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INSTALLER PROFILE:

We Need a Laser Focus By David Steinkraus

ON THE COVER:

A workload of 50 percent onsite installations and 50 percent installations of components for community and municipal wastewater systems has been the key to success for NISS (North Iowa Septic Systems) Excavation. The NISS Excavation crew (from left) includes Scott Chapin, Noah Sanders, Corey Nichols and Colby Nichols, shown on a work site with a Case TR270 skid loader with a Stout Skeleton rock bucket. (Photo by Mark Hirsch)

Editor's Notebook:

The Good, the Bad and the Ugly of Wastewater News From a dubious choice for a septic tank to a clueless public official, it's time to share some onsite industry tidbits. By Jim Kneiszel

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Enjoy this issue!

Established in 2004, Onsite Installer[™] fosters higher professionalism and profitability for those who design and install septic systems and other onsite wastewater treatment systems.



The Good, the Bad and the Ugly of Wastewater News

From a dubious choice for a septic tank to a clueless public official, it's time to share some onsite industry tidbits

ith hundreds of emails received every week, constant Google alerts, social media and other direct contact with folks in the industry, I compile a barrage of wastewater news tidbits on my computer desktop. The web of information grows at an ever-faster pace, creating a long list of items I'd like to share with you.

Every now and then, I'll use this space to talk about a few of the positive, the outrageous and the unusual stories I save related to the world of onsite installers. I hope you find these dispatches thought-provoking or at least a little entertaining. As always, I invite your response. If you have a comment, write to me at editor@onsiteinstaller.com. I'd be glad to share your thoughts on any onsite-related topic right here in the magazine.

Read on.

The onsite industry message is sinking in.

A recent report titled 5 Things You Need to Know When Representing Rural Buyers, from Inman, a website dedicated to educating real estate agents working in the luxury housing market, listed "septic components and maintenance" as the No. 2 topic to review with clients. Writer Maria Dampman advises real estate professionals about the importance of discussing onsite system maintenance and the potential cost of repairs.

"A thorough inspection of the system is a necessity, and it should include pumping the tank, excavation and inspection of the distribution box, and sometimes even running a small camera down the lines to check for obstruction or damage," she writes. "Also, you should know where to find records to make sure the system is able to handle the number of household occupants."

In the past, I have accused some Realtors of turning a blind eye to septic system inspections because issues they turn up can complicate home sales. It's only fair to point out when real estate agents recognize the importance of time-of-sale inspections.

What were the other four things to review with rural homebuyers? Well system and water safety; covenants and restrictions; land use, conservation and tax benefits; and specific-use needs (Is the property suitable for the buyer's lifestyle, hobbies, etc.?).

Generous assistance for new systems.

Towns on New York's Long Island have announced some generous grant programs to cover the cost of replacement onsite systems in an effort to clean up watersheds. For example, a Southampton town rebate program raises grant money limits from \$10,000 to \$15,000 to pay for nitrogenreduction systems now being required in Suffolk County.

The income limits for participating in this program are higher than I've ever seen, and I would describe them as "eyebrow-raising." As reported at www.newsday.com, a property owner with \$300,000 or less in annual income qualifies for 100 percent of installation costs, up to \$15,000. A property owner making up to \$500,000 qualifies for 50 percent of the cost of a new system. On top of the grants supported by the town's Community Preservation Fund, Southampton residents can apply for another \$11,000 grant from Suffolk County. Added together, homeowners can receive up to \$26,000 toward a new system.

"(Onsite system grants are) a heck of

a deal. If this existed for automobiles, it would mean you'd get reimbursement for inspecting your car and then you get a reimbursement for repairing it, too." Greg Wichelns

I've heard of low-income assistance before, but not high-income assistance like this.

Virginia's Culpeper Soil and Water Conservation District has significantly raised its reimbursement rates for residents who maintain their onsite system. The assistance has nearly doubled in several categories: \$240 for pumpouts, \$4,000 for system repairs, \$6,400 for full systems and up to \$19,200 for alternative engineered systems.

The payments to private property owners prompted the district's manager, Greg Wichelns, to share an analogy to convince homeowners to take part: "This is a heck of a deal. If this existed for automobiles, it would mean you'd get reimbursement for inspecting your car and then you get a reimbursement for repairing it, too," he said in a report in www.dailyprogress.com.

Two questions come to mind for installers trying to forecast the demand for their services over the next few years: Will this trend continue across the country? And if it does, where are they going to find enough new workers to join their crews?

She said what?

My award for the Ignorant Public Official of the Month goes to Melinda Lautner, chairwoman of the Leelanau County, Michigan, board of commissioners. In opposition to an onsite system inspection ordinance for the county, Lautner had this to say during a board meeting (as reported at www.record-eagle.com):

"A great majority of our county, the septic systems sit in well-drained

soils. When those systems fail, it doesn't go down to our groundwater, it actually will rise up and that person will have a beautiful patch of green grass on their lawn."

Nothing like trying to put a positive spin on foul-smelling and bacteria-laden puddles that could sicken a homeowner's children, pets and cause harm for the neighborhood. This is one public servant who needs to do her homework on the consequences of ignoring failing onsite systems. She should be listening to her fellow commissioners, Ty Wessell and Patricia Soutas-Little, who pushed to form a committee to study the need for inspections, which are required at the time of sale in surrounding communities.

"We inspect electrical, we inspect housing, why don't we inspect septic systems? ... We have a responsibility to do whatever it is to keep our human waste out of our waters," Wessell told the group. He said an inspection ordinance in another county reduced the septic system failure rate from 15 percent to 9 percent after it was enacted in 1990.

Holy Fahrvergnügen!

What's the strangest septic tank you've encountered during an onsite inspection? For Richard Umlauf owner of R-N-R Backhoe & Complete Septic in Edwards, Missouri, it was an old Volkswagen. Umlauf told the *Benton County Enterprise* that the buried Bug had an inlet pipe coming in the rear window and an outlet to the drainfield going through the windshield.

"It used to be that a lot of weekenders to the area had cabins around lakes, and they put in anything they could find to act as a holding tank for sewage," Umlauf told the newspaper. "We've seen water heaters, an ice box and the basement of a house that burned down used as septic tanks. And when people can't get plumbing supplies to repair a system during a weekend visit, they sometimes use radiator hoses as lateral lines."

Installers never know what they'll find underground because the ordinance regulating installs wasn't in place before 1991, explained Barry Pabst, the environmental public health specialist for the county. "My job is to ensure the new systems being installed and old systems being replaced meet minimum requirements of the state and county," he said. The informative article recommended homeowners pump their tanks every three to five years, but Umlauf suggested every two years is a safer bet for many families.

.....

Send your comments, questions or opinions to Jim Kneiszel at editor@onsiteinstaller.com.





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Equipment Rundown

This month's cover features North Iowa Septic Solutions, and an exclusive online story gives the rundown of the owners' favorite and trusted equipment that helps make them successful at the wide variety of projects the company takes on onsiteinstaller.com/featured

Overheard Online

"If you don't ask good questions, you'll keep repeating this process over and over because you won't be hiring people who are truly a good fit for your company."

