, Not Generate, Fines

The ability for the VCD to utilize cake wall filtration and a low differential speed mitigates the effects associated with rotating flites grinding away at the accumulated cuttings.

Figure 3: VCD Advantages

4. Lack of Education – Despite a deployment history that dates back more than 20 years and the fact that more than 1/4 of the world's rigs in the oil & gas industry are already successfully utilizing VCD technology, there has not been a great deal of formal education presented to the market for adoption into the trenchless industry.

CONCLUSION

The most cost effective, field proven and efficient means of deploying highly effective waste management at the rig site is through the deployment of Vertical Cuttings Dryer's ("VCDs"). It is important to keep in mind that the common shaker cuttings discharge may maintain a Water-On-Cuttings ("WOC") moisture content as high as 25%. As such, the average well will lose approximately 5 gallons a minute of drilling fluid with the discarded flow-line shaker cuttings. Over a 10-hour day, this would equate to 3,000 gallons (71 barrels). If the make-up cost of this drilling fluid were just $50 per barrel, more than $3,500 of drilling fluid are lost per day. A VCD operating at a 90% recovery rate will return $3,200 (64 barrels) worth of this drilling fluid back to the active mud system. If there were only 10 drilling days per month, a drilling contractor could pay for an entire VCD system (i.e. Dryer package, telescoping stand, control panel, cuttings feed system, and cuttings collection system) in less than one year.

However, the recovered drilling fluid savings are just one component of the big picture. By recovering 64 barrels per day of drilling fluids, the waste disposal volumes are reduced by as much as 27,000 pounds (Assuming the drilling fluid maintains a weight of 10 ppg). In many cases, this means one less truck load and one less landfill disposal fee per day, further increasing the potential daily savings. Not to mention the fact that this presents a smaller environmental footprint. Even if the wastes are being submitted for further treatment (i.e. thermal desorption), the significantly dryer material will dramatically lower the energy consumption and therefore the costs required for further processing.

More importantly, when properly integrated with a solids control system, VCD technology will allow shale shakers to be fitted with finer screens, therefore lowering the volume of drilled solids from entering the active mud system. This ultimately places less stress on the centrifuge system, improving their performance. The combined effect of improved shaker and centrifuge performance ultimately results in higher drilling fluid quality. This improves the drilling rates of penetration and reduces the damaging effects of accelerated wear on bits, mud pumps, and related equipment. In essence, when properly used, VCDs can help improve the performance of the solids control system, enhancing the drilling fluid properties, thereby improving rig performance (i.e. increased rates of penetration, improved cake wall stability, reduced bit torque and reduce pipe drag).

Michael Rai Anderson is the president of Elgin Separation Solutions.

Figure 4: VCD Advantages

VCDs Recover All Free Moisture

VCDs can be expected to remove 100% of the free moisture, 99% of the surface wetted moisture and 50% of the interstitial moisture.

VCDs Sufficiently Clean Cuttings

When deployed properly, VCDs will allow for disposal of cuttings in non-lined landfills as cap material. This opens up disposal site options and the disposal cost per ton.

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SEEING THE BENEFITS OF TRENCHLESS INSTALLATIONS

Though Their Infrastructure Differs, Oil & Gas and Water/Sewer System Owners Look to Less Invasive Construction Methods

By Mike Kezdi

When looking at the installation of new underground infrastructure no matter the product type it's important to consider many factors. One of those being how will the new infrastructure be installed.

While there is a myriad of installation methods, ultimately, they can be broken into two categories — open cut construction and trenchless construction methods. To get an idea of how system owners are using trenchless new installation methods, we reached out to a pair of system owners — one on the munipcal side the other coming from an oil and gas energy transportation perspective.

On the municipal side is the Regional Municipality of Wood Buffalo (RMWB), in northeastern Alberta, Canada. The Fort McMurray Urban Area is the hub of

the region and the heart of Canada's oil production. And because of the Region's oil production growth in the early 2000s, the RMWB saw major population gains in the last two decades. This has meant that the RMWB has worked aggressively to improve its existing aging infrastructure — some of which dates to the 1960s — and add new infrastructure to address the growth.

On the oil and gas infrastructure side we have Tulsa, Oklahoma-based Williams, a leading energy infrastructure company that gathers, processes and transports natural gas. Its operations are concentrated in the Pacific Northwest, Rocky Mountains, Gulf Coast and Eastern Seaboard. Williams owns and operates more than 30,000 miles of pipelines system wide — including Transco, the United States' largest volume and fastest growing pipeline — and handles approximately 30 percent of the natural gas in the United States.

Responding for this article are:

Webb Winston, P.E., Principal Engineer, Engineering Services, Williams

Mas Ross, P.Eng., Project Manager, Engineering Department, Regional Municipality of Wood Buffalo

What are the main problems you are facing with your system?

ROSS: Typical issues that we see with our underground systems include aging infrastructure within our residential and commercial areas, undersized and overwhelmed sewer pipes during high intensity rainfall events; this is true for both sanitary and storm applications; undersized water distribution systems which have resulted in fire flow deficiencies in select areas, and pressure related issues when there are large differences in elevation across the pressure zone. As an organization, we have programs in place to progressively address these issues and deficiencies by way of our Rural Infrastructure Rehabilitation Program (RIRP) and Urban Infrastructure Rehabilitation Program (UIRP). We conduct regular asset assessments under these programs which then helps us to plan out these rehabilitation programs depending on the nature and severity of the issues identified.

