

DEEP HOLE DRILLER



AN ATLAS COPCO PUBLICATION FOR THE DRILLING PROFESSIONAL No. 3, 2009

**ATLAS COPCO CENTER OF
EXCELLENCE SETS ITSELF
APART FOR WATER WELL
CUSTOMER SERVICE AND SALES**

**CALIFORNIA DRILLER BECOMES
WINE MAKER ON THE SIDE**

**EXPLORATION DRILLERS HELP
FIND NATURAL GAS RESERVES**



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DEEP HOLE DRILLER

is published by Atlas Copco Drilling Solutions LLC. The magazine focuses on the company's expertise, products and methods used for deep hole drilling and the advancement of the industry worldwide.

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ATLAS COPCO TH60... THE LEGEND CONTINUES

Welcome and happy new year!

It was exactly one year ago that I wrote the editorial for *Deep Hole Driller* after coming off a record year of sales in 2008. I predicted a downward trend in business for 2009 and, obviously, that was an understatement.

However, I also predicted that the perseverance of the drilling industry would keep business moving forward. I am happy to say that I was correct

on that point. Owner/operators, mid-sized drilling firms and large corporations alike have found new markets where their expertise can be used ... and they've kept the drill string turning to the right.

A large part of business success is having good, reliable equipment. This year at the National Ground Water Association (NGWA) convention in New Orleans we showed off our legendary Atlas Copco TH60. The features that made this drill a favorite of many drillers and the envy of our competition still exist today, but now come with added benefits since a recent upgrade:

- Larger capacities in both depth and casing capacity compliment today's need for flexibility.

- Large diameter sheaves reduce maintenance while enhancing speed and smoothness of the whole feed system.

- An Electronic Air Regulation System provides greater control over volume and pressure of the 900 or 1,070 compressor, while eliminating those nasty winter freeze ups of the air control valves.

- The automatic variable speed fan helps maintain proper operating temperatures on those cold and hot days.



EDITORIAL

By Scott Slater
U.S. Business Line Manager
Oil & Gas and Water Well

Couple these features with a support network that is second to none in the industry and you have yourself a drill that will provide years of service, a reputation that follows it for excellent resale and most of all – PRODUCTIVITY. In

case you missed it at the show in New Orleans, speak with your local Atlas Copco sales representative to find out more about the benefits of owning and operating a TH60. I am confident you will be impressed.

OIL AND GAS MARKET

I hope you have been regularly following the progress of our new, from-the-ground-up Predator Drilling System. This 200,000 pound hook load drill designed for oil and gas is undergoing the final step in one of the most comprehensive testing programs of any manufacturer. From the new look and design to the most technological, efficient and productive operating systems on the market today – this machine is catching the attention of oil and gas drilling companies as well as the people they drill for. It has user-friendly features, capacity ratings, a small footprint, economical mobility and quick setup time. If you haven't visited www.atlascopcoilandgas.com, do so today!

From my family to yours, I wish you a prosperous 2010 that will provide new opportunities for success.

P.S. My first sale almost 20 years ago was a TH60 to an owner/operator drilling company in Michigan. This machine is still performing today for the same company.

Atlas Copco is committed to comply with or exceed all applicable laws, rules and regulations. Photos in this publication may show situations which comply with such laws, rules and regulations in the country where the photo was taken but not necessarily in other parts of the world. In any case think safety first and always use proper ear, eye, head and other protection to reduce the risk of personal injury.

Atlas Copco



Center of Excellence

Frank Chickey, Deep Hole Product Support manager, Eastern Region; Scott Slater, Business Line manager for Atlas Copco Drilling Solutions; and Ray Kranzusch, Deep Hole Product Support, Western Region, have been instrumental in developing the Water Well Center of Excellence and developing a core group of highly trained water well drill unit technicians.

Atlas Copco Milwaukee Store sets itself apart in water well market

When Scott Slater, Business Line manager for Atlas Copco Drilling Solutions, went looking for a way to streamline operations and improve customer service for water well customers, the solution was found right outside his office door at Atlas Copco's Milwaukee, Wisconsin, branch.