> - Smart Employers Ask These Interview Questions onsiteinstaller.com/featured



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INSTALLER PROFILE

WE NEED A LASER FOCUS

Iowa business partners sell off portable restrooms and give away inspection work to concentrate on a profitable installing niche By David Steinkraus

espite only having a few years of construction-related experience between them, Dain Mann and Corey Nichols decided to join forces and form NISS (North Iowa Septic Solutions) Excavation back in 2006. They were driven by a common goal (one that motivates many entrepreneurs in the wastewater industry): a burning desire to work for themselves.

At first, the pair — Mann, now 37, and Nichols, 36 — chose to broaden their path to profitability, looking to add many revenue streams associated with small wastewater businesses in rural areas like their Mason City, Iowa. They performed excavation, system installation, onsite inspections and portable sanitation, among other things. A decade later, they've honed in on a few specialties as a way to more efficiently build the business.

CREATE A SHARPER FOCUS

Focus didn't happen overnight, nor did it happen by accident. It has meant consciously giving up business along the way. For example, until recently, NISS Excavation did time-of-sale inspections on residential wastewater systems. But even such a logical diversification wasn't the best position for their business, says Mann.

"If you show up and you're both the inspector and installer, maybe 20 or 30 percent of the time the client suspects you're favoring yourself and trying to sell additional services that aren't necessary. From a business standpoint it's a lot more profitable for us to do just one thing instead of trying to be the entity that does everything," Mann says.

"All we're doing now is uncovering a system for the guy who inspects it," Nichols adds. "That's also why we sold the portable restroom business. For us, there's more profit in being very good at one thing."

Letting go of business still helps their business. The guy who bought the NISS Excavation pump truck also acquired a license to do time-of-sale inspections. Mann and Nichols now refer business to him, and he does the same. He also owns a jetter, and when NISS Excavation needs a pipe cleaned out, they know whom to call.

This focus has brought them to a 50-50 business: 50 percent onsite installations and 50 percent installations of components for community and

municipal wastewater systems.

"The community work comes and goes. In 2015, we installed pipes and tanks for a community system in Woden, Iowa, but in 2016, we didn't do any of that work," Mann says.

Yet, they have been pushing to expand the share of business from work that serves multiple homes.

"Single onsite systems are easy: You drive out into the country and get them when you can. The law requiring a time-of-sale inspection changed the market for single-system work. Previously, people updated onsite systems because a long time had elapsed and it was the right thing to do," Nichols says. The inspection rule is causing people to look further into the future. They

delay work as long as possible because of the inspection cost and fear that a system will not pass inspection, or they work out a property transfer within a family so an inspection and system update are not necessary.

AdvanTex (Orenco Systems) is the main system they use, Mann says. They've used ATUs on small parcels of hunting property and developments built on marshes.

Monitoring advanced systems for individual property owners in rural Iowa is challenging, Mann says. It's difficult to charge a single homeowner for a 100-mile round-trip service call generated by a false alarm. However, it's easier to justify a service call to a community system because the cost is spread over many property owners.

On the municipal end, they install sewer mains, perform pipe rehabilitation, replace manholes and do spot repairs.



Crew member Noah Sanders sets up a Spectra Precision/ Trimble laser level during an install job in Clear Lake, Iowa. (Photos by Mark Hirsch)

CHANGING EMPHASIS

NISS Excavation began as strictly an excavating company. Mann had worked a few different jobs, but that included time in a plumbing company. Nichols had about 18 months' experience in excavating.

In 2007, they bought a company that provided portable restrooms and pumping services. But their decision to focus on onsite work led them to sell the restroom business in 2013 as well as the septic service truck and its associated business in 2015.

In 2013, they began pursuing community systems and municipal work more aggressively. They did one project replacing water mains in Clear Lake, Iowa, and then they did a few similar projects. They made it work by contacting engineering firms to learn about projects coming up. And, of course, this required a capital investment to acquire larger equipment.

North Iowa

Septic Solutions

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Location:	Mason City, Iowa
Owners:	Dain Mann and Corey Nichols
Founded:	2006
Employees:	10
Services:	Onsite system installation, small community systems, municipal sewer work
Associations:	Iowa Onsite Waste Water Association
Website:	www.nissexc.com

>> Scott Chapin lays out ADS 34-inch by 5-foot low profile septic chambers from Advanced Drainage Systems for a residential septic system.

Scott Chapin, left, and Noah Sanders level pipe during an install job.



"In a way, it's not difficult to get to this point. You do what you say you're going to do. Don't tell the customer you'll dig a stump and then leave without doing it."

Dain Mann

A Case CX160 excavator joined their smaller equipment, a Yanmar ViO75 excavator and Case 410 skid-steer loader.

Each year, they try to do two or three larger projects. It took forever to win those first five large projects, but over a decade, sales have never showed anything but a steady rise, Mann says.

"I don't know why we don't use Facebook, but we don't," Nichols says. When they had the portable restroom company, they spent thousands on advertising. Now, they depend on referrals.

"North Iowa is a small community. We get calls from people who heard about our work from another customer and want us to work for them," Mann explains. "In a way, it's not difficult to get to this point. You do what you say you're going to do. Don't tell the customer you'll dig a stump and then leave without doing it because the customer will remember that you didn't follow through."

They redesigned the website recently and are happy with its look and their new logo. What doesn't quite fit is the company name.

"We kind of think of it as North Iowa Site Solutions because we take care of anything your site might need from draining to excavating. If you don't shy away from hard jobs and those that may put you at a bit of risk, people get to know you. Now, the big general contractors are reaching out to us," Mann says.

Smaller communities, for example, may not have the expertise to work down in trenches. So NISS Excavation will go out with an excavator and a trench box and do that part of a job while municipal employees handle the rest.

TEAMWORK COUNTS

Keeping the company strong and profitable means keeping a good crew together. Technicians receive a uniform allowance and a food allowance. Supervisors have health insurance, and all employees receive five days of leave per year.

"When you work in a seasonal business, it's like going out on a boat in the ocean. There's nothing to do but work, but we don't work Saturday and Sunday. That's something we pride ourselves on," Mann says.

Mann or Nichols may come in on a weekend to dig a basement or do some demolition, and one of the guys may come in to help, but they don't have to. When Mann and Nichols started the business, they were both in their 20s and both had children.

"It's hard to have time off in this business because you don't know what any day will bring and what may break. But everyone needs reasons to live, and as a young company, we have younger guys, and one of their reasons for living is to go home to their families at night," Mann says.

Helping make sure technicians have that weekend time is Georgia Nichols, who is Corey's mom and the office manager. Over the course of several years, she learned what technicians need to do their jobs as efficiently as possible.

That led to a worksheet. Customers want to give you the right information, but they don't know what information you need, Mann says. When a call comes in, a worksheet comes out, and using it means the right questions are asked even if everyone is very busy that day.



Scott Chapin uses a Spectra Precision/Trimble laser level to measure drainfield depth as Colby Nichols operates a Yanmar Vi075 mini-excavator.

Mann and Nichols condensed their needs into two worksheets, one for onsite projects and one for public works. A sheet will list, for example, important contact and permit information, whether a crew is cutting asphalt or concrete, whether trucking is required to move equipment or materials, and what size septic tank is required. When a job is done, the supervisor draws maps of what went in the ground for a good record.