WINSTON: Today, one of the main challenges on our system is the need to expand our system and increase capacity. Williams is committed to leveraging

our natural gas-focused business to reduce emissions and build a clean energy economy. Today, there are around 60 coal power plants along the Transco footprint alone and converting these coal plants to natural gas would reduce over 344 million metric tons of CO2 emissions, or the equivalent of removing 75 million cars from the road every year.

What specific trenchless technologies do you use? Which ones work best?

ROSS: The RMWB uses a wide variety of trenchless technologies across their capital projects. Technologies that I am aware of being used include horizontal directional drilling (HDD), auger boring, Direct Pipe, microtunneling and pilot tube guided boring just to name a few. Each technology has its respective pros and cons, as well as respective applications. I wouldn't really say that there is any one size fits all trenchless solution to address problems that owners today have. I suggest that owners always work with professionals who are experienced and knowledgeable in the trenchless field, as a lot of the trenchless methods that have been developed today rely heavily on the experiences which the trenchless professionals have gained over the year.

WINSTON: Most of our pipeline systems are high-pressure steel pipelines so HDD is one of the most common trenchless methods that we use. However, we also use other trenchless methods like horizontal auger boring and Direct Pipe depending on the site-specific conditions.

How has your use of trenchless technologies changed over the last few years?

WINSTON: Trenchless technologies continue to be a vital part of our pipeline construction projects. As new trenchless technologies are developed and the existing technologies continue to improve, it really helps us in reducing environmental impacts at sensitive and challenging crossings. We are excited and hopeful that the trenchless industry will continue to innovate and find better ways to help us execute crossings while reducing our environmental impacts.

ROSS: Where we have been installing new, large-diameter, trunk sewers to meet our infrastructure needs, we have

begun to adopt more accurate guided boring methodologies such as microtunneling and pilot tube guided boring. We rely heavily on our professional consultant's expertise when selecting the most appropriate trenchless technology to meet our infrastructure installation and rehabilitation needs. HDD methods are still frequently used, however, for our region, HDD is typically used for pressure-based applications such as water distribution, water trunks and sanitary sewer force mains. Very seldom have I seen HDD used for gravity applications unless the proposed grades are steep.

What have you learned from your experience?

ROSS: During my experience with the various trenchless technologies used across our region, I have developed an understanding of the various technologies and their applicable uses. I would say that the two most vastly used trenchless method in our region has been HDD to install new pressure sanitary systems and auger boring to install casing pipes which later are used to house the product or carrier pipe. Understanding the technical shortcomings of the two technologies has allowed me to contribute during design reviews to help ensure that the most appropriate and technically feasible technology is being used.

WINSTON: I have learned that it takes many different stakeholders in the trenchless industry for us to be successful. These include engineering consultants, contractors, environmental permitting personnel, equipment providers, academics, and government agencies, to name a few. I have learned that there are so many talented people in this industry, and when we all pull together for a common goal, we continue to make impressive strides in improving our execution.

What advice would you give to a municipality or utility looking at trenchless technologies for installing new infrastructure?

WINSTON: To understand that trenchless technologies is a toolbox that consists of multiple different trenchless methods that have pros and cons in varying situations. I think it is imperative to understand the different methods and make informed decisions on which methods should be used in different areas. If there are gaps that exist in the industry, where we have situations that we don't have trenchless methods that are effective, let's have discussions in the trenchless industry to drive innovation and develop new methods to help improve our overall execution.

ROSS: First, I would suggest that municipalities and utility owners familiarize themselves with the countless trenchless technologies available before selecting a preferred trenchless method. They should strive to gain an understanding of each respective technology's recommended use before picking any one technology to address their problem so that they can ensure that the most appropriate technology is being used. While means and methods of execution typically fall onto the contractor to decide how they intend to successfully execute the trenchless work, I have found it beneficial as a representative of a municipality to specify the intended trenchless methods to provide better clarity and ensure equal opportunity and fairness with respect to pricing received from the prospective bidders.

Second, I strongly recommend working with a professional consultant that specializes in the design and construction of trenchless methods when looking at using trenchless means for installations. Trenchless technologies are as much an art as they are a science, so partnering with a professional that is highly experienced with trenchless works and are deemed experts in their field will help mitigate future budgetary issues as well as potential claims from contractors during the execution stage of the project.

Lastly, always consider your project timelines and endeavor to plan project works well in advance of the required completion dates. With today's workforce shortage, supply chain issues and contractor resources already committed on other projects, I have noted that larger diameter pipelines and more specialized trenchless technologies are experiencing long lead times and are sometimes unable to meet project timelines. Municipalities and utility owners should consider working with their supply chain representatives to share information with prospective bidders in advance of any official market posting by way of a Notice of Planned Procurement posting. This will help inform the bidders and trenchless experts of the upcoming works and allow them to plan and schedule their resources before the official market posting becomes available.

Any final thoughts?

WINSTON: It is very rewarding to work with so many talented and dedicated people in the trenchless industry. I'm excited about the future of the industry and excited about continuing to work with the dedicated individuals to develop meaningful solutions to the challenges and problems that we face.

ROSS: Trenchless technologies in construction allows municipalities to construct and repair critical pieces of infrastructure while having far less impacts on residents than traditional open cut methodologies. Whenever possible, it's always worthwhile to discuss trenchless options with the industry experts to really understand what benefits your projects can get from utilizing trenchless methods.

It has been a goal of mine recently to better understand the different trenchless technologies available in the industry so that I can be a better project manager and municipal engineer. Having a better understanding of the applicable applications, pipe materials that can be used amongst the different methods, and general limitations of each methodology would help any engineer and project manager when deciding whether a trenchless technology may be right for your project.

Mike Kezdi is managing editor of *Trenchless Technology*.

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