"We decided to take a facility already set up for water well products, build on the competency levels in the business and then designate this branch as a central location for water well products, parts and service," said Slater. For customers, this new Water Well Center of Excellence means better access to Atlas Copco's sales and service expertise, and parts and equipment inventory.

Although every Atlas Copco branch operates independently, Slater explained that water well drilling gravitated to the Milwaukee area some time ago; establishing the Water Well Center of Excellence here was just a logical extension. "Milwaukee is also centrally located in the United States,"

"When people call in, they'll have direct contact with a parts specialist who can determine their needs, go to the shelf and send them the part."

— Sturge Taggart
Regional Branch Manager of the
Milwaukee Store

added Slater. "We can keep hours to easily cover the rest of the country. We're close to Chicago and there's a great airport in Milwaukee, so we can bring international customers and brokers in to see used inventory. We also have a facility with a high bay that's capable of standing up drill rigs, facilitating complete rebuilds. We also had experienced water well people already here to focus on products and customer needs."

Slater pointed out that the center of excellence does not diminish the importance of Atlas Copco's store network. "We'll still have localized technicians and services.

With the center located in Milwaukee, we also have teams in every region so the customer has someone to see face-to-face for sales and service, and a central parts person here will help them with those issues."

This centrally located parts specialist, Steve Matic, will be a key player in the success of the center. People calling 866-254-8511 will speak directly with Matic.

Sturge Taggart, regional branch manager of the Milwaukee store, said that this will be a huge benefit for customers. "When people call in, they'll have direct contact with a parts specialist who can determine their needs, go to the shelf and send them the part. This position is also a big benefit for those outlying stores who may not have a parts specialist on staff; this will enable them to help their customers better. It will build efficiencies."

The Water Well Center of Excellence will also be a source for training service technicians, who will then take this knowledge back to the branches. Recently, 16 service



STEVE MATIĆ will be the designated water well parts specialist. He will be a key player in the success of the center. For the past three years Steve has covered the Midwest for water well sales for Atlas Copco and prior to that he spent 13 years as a parts manager and customer support manager at Ingersoll-Rand in Milwaukee. He has a thorough knowledge of Atlas Copco water well rigs and will work to ensure parts will be available and get to the customer in a timely manner — whether they come from Milwaukee or the Atlas Copco Distribution Center in Allen, Texas.