ENGAGING WORKERS

They built the worksheet in Excel, but it's a printed copy that's filled out and placed in a folder that goes out with the crew. Information from the sheet is not entered into a computer: it's enough for technicians to get dirty and tired during a 12- or 13-hour day without requiring more hours spent on office work, Nichols says. Some of the technicians are now sending back videos, and those are stored on the computer and tagged with the job number.

"We have a pretty healthy inventory list, too, so our technicians aren't waiting for a tool to be free from another job," Nichols says.

Finding good technicians can still be difficult. The partners insist that technicians be engaged at work.

"We're dealing with life and death every day," Mann says. "It may not seem that way to the average person, but the reality is that the people who locate utility lines are overworked and underpaid. Every time you put a bucket in the ground, you're taking a risk. When you're doing that — when you're hauling heavy equipment — you need your guys to have their minds present in the work."



"We're dealing with life and death every day. ... Every time you put a bucket in the ground, you're taking a risk. When you're doing that — when you're hauling heavy equipment you need your guys to have their minds present in the work." Dain Mann



Noah Sanders, left, and Scott Chapin run PVC pipe from a distribution box to the drainfield.

IOWA NEEDS UNIFORM ONSITE RULES

Like the patchwork of fields that cover most of its land, lowa is also a patchwork of wastewater rules. And that doesn't provide the best outcome for citizens or businesspeople.

"You go to one county, and you don't need a permit, and no one is doing inspections," says Dain Mann, co-owner of NISS (North Iowa Septic Solutions) Excavation. Two counties away, local officials are extremely tight with regulations.

"Iowa needs to be unified. Every county has to do the same thing, not this county does one thing and a mile later another county does something else," says Corey Nichols, the other co-owner of NISS Excavation.

Many counties have cut funding for local sanitary employees; there are sanitarians, he says. These people take it upon themselves to get training and they recognize the importance of keeping the environment clean, yet they're paid part-time or volunteer their services because their counties do not recognize the importance of the job.

And in Iowa, Nichols says, any homeowner can legally install his own system as long as he receives a permit. That's fine with him, but when counties don't have the same standards, it makes it hard for a business owner to talk to people about why they need technical help, he says.

This lack of statewide rules is holding back business. It's why NISS Excavation gave up on transfer inspections. The changes in rules, or absence of them, made the service too uncertain.

This isn't saying Iowa's system is bad, Mann says, but it's not doing the good job it could do if there were uniform rules.

The entire crew has a safety meeting every Monday morning. Instead of preparing a lecture, Mann and Nichols ask their technicians to bring issues. They also ask if technicians have seen unsafe practices in the field. "If a concrete truck came to a job site, and its backup alarm wasn't working, we want to know about that," Mann says.

Mann and Nichols have the firsthand experience with safety needs. In 2009, Mann lost the tip of a finger while hauling snow when his glove became caught in the equipment. A friend of theirs was cutting concrete pipe with a saw on unlevel ground; the saw bound, jerked, broke his nose and some teeth; and sent him to a doctor for corrective surgery. The worst was an employee of their portable restroom business who drove a company truck into an intersection and collided with a semitruck. He died as a result.

EQUIPMENT LIST

The company no longer maintains a vacuum truck or portable restrooms, but it keeps a versatile inventory of earth-moving machines. In addition to the Yanmar and Case equipment they started out continued >>

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Colby Nichols uses a Case skid loader to backfill over the Advanced Drainage Systems chambers.

with, NISS Excavation maintains a Case CX235 excavator; 2007 Yanmar ViO35 excavator; Case 590 rubber-tired backhoe; Case 2014 TR320, 2016 TR270, and a 2013 TR270 tracked skid loaders; two Mack dump trucks with Interstate trailers; and a low-boy triple-axle trailer pulled by a 1991 Kenworth semitractor. In addition, they have a MyTana Mfg. push camera

and locator, a RIDGID cable sewer cleaner, and a Spectra Precision/ Trimble laser level.

BUSINESS AND FAMILY

Rural Iowa provides many varied opportunities for work, Nichols says. When septic installations began booming, the NISS Excavation owners saw an opening in a market where few people were ready to do the work. They pounced. Then came the shift to community system work, and they remain open to change because they know they will have to adapt to whatever happens next.

But it's more than a business. They both have children, and they want to make sure the world is in good shape for their kids and there is a business for them to work in.



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Hawaii Continues Effort to Eliminate Cesspools

By David Steinkraus

Estimates say there are 90,000 cesspools in use across the Hawaiian Islands, and now their days are numbered. This spring, the state Legislature passed and Gov. David Ige signed a bill that will require most of those cesspools to be converted to septic systems or ATUs, or require those properties to connect to a municipal sewer system. This must happen by Jan. 1, 2050.

Act 125 allows for some cesspools to remain. The state health director may grant exemptions if property owners present documents showing a legitimate reason why conversion would not work. Those reasons include small lot sizes, steep topography, poor soils or problems accessing the site.

Hawaii has had a tax credit program to help people with the cost of replacing cesspool wastewater systems, and to fund it, the Legislature has set aside \$5 million to help 500 people annually. Yet in 2016, the state issued only five credits, and in the first part of 2017, it issued 12.

By early 2018 when the Legislature next convenes, the state Health Department must prepare a report on the number and location of cesspools throughout the state and set priorities for conversion of the first systems. State agencies must also look at the feasibility of establishing a grant program to help low-income residents convert their cesspools.

News reports have noted a steady increase in the counts of fecal bacteria in Hawaii's nearshore waters. Average beach fecal bacteria counts have greatly increased between 2006 and 2016, according to *West Hawaii Today*.

Indiana

About 2,000 gallons of wastewater spilled into Holly Creek in Indianapolis in August after a bridge collapsed under a vacuum truck used to empty a septic tank. When the rear of the truck fell through the bridge deck, the valve on the back of the tank broke. The 4,000-gallon truck was filled with about 3,000 gallons of wastewater after pumping out a tank at a home, according to *The Indianapolis Star*.

The pumping company sent a second truck to the scene, and its operator vacuumed up most of the wastewater. The rest was allowed to flow downstream and be diluted in the White River.

Pam Thevenow, head of water quality and hazardous materials management for the Marion County Public Health Department, said it is up to contractors to determine the ability of bridges to handle their loaded vehicles. The department said it would not cite anyone involved in the incident because it was an accident.

Alabama

The police chief of Bay Minette has been found guilty of two counts of illegally dumping sewage and will be fined \$1,000 for each violation. He will also lose his pumping license, said a report from *Fox 10* television in Mobile, Alabama. Clarence Crook III was found guilty in July by the Alabama Onsite Wastewater Board. At a hearing earlier this year, an investigator for the board said Crook admitted to dumping wastewater in his pasture. Crook has not had a valid pumping license since 2013.

Ohio

Five northeastern Ohio counties will receive money from the state EPA's Water Pollution Control Loan Fund to help owners remedy failing home septic systems. The goal is to prevent wastewater from contaminating streams and groundwater.

Money for the work will come in forgivable loans. Depending on household income, borrowers will receive 100, 85 or 50 percent of the cost. The counties — Cuyahoga, Holmes, Lake, Lorain and Portage — will identify homes with failing systems and determine whether the systems should be replaced or repaired. Residents can apply to their local health departments for consideration.

Minnesota

In an ongoing case, several members of an Amish community appeared in court last summer to defend themselves against charges that they violated county orders to install septic systems on their properties. Attorneys for the state argued that the Amish should be held in contempt of court for failing to follow previous court orders to install septic systems. The core of the Amish defense was their religious beliefs, according to the *Rochester Post-Bulletin*.

Modern, worldly technology is not allowed by their religion, said the defendants. They cited Bible scripture that advises Christians not to conform to the world but to transform their minds in order to discern the will of God. "We feel that any type of septic system is a way of the world, and we do not conform to the way of the world," says Emery Miller, one of the 15 defendants.

The Amish properties in question get water from a gravity-feed system and discharge wastewater directly onto the ground.

South Dakota

The U.S. EPA recently issued a final denial of a wastewater injection permit sought by The Lodge at Mount Rushmore. As a result, the 50-room hotel was prohibited from using its septic system and could not open for the season. Septic system issues at the hotel date back to at least 2015, when a neighbor complained of smelly water surfacing from a drainfield, according to the *Rapid City Journal*.



Pennington County eventually took the problem to court, and it and the hotel reached agreement that the hotel would remain closed until it could obtain all necessary permits. EPA documents said the hotel's owner, Winona Inn Limited Partnership, had not done enough to show the system could be operated safely.

California

Undocumented onsite systems along a 25-mile stretch of the Russian River would be inspected under a plan of the North Coast Regional Water Quality Control Board, according to *Sonoma West Times & News*. Inspections would occur on properties within 600 feet of the river as it flows through northern California wine country from Healdsburg to Monte Rio. Concerned real estate brokers asked for a meeting with officials to discuss how property owners would be affected by the costs needed to repair or replace systems that fail inspections.

A preliminary assessment of properties in Monte Rio six years ago found no record of wastewater disposal plans or permits for most of them. A plan proposed two years ago listed that stretch of the river as a priority area where septic system problems contributed to high bacteria levels in the river. That plan was abandoned in the face of opposition from residents.

Prince Edward Island

A man who said he couldn't take a certification course was fined \$500 for installing a septic system without a license, according to *The Guardian*. Allan Emmett MacDonald, 65, pleaded guilty to the charge in provincial court in Charlottetown. He told the court he had been in the wastewater business for 40 years and was previously licensed. MacDonald has more than \$7,000 in unpaid fines, including a \$200 fine for the same offense in 2015. The judge also placed MacDonald on probation for two years and added a condition that he not install any wastewater systems unless he obtains a valid license.



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SYSTEM PROFILE

Lakefront Lot Leaves No Room to Spare

An innovative design for a tricky lot enables the expansion of a sports bar in north-central Wisconsin **By Scottie Dayton**

he owner of Dublin Sports Bar & Grill in Conover, Wisconsin, wanted to increase the seating capacity to more than 300. The expansion also entailed a larger parking lot and onsite system. For the latter, he called Greg Simac, owner of Simac's Plumbing in Eagle River.

"It was late autumn with snow on the ground," Simac says. "I suggested he call Dale Schlieve, owner of C.E.C., an engineering firm in Rhinelander. Dale's design for the restaurant with three-bedroom home arrived in spring, and it used every inch of spare space on the 1.4-acre property." It also incorporated all of the original system components.

Lot constraints and working only feet from the building made the installation tricky. "I probably installed the system in my mind three dozen times," Simac says. "Because everything had to be right on, I lost sleep over this one."

Site conditions

Soils are loamy sand and sand with a loading rate of 0.7 gallons per square foot per day. Situated in the Nicolet National Forest, the lot abuts North Twin Lake to the south and a road to the north. Two neighboring cabins are west along the lake. All the properties are cut into a hill with a 40 to 50 percent grade.

System components

Schlieve designed the system to handle 3,129 gpd. There are several major components:

- Existing 1,255-gallon grease interceptor (single-compartment tanks by Antigo Block).
- Existing 2,000-gallon septic tank.
- PL-625 effluent filter (Polylok Inc. / Zabel).
- Existing 2,000-gallon former pump tank.
- Two WK-200 White Knight Microbial Inoculator Generators (Knight Treatment Systems).
- Dual-compartment (3,000/1,800) concrete pump tank (Wieser Concrete).
- Alternating duplex WE20H 2 hp pumps (Goulds Water Technology, a Xylem brand).
- 72 EZflow geosynthetic aggregate modules (Infiltrator Water Technologies).
- IFS duplex control panel (SJE-Rhombus).

The tiny patch of lawn behind the building contains the original grease interceptor, septic tank and pump tank with just enough space for the new pump tank. Note the large block retaining wall to the left and the elevation of the two cabins to the right. A laborer stacks triple configured EZflow by Infiltrator modules. (Photos courtesy of Greg Simac)

>> Tom Collins, owner of Collins Excavating Grading, digs the bottom trench of the second terrace with his Kobelco SK295LC excavator.



System Profile

Location:Conover, WisconsinFacility served:Dublin Sports Bar & GrillInstaller:Greg Simac, Simac's Plumbing,
Eagle River, WisconsinSite conditions:Loamy sand and sand, loading rate
0.7 gallons per square foot per dayType of system:Secondary treatment, time dosedHydraulic capacity:3,129 gpd

System operation

High-strength waste from the kitchen flows to the grease interceptor and then into the 4-inch PVC house lateral that carries wastewater to the septic tank. Secondary treatment occurs in the second tank before effluent flows to the pump tank. From the pump tank, the original 2-inch Styrofoam-insulated PVC force main runs under the parking lot to the west end of the driveway. Simac cut the pipe at a 45-degree joint and capped and marked it. He then connected the new force main running 250 feet up the hill to the 2-inch manifold. Total lift from the pump to the field is 26 feet, but the rise up the hill from the connection is 16 feet.

The 2,040-square-foot drainfield receives 10 312.9-gallon doses daily with 37.49 additional gallons draining back. The two-step field has two 85-by-6-foot trenches per terrace. Each trench holds 16 bundles on 3-foot centers with 1.5-inch distribution pipes and 1/8-inch holes at 4 o'clock. Every fifth hole faces down.

Installation

Enlarging the parking lot was the first order of business. A contractor cut out 30,000 cubic yards of hill north of the building and then built a large block wall to retain the face. "I needed the parking lot completed to ensure we had enough room to set the pump tank parallel to the north side of the building," Simac says. "However, we installed the drainfield first to keep the establishment open."

Needing a large excavator, Simac hired Tom Collins, owner of Collins Excavating Grading, and his Kobelco SK295LC machine with 2-cubicyard bucket. He rumbled 25 feet up the side of the hill to cut and level off the first shelf. Collins dug the top trench 5 feet deep and the lower trench 2 feet deep to maintain the same elevation. He repeated the procedure for the bottom terrace.



Tom Collins, owner of Collins Excavating Grading, uses a Kobelco SK295LC excavator to backfill the bottom trench in the second drainfield terrace. Fabric covers the EZflow by Infiltrator modules.

"I probably installed the system in my mind three dozen times.

Because everything had to be right on, I lost sleep over this one."