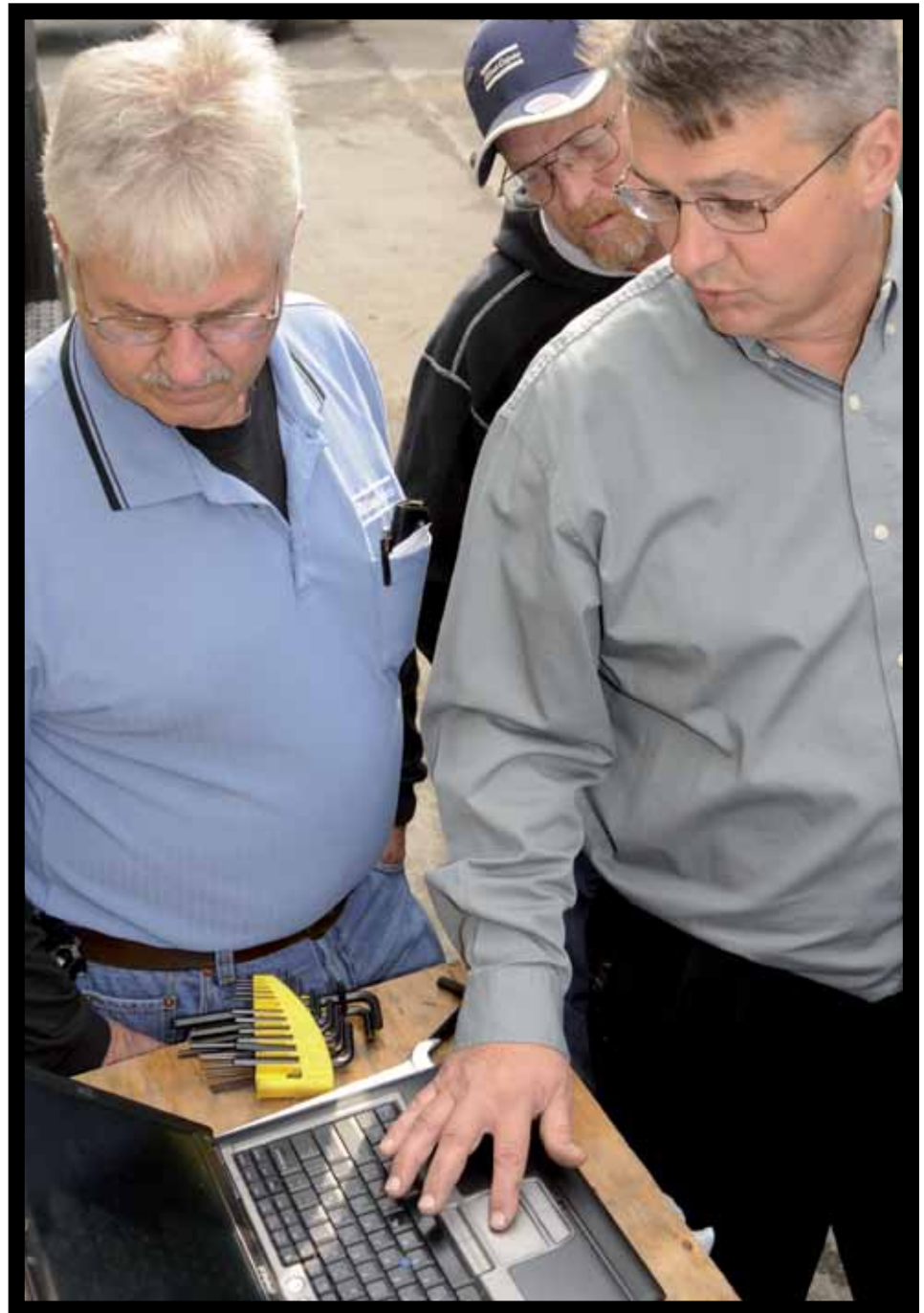
Call 866-254-8511 to speak directly with Steve.

technicians from the United States and Canada attended a five-day training seminar on the T3W and, primarily, the new TH60. Led by Ray Kranzusch, Deep Hole Product Support, Western Region, and Frank Chickey, Deep Hole Product Support manager, Eastern Region, the seminar shared expertise and created a core group of highly trained water well drill unit service technicians.

THE CLASS COVERED:

- How to properly perform a drill evaluation before it is traded in
- TH60 hydraulic system – load sensing systems, flows, pumps and motors
- The electronic air regulation system (EARS) and electronic fan regulation (EFR)
- Electrical systems for T3W and TH60

“These men are a critical portion of the ‘front line’ of our product support team. This training seminar brings them here in order to obtain hands-on training and share the expertise from this branch, as well as to contribute knowledge from their own



Wayne Tobe, service manager, and Wade Joiner, field technician, both from the Atlas Copco CMT USA store in La Vergne, Tennessee, look on as Frank Chickey demonstrates the simplicity of the Electronic Air Regulation System (EARS) and the Electronic Fan Regulation Systems (EFR).

experiences,” said Chickey. “Working as a team, we communicate all of the issues and details of their resolution in order to expeditiously resolve the customer’s concerns, which ultimately results in productivity, profitability and customer satisfaction.”

“Most of these service technicians have extensive deephole rig experience,” added Kranzusch, “and a few are coming up to speed, gaining knowledge of the current systems. This course will benefit all

service personnel in order to help develop them into highly trained deephole drill unit mechanics.”