Greg Simac

In the rain and cold wind, Simac and a helper carried the triple-configured modules from the parking lot up the hill and installed them when the first trench was completed. They covered the bundles with fabric and set inspection ports on each end of the rows. After passing inspection, Collins backfilled with 48 inches of native soil for the top lateral and 24 inches for the bottom lateral.

"We were worn out, but everything went well," Simac says. "That night I did sleep soundly."

The team assembled again the following week to install the 15.25-by-8.5-by-7.5-foot-high pump tank. The utility company We Energies dropped the upgraded overhead power line that replaced its dead underground counterpart. Utility workers also located the multiple water, gas and



The rear two risers mark the 3,000-gallon chamber on the Wieser Concrete pump tank, while the closest riser marks the 1,800- gallon compartment.

telecommunication lines crossing under the parking lot.

Meanwhile, Simac took down the satellite dishes that were in harm's way, and Mike's Septic Service pumped the tanks buried under a tiny patch of lawn against the north side of the building. The area also contained most of the space for the new pump tank, which protruded beyond the low, concrete-block retaining wall and into the driveway. A taller block wall protected the north side of the building and a semirecessed bagged ice storage bin.

Simac removed the north and west block walls before Collins dug the 20-by-10-by-14-foot-deep hole. "One wrong move could cave in the retaining wall alongside the building or damage the original pump tank," Simac says. "Tom was excavating right up to both surfaces." Two delivery drivers from Wieser Concrete and Simac acted as spotters for Collins.

Collins brought shoring, but the sandy clay loam and gravel held firm. Then, the bucket snagged the first buried power line. "Our hearts stopped, even though we knew it was dead," Simac says. More wires and old galvanized pipes followed. Collin's dump truck driver hauled away two loads of spoil, while some spoil was used for backfill and sloping on the site.

While the drivers set the 15,300-pound tank halves, Simac replaced the effluent filter in the septic tank, repaired the broken baffles in the second tank and installed the White Knight Microbial Inoculator Generators. "The original drainfield with Infiltrator chambers is good," Simac says. "It was

just too small for the increased flow, and the steep grade made enlarging it impossible. The owner opted to save it for when the cabins' outdated onsite systems failed or need replacing. At that time, we'll put new tanks in front of them and pump to the first drainfield."

Maintenance

Simac holds the three-year maintenance contract for the White Knight Microbial Inoculator Generators. For his own edification, he sampled the effluent six months after startup and will then check the system's health annually. "The owner understands that if he doesn't take care of it, he's out of options," Simac says. "There is no more land and no plan B."

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Jim Anderson, Ph.D., and David Gustafson, P.E., are connected with the University of Minnesota onsite wastewater treatment education program. David is extension onsite sewage treatment educator. Jim is former director of the university's Water Resources Center and is now an emeritus professor. Readers are welcome to submit questions or article suggestions to Jim and David. Write to ander045@umn.edu.

Defining the Absorption Area of a Mound Treatment System

Pay attention to several critical siting and construction practices when you incorporate mounds into a septic system plan By Jim Anderson and David Gustafson

ecently, someone asked us how setback distances were determined for mound systems. In Minnesota, rules state setback distances must be measured from the original soil absorption area. Absorption area terminology is not used in a lot of other states. Although when talking about mounds, it is our opinion that this is the desired approach over other ways of looking at the width and area necessary under the clean sand layer that receives effluent.

The width of original soil receiving effluent under the mound must be capable of absorbing effluent introduced to the infiltration bed (previously called the rock bed layer) of the mound or else surfacing will occur at the toe of the mound berm. Total absorption area is the product of the length of the infiltration bed and the absorption width. The berms on the short ends and the upslope berm are not considered in the total absorption area.

In direct answer to the question then, setbacks would be measured from the edges of the infiltration bed on the upslope side and edges. Setbacks on the downslope side would be determined from the end of the downslope absorption width.

LOADING RATES

Required soil absorption width depends on the allowable loading rate for the original soil under the clean sand layer. This is determined by soil analysis of the top one-foot layer of soil in contact with the clean sand layer. This analysis can be done either by soil evaluation or by percolation rate.

For a mound installed on a level site — defined as a slope less than 1 percent — the shape of the mound will be symmetrical since the assumption is that effluent will move downward and away from the infiltration bed in both directions. Absorption width is equal to the width of the infiltration bed plus the width of mound berms on either side of the bed. As indicated above, the ends are discounted since, while some will flow out the ends, most of the flow will be to the sides.

When a mound is installed on a sloping site — defined as a site with a slope greater than 1 percent — effluent is assumed to move downslope, and the required width is determined from by the width of the infiltration bed and the downslope berm width.

One of the major reasons we have seen for surfacing at the toe of mound berms is not allowing adequate width for the effluent applied to the infiltration bed to soak in before the end of the berm. This should be accounted for in the design process. However, a check an installer can make on site during installation is to make sure there is adequate width when the We often see this downslope width get cut off some during the installation process in the desire to fit the mound within the surrounding landscaping. **This results in surfacing at the toe of the berm.**

sand is placed and the mound is finished.

We will present an example using Minnesota design numbers, but recognize the same analysis can be done using your state's design numbers for mounds. Research on soils in Minnesota has shown that in the upper foot, the hydraulic conductivity is never less than about 1 centimeter per day. Using this as the bottom design number for heavy textured clay soils, the allowable loading rate (or the expected amount of effluent the soil will absorb) works out to be 0.24 gallons per square foot per day. Many states we have visited use a loading rate number for these types of soils of 0.2 gallons per square foot per day, which makes for easier calculation.

FINISHING THE MOUND

For a clean sand infiltration bed, the loading rate is specified as 1.2 gallons per square foot per day. The original soil under the bed, though, can only accept 0.24 gallons per square foot per day. This means that 5 times the width of the infiltration bed is necessary for the effluent to infiltrate the original soil (1.2 gallons per square foot per day \div 0.24 gallons per square foot per day). If the infiltration bed is 10 feet wide and the necessary width is 5 times that (or 50 feet), the width of the mound from the downslope edge of the bed is at least 40 feet to accept the effluent.

When finishing the mound, we often see this downslope width get cut off some during the installation process in the desire to fit the mound within the surrounding landscaping. This results in surfacing at the toe of the berm. We advise installers to watch that absorption width during mound construction. It is a key component of proper mound installation.

A final note on this issue: The reader should recognize that "absorption width" and not "absorption area" is the terminology that best describes how to make sure that there is soil under the mound to allow for infiltration of applied effluent.

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Our Big Challenge - Encourage the Next Generation of Wastewater Workers

Tony Mendes believes state and national trade associations must follow new technologies to help the environment and enhance professionalism **Compiled by Betty Dageforde**

In States Snapshot, we visit with a member of a state, provincial or national trade association in the decentralized wastewater industry. This time, we learn about a member of the Nebraska Onsite Waste Water Association.



Tony Mendes, owner (semiretired)

Business: Tony Mendes Excavating, Scottsbluff, Nebraska (sold business to stepson, and now operating under Larry Kessler Construction) Age: 68

Years in the industry: 25

Association involvement:

- Nebraska Onsite Waste Water Association (NOWWA) founding board member, past president, current board member and education coordinator
- Nebraska Department of Environmental Quality Onsite Wastewater Advisory Committee — appointed member
- National Onsite Wastewater Recycling Association (NOWRA) board member
- Member of National Association of Wastewater Technicians (NAWT) education committee

Benefits of belonging to the association:

Education opportunities; having a voice in influencing regulations and changes within the state and the industry; fellowship; and the opportunity to share experiences, gripe, and (at some point) realize that many of us in the industry share the same problems and experiences, and utilize these experiences in solving some of our common work issues.

Biggest issue facing your association right now:

Membership — maintaining and growing the membership as well as getting and developing the next (younger) generation of professionals within the industry.

More on the NOWWA crew:

Nebraska is a geographically large state with a relatively small population. The active leadership of the organization is voluntary and has been historically filled by a great group of committed individuals. But, we decided at its inception that NOWWA would require professional management, not just to get through the day-to-day aspects of the organization, but also to guide us through the maze of reporting, regulations and bureaucracy along with the day-to-day business functions. We were extremely fortunate in having been able to draw upon the experience of Lee Orton and his management group from day one. Through their input and leadership, we have been able to develop a very professional industry organization, conduct training across the state (along with our University of Nebraska and Nebraska Department of Environmental Quality partners), present a very successful annual three-day conference (along with our Nebraska Well Drillers Association partners), be involved in the legislative issues within the state, and have input into the direction our industry is taking. Jason Orton, Cindy Kreifels and Diane Snapp (now retired) have shouldered the burden of keeping our association on track and helping us refocus when we wanted to stray off course. At times, it was probably like herding cats.

Typical day on the job:

Most of my time is now spent in front of a computer or a windshield. Even though I am semiretired, I still get up early, get to my desk and sort through and respond to correspondence, work on training and education details, and participate in numerous individual and conference calls pertaining to my various industry involvements. When not at home, I spend a considerable amount of time driving to and from various state activities and meetings. And in a state that is about 450 miles across, with us living in the far western part of the state and most of our population and activity occurring in the far eastern part of the state, drive time can be considerable.

The job I'll never forget:

A septic system replacement at Scotts Bluff National Monument, our local historic site and national monument. The installation of the new system was fairly straightforward. The problem arose when I realized I didn't have nearly large enough equipment to remove the old concrete septic tanks. As I was still a one-man shop and this was my first government bid project, I was getting very worried that I had taken on more than I could handle, both physically and financially. Fortunately, having a great working relationship with our local Caterpillar dealership, Nebraska Machinery Company (NMC), I was able to get a large excavator and jackhammer on site without breaking the bank. The job was completed without any other setbacks.

My favorite piece of equipment:

When I was actively installing, our Caterpillar backhoes. Being a small one- or two-person operation meant trying to keep capital investment to a minimum. We could generally do anything we needed to do with that equipment. Today, I would have to say my computer and smartphone. The ability to react to problems and opportunities as well as develop and share information has probably changed how most of us are doing business.

Most challenging site I've worked on:

The "next one" — it seems that no matter how much planning and preparation would go into a proposal, each project presents its own unique set of problems to solve.

The craziest question I've been asked by a customer:

"You mean I was supposed to look at all of that information you gave us?" Although not that crazy, it seems to be a recurring theme. This had generally been preceded by the comment: "Yeah, I know my system is 10 years old, but you mean I needed to have it pumped?" Historically, with our bill for services, we have religiously provided site drawings and technical information along with an explanation regarding their installed system. Having been around long enough to experience follow-up calls on many of these systems proves the old adage about leading a horse to water. As an industry, we need to expand the efforts to get information to the homeowner/consumer.

If I could change one industry regulation, it would be:

Not one thing but two. First, remove the term "flushable" from all wipes and products with the potential of being put down the drain. Having owned a septic pumping business for several years, we have been able to experience firsthand the damage and problems these products can create.

Second, I don't think it would be a specific regulation because regs are in constant flux as technologies and equipment change and we are constantly playing catch-up, but I would find a way for the regulatory groups to be adequately staffed, trained and financed so that the level of active enforcement

increases throughout the industry. It seems to be a common problem nationally that — even when regulations are implemented — without an adequate enforcement effort, the new regs are ignored. They end up putting the compliance operators at a competitive disadvantage; customers are being misled, and environmental problems are continuing. I think you see the results in jurisdictions that have well-established, effective enforcement involvement where there is a mutual respect for the regulatory group and the on-site professional.

Best piece of small business advice I've heard:

From a supervisor I had many years ago in the corporate world: he said that whenever you are having a discussion or are in a meeting, try to talk and listen in equal parts. It makes no difference if this is a sales talk, problemsolving or teaching. Don't lose sight of other individuals' input, questions or opinions. Although I was told this nearly 50 years ago, it seems that this may be an appropriate message for today.

If I wasn't working in the wastewater industry, I would:

Probably be rich! Just kidding. The business has been good to us, and we enjoy trying to give back. I have always enjoyed designing and building things, so I would probably still be contracting and building or doing some type of residential design work.

This is my outlook for the wastewater industry:

Advances in technology will allow us to gain a better understanding of the hows and whys of system performance so we can train both professionals and consumers in the appropriate operation and service of new and existing septic systems. Advances in technology will open us up to better systems and equipment to help us solve current and future environmental problems. They will also give us the ability to be more efficient in our business operation and, hopefully, more profitable.

Would you like to see someone in your state or provincial wastewater trade association profiled in Snapshot? Send your suggestions to Jim Kneiszel at editor@onsiteinstaller.com.



PRODUCT FOCUS

New Technology and Installation Tools

By Craig Mandli

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rated operating capacity to lift heavier loads and is equipped with a 94-inch hinge-pin height, providing flexibility for loading and unloading material on a wide range of dump sites. The 4.7 mph ground drive speed, in forward and reverse, increases job cycle times. Optional dual-auxiliary connections can use attachments for better productivity for heavier loads, such as logs, trees and sod. 800/654-6481; www.ditchwitch.com.

Hyundai Construction Equipment Americas R35Z-9A

The **R35Z-9A** zero-tail-swing excavator from **Hyundai Construction Equipment Americas** is powered by a 23.7 hp Yanmar engine. Its maximum digging depth is 10 feet 3 inches, and bucket breakout force is



6,900 ft-lb. With a standard canopy, the unit has an operating weight of 7,800 pounds. It's also available with a cab. Standard bucket capacity is 0.14

cubic yards. It includes a thumb bracket, large dozer blade, hydraulic quick coupler, attachment-ready auxiliary piping and auto two-speed function. Its boom swing enables the operator to offset the boom 75 degrees left and 50 degrees right, enabling close work alongside foundations and in congested areas. 877/509-2254; www.hceamericas.com.

HAND/POWER TOOLS

Crust Busters agitator

The hand-held power agitator from **Crust Busters** has an 80-inch shaft and two- or three-blade propeller designed to mix a 1,000-gallon septic tank in five minutes. Options include 2-, 4-, 6- and 9-foot extensions and a short three-blade shaft that adapts to the two-blade unit. **763/878-2296**; www.crustbusters.com.



Jet Inc. BAT Media Cleaning Tool

The BAT Media Cleaning Tool from Jet Inc. allows efficient compressed air delivery below the effluent surface while service technicians remain above grade. The original swivel design can be used with readily available, off-the-shelf air pumps, vacuum trucks, or the Jet Catalog compressor. Proper service removes accumulated solids with course bubbles, without a washing wand or harsh chemicals. The biologically treated solids then settle in

the aeration chamber to reveal more BAT Media surface area for a new biological colony to form. 800/321-6960; www.jetincorp.com.

PROBE

T&T Tools Mighty Probe

The Mighty Probe from T&T Tools has a 3/8-inch hex rod (approximately 20 percent stiffer than a round rod) or a 7/16-inch hex rod (approximately twice as stiff as the standard round rod). Stiffer hex rods bend less to make the probe easier to push into the ground, especially when probing at deeper depths. Lengths are available from 36 to 78 inches in 6-inch increments. When the probe is combined with a slide adapter, an integrated mini slide-hammer probe is created, allowing the technician to pound through difficult spots. 800/521-6893; www.mightyprobe.com.

PUMPS



Ashland Pump AGP-HC200 grinder pump

The AGP-HC200 grinder pump from Ashland Pump has a radial portion that grinds waste into fine slurry and a cutting-edge axial portion that cuts and chops stringy solids and other forms of nonhuman waste into pieces small enough to pass through the small-diameter discharge pipe. Fibrous materials get chopped and cut, while the soft solids become slurry, minimizing downstream solids and preventing clogging. The engi-

neered design prevents wrapping at the inlet, which clogs grinders. The cutters are made of case-hardened 440 stainless steel and are easy to sharpen and adjust clearances. **855/281-6830**; www.ashlandpump.com.

Clarus Environmental Model 5054

The Model 5054 from Clarus Environmental is designed for high head applications. The high-efficiency, semivortex impeller prevents any hang-ups that may occur. It produces a maximum flow of 70 gpm at 20 feet TDH and can reach 114 feet at shut-off. It is powder-coated, has cast-iron housing, has a 1 1/2-inch NPT discharge and can pass 3/4-inch spherical solids. 800/928-7867; www.clarusenvironmental.com.



Flygt - a Xylem Brand Concertor

The **Concertor** smart, interconnected wastewaterpumping system from **Flygt - a Xylem Brand** senses the operating conditions of its environment, adapts its performance in real time, and provides feedback to pumping station operators. It offers energy savings of up to 70 percent compared to a conventional pumping system; it also reduces inventory by up to 80 percent

due to flexible performance. Clog-free pumping operation and clean wet wells can save up to 80 percent in vacuum cleaning costs. Its compact design reduces cabinet size by up to 50 percent. It offers a wide performance field to choose the right operating point, making it simple and facilitating performance fine-tuning. **855/995-4261**; www.xylem.com.

Polylok, Inc. / Zabel PL-CPE5A

The Polylok, Inc. / Zabel PL-CPE5A is a submersible 1/2 hp, 115-volt, single-phase effluent pump with a 2-inch NPT vertical discharge. It has a maximum head of 48 feet and a maximum flow of 64 gpm. It is designed with a 3,450 rpm, oil-filled permanent split-capacitor motor and has an amp rating of 8.5 for 115 volts, cast-iron housing, and volute equipped with a cast-iron vortex impeller capa-



ble of passing 3/4-inch-diameter solids. The stainless steel shaft is supported by two single-row, oil-lubricated ball bearings. The shaft seal is an inboard design with a secondary exclusion V seal. Construction materials are carbon for the rotating face and ceramic for the stationary face. All elastomers are Buna-N, and the hardware is 300 Series stainless steel. It has a 20-foot UL/CSA-listed power cable that's suitable for submersible service and fitted with a three-prong plug. **888/765-9565**; www.polylok.com.

Webtrol Pumps MVPS-RE1

The MVPS-RE1 drop-in package for existing progressive cavity systems from Webtrol Pumps has a progressive cavity pump at its center, providing reliable operation and nearly constant flow, and it is easily able to adjust for pressure variations in any system setting, according to the maker. The package is powered by a 1 1/2 hp motor, spinning at 1,750 rpm to provide grinding torque. With all package parts readily available and easily replaceable, it can quickly and easily be serviced in the field. 800/769-7867; www.webtrol.com.



SLUDGE SAMPLING EQUIPMENT

Sim/Tech Filter TruCore

The TruCore from Sim/Tech Filter is a large-diameter, accurate, user-friendly sludge sampler that's designed for use in the thicker sludge common to septic tanks. It allows samples to be taken quickly without creating excessive turbulence, as there are no restrictions caused by valves, stoppers or flaps. With a 1 3/8-inch I.D., the capacity per foot is almost 10 ounces. The straight-through design allows the sample to be effortlessly returned to the tank. The unit is made of a polycarbonate sampling tube (marked every foot) and PVC fittings. It comes as a single-piece, 8-foot unit or as two 4-foot units that slip together. Custom sizes and configurations are also available. A simple and customizable extension kit is available for deeply buried tanks. **888/999-3290**; www.simtechfilter.com.





CASE STUDY

New Technology and Installation Tools

By Craig Mandli

New technology eliminates labor and materials costs

Problem: Brady Rettkowski of Done-Rite Septic in Hermiston, Oregon, was tasked with the replacement of a failed chamber system utilizing pressure distribution. The drainfield failed because ground-burrowing rodents had managed to pack the chambers full of sand.



"This is a common problem in our area with any drainfield system that doesn't use rock," Rettkowski says. With his original drainfield destroyed, the homeowner was adamant that he was not going to accept anything but genuine rock and pipe for his new drainfield.

Solution: Rettkowski deployed the **BH 2412** leach line-extrusion machine from **Rockslide Technologies.** The unit can place gravel, pipe and fabric in a single pass down an excavated trench. He started a flat trench on-grade and then placed and filled the unit with 1 1/2-inch round rock and 1 1/4-inch HDPE pipe. The machine was then intermittently pulled along the trench bottom with a backhoe to deposit the gravel and pipe on-grade. Because he was constructing pressurized leach lines, Rettkowski later uncovered the lateral pipes at prescribed intervals, drilled distribution orifices, installed orifice shields and then covered the rock with filter fabric. "The machine eliminated my need for employees, satisfied my client's requirements, and saved me several hundred dollars in material costs versus using alternative leach line products," Rettkowski says.

Result: The homeowner is content knowing the new drainfield is impervious to ground-burrowing rodents. **541/567-7830**; **www.rockslidetech.com.**

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Advanced Drainage Systems announces management changes

Advanced Drainage Systems announced several leadership changes as part of its previously communicated succession plan. The board of directors has named Scott Barbour president and CEO, succeeding Joe Chlapaty, who has served in that capacity since 2004. Chlapaty will become chairman emeritus of the board. The board also named C. Robert



Scott Barbour

Kidder as chairman of the board and Barbour as a director.

Medo USA announces merger with Nitto Kohki

Medo USA has merged with its parent company, Nitto Kohki, to unify its corporate structure in the U.S. The company's structure, location and contact information will remain the same. The merger will have no effect on pump models, part numbers, and pricing of air compressors and vacuum pumps previously purchased from Medo USA.

Wieser Concrete promotes Winkler to general manager

Andy Winkler has been promoted to general manager of the Wieser Concrete headquarters in Maiden Rock, Wisconsin. He will lead the company's safety, marketing, sales, administrative and service groups.



HD Supply Waterworks changes name

Andy Winkler

HD Supply Waterworks announced it is changing its name to Core & Main, effective immediately. The company, previously a division of HD Supply, currently employs about 2,900 associates at 246 branch locations throughout the U.S.

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PRODUCT NEWS

Water Cannon Inc. - MWBE skid-style pressure washer

The V-belt drive skid-style hot-water pressure washer from Water Cannon Inc. -MWBE is powered by a Kohler diesel engine and has customizable psi ratings from 3,200 to 4,000 and power from 4 to 8 gpm. It is self-



contained with dual 15-gallon poly diesel fuel tanks, a 12-volt battery start and a 45-amp charging system, so no external power is required. It has a stainless steel coil wrap, a burner hood, Beckett burners, a control panel, an adjustable thermostat and safety pressure release valve controls. Accessories include a gun/wand assembly, 50-foot high-pressure hose, Maxi-Flo 20 percent chemical injector, four color-coded spray nozzles and a color-coded chemical nozzle. An optional wheel kit is offered for portability. 800/333-9274; www.watercannon.com.

Advanced Drainage Systems Barracuda hydrodynamic separator

The Barracuda S4 hydrodynamic separator from Advanced Drainage Systems removes sediment and other debris from stormwater runoff, protecting water resources. It is designed with teeth that mitigate turbulence in the storage chamber to prevent resuspension of captured contaminants. The Barracuda is designed to be used on single manhole jobs and offers multiple pipe con-



figurations, flexible inlet and outlet positioning, quick installation, and easy inspection and maintenance. 800/821-6710; www.ads-pipe.com.



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Arizona Onsite Wastewater Recycling Association; www.azowra.org; 928/443-0333

ARKANSAS

Arkansas Onsite Wastewater Association; www.arkowa.com

CALIFORNIA

California Onsite Wastewater Association; www.cowa.org; 530/513-6658

COLORADO

Colorado Professionals in Onsite Wastewater; www.cpow.net; 720/626-8989

CONNECTICUT

Connecticut Onsite Wastewater Recycling Association; www.cowra-online.org; 860/267-1057

DELAWARE

Delaware On-Site Wastewater Recycling Association; www.dowra.org

FLORIDA

Florida Onsite Wastewater Association; www.fowaonsite.com; 321/363-1590

GEORGIA

Georgia Onsite Wastewater Association; www.onsitewastewater.org; 678/646-0379

Georgia F.O.G. Alliance; www.georgiafog.com

IDAHO

Onsite Wastewater Association of Idaho; www.owaidaho.org; 208/664-2133

ILLINOIS

Onsite Wastewater Professionals of Illinois; www.owpi.org

INDIANA

Indiana Onsite Waste Water Professionals Association; www.iowpa.org; 317/889-2382

IOWA

Iowa Onsite Waste Water Association; www.iowwa.com; 515/225-1051

KANSAS

Kansas Small Flows Association; www.ksfa.org; 913/594-1472

KENTUCKY

Kentucky Onsite Wastewater Association; www.kentuckyonsite.org; 855/818-5692

MAINE

Maine Association of Site Evaluators; www.mainese.com Maine Association of Professional Soil Scientists; www.mapss.org

MARYLAND

Maryland Onsite Wastewater Professionals Association; www.mowpa.org; 443/570-2029

MASSACHUSETTS

Yankee Onsite Wastewater Association; www.maowp.org; 781/939-5710

MICHIGAN

Michigan Onsite Wastewater Recycling Association; www.mowra.org

Michigan Septic Tank Association; www.msta.biz; 989/808-8648

MINNESOTA

Minnesota Onsite Wastewater Association; www.mowa-mn.com; 888/810-4178

MISSOURI

Missouri Smallflows Organization; www.mosmallflows.org; 417/631-4027

NEBRASKA

Nebraska On-site Waste Water Association; www.nowwa.org; 402/476-0162

NEW HAMPSHIRE

New Hampshire Association of Septage Haulers; www.nhash.com; 603/831-8670 Granite State Designers and Installers Association; www.gsdia.org; 603/228-1231

NEW MEXICO

Professional Onsite Wastewater Reuse Association of New Mexico; www.powranm.org; 505/989-7676

NEW YORK

Long Island Liquid Waste Association, Inc.; www.lilwa.org; 631/585-0448

NORTH CAROLINA

North Carolina Septic Tank Association; www.ncsta.net; 336/416-3564

North Carolina Portable Toilet Group; www.ncportabletoiletgroup.org; 252/249-1097

North Carolina Pumper Group; www.ncpumpergroup.org; 252/249-1097

OHIO

Ohio Onsite Wastewater Association; www.ohioonsite.org; 888/294-0084

OREGON

Oregon Onsite Wastewater Association; www.o2wa.org; 541/389-6692

PENNSYLVANIA

Pennsylvania Association of Sewage Enforcement Officers; www.pa-seo.org; 717/761-8648 Pennsylvania Onsite Wastewater Recycling Association; www.powra.org

Pennsylvania Septage Management Association; www.psma.net; 717/763-7762

TENNESSEE

Tennessee Onsite Wastewater Association; www.tnonsite.org

TEXAS

Texas On-Site Wastewater Association; www.txowa.org; 888/398-7188

Education 4 Onsite Wastewater Management; www.e4owm.com; 713/774-6694

VIRGINIA

Virginia Onsite Wastewater Recycling Association; www.vowra.org; 540/377-9830

WASHINGTON

Washington On-Site Sewage Association; www.wossa.org; 253/770-6594

WISCONSIN

Wisconsin Onsite Water Recycling Association; www.wowra.com; 888/782-6815

Wisconsin Liquid Waste Carriers Association; www.wlwca.com; 888/782-6815

NATIONAL

Water Environment Federation; www.wef.org; 800/666-0206

National Onsite Wastewater Recycling Association; www.nowra.org; 800/966-2942

National Association of Wastewater Technicians; www.nawt.org; 800/236-6298

CANADA ALBERTA

Alberta Onsite Wastewater Management Association; www.aowma.com; 877/489-7471

BRITISH COLUMBIA

British Columbia Onsite Wastewater Association; www.bcossa.org; 778/432-2120

WCOWMA Onsite Wastewater Management of B.C.; www.wcowma-bc.com; 877/489-7471

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Manitoba Onsite Wastewater Management Association; www.mowma.org; 877/489-7471

Onsite Wastewater Systems Installers of Manitoba, Inc.; www.owsim.com; 204/771-0455

NEW BRUNSWICK

New Brunswick Association of Onsite Wastewater Professionals; www.nbaowp.ca; 506/455-5477

NOVA SCOTIA

Waste Water Nova Scotia; www.wwns.ca; 902/246-2131

ONTARIO

Ontario Onsite Wastewater Association; www.oowa.org; 855/905-6692

Ontario Association of Sewage Industry Services; www.oasisontario.on.ca; 877/202-0082

SASKATCHEWAN

Saskatchewan Onsite Wastewater Management Association; www.sowma.ca; 877/489-7471

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Western Canada Onsite Wastewater Management Association; www.wcowma.com; 877/489-7471

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