With five acres of property, and the technical expertise and extensive parts inventory on site, the Milwaukee branch is also an ideal location for selling used rigs. Moving forward, used drills from around the country will go to the center to determine whether they will be rebuilt, reconditioned or sold as-is. ►



Atlas Copco is also looking at implementing a center of excellence and similar parts distribution structure for water well rigs and other product lines in other countries, starting with Africa. Other country managers are currently evaluating the competency and specialty levels of their service technicians and will visit Milwaukee for further training.

As the Water Well Center of Excellence continues to grow, Slater is confident that Atlas Copco's expertise and customer service will also continue to improve – in Milwaukee, around the country and around the world. "What separates us from our competitors is that we're taking our experience closer to the customer," says Slater. "There's no way our competitors can touch our structure and the amount of people we have available to see and help the customer."

DHD 3 09

Milwaukee Water Well Center of Excellence sells refurbished rigs to drilling companies anywhere in the world

THE CENTER OF EXCELLENCE is uniquely outfitted and ideally situated to be a showcase for used Atlas Copco drill rigs, as well as competitive models. Rigs arrive at the center from around the country. Mark Herbst, product support specialist/water well supervisor, then evaluates each rig, reviewing repair records to determine its status and what work must be done. From there, highly trained mechanics perform the necessary repairs and upgrades to prepare the rig for resale anywhere in the country or around the world.

The Center of Excellence is located near three major airports – Chicago's O'Hare International Airport and Midway Airport, and General Mitchell International Airport in Milwaukee. This makes it easy for international dealers, brokers and Atlas Copco sales reps from around the world to fly in and "kick the tires" before purchasing a used rig. Once a used rig is sold, Herbst carefully goes over the rig with the customer before it leaves the lot. He reviews all repairs that have been made, and operates the rig with the customer to demonstrate its functionality.

The used equipment number is **888-456-6017**.



Mark Herbst



**For used equipment, call 888-456-6017.
www.atlascopcomarketplace.com**

Pre-owned drills and specs at your fingertips



VersaDrill V2000/2003

Serial Number: 1120
Location: Milwaukee, Wisconsin
Tower: 35 ft, 6 inches
Drill Engine: CAT C 16 (575 hp)
Drill Hours: 4,443 hours
Compressor: 1070 cfm / 350 psi
Good condition



Atlas Copco T3W/2003

Serial Number: 6776
Location: Milwaukee, Wisconsin
Tower: 32 ft
Pullback: 32,500 lbs
Deck Engine: CAT C15/ 475 hp
Compressor: 1070 CFM/350 psi
Offboard mud package
Good condition



Atlas Copco T2W/1996

Serial Number: 6201
Location: Milwaukee, Wisconsin
Pullback: 30,000 lbs
Drill: CAT C10 with 1,676 hours
Mud Pump: 3x4 Mission
Compressor: 400 cfm / 200 psi
EXTRAS: Fold-up mud pit
Good condition



Atlas Copco TH60/1992

On an International 5000
Serial Number: 3640
Location: Milwaukee, Wisconsin
Tower: 38 ft
Drill Engine: Cummins N14
Drill Hours: 16,000 hours
Compressor: 750 cfm / 300 psi
Good condition



Atlas Copco T4W/1998

On a Crane Carrier
Serial Number: 6325
Location: Clarks Summit, Penn.
Tower: 33 ft
Drill Engine: Cummins QSK 19
Drill Hours: 4,416
Compressor: 1070 cfm/ 350 psi
Good condition

ALSO AVAILABLE...

•**Atlas Copco RD20 III/2001** in good condition; on crane carrier with CAT 3412 (700 hp) engine; 1250 cfm/350 psi compressor; Drill hours — 13,950

•**Atlas Copco T3W/2004**
600 hp CAT engine C15;
1070 cfm/350 psi compressor;
Drill hours — 2,154

•**Drilltech D25K/1999** in good condition; 30,000 lb. pullback; 1000 cfm/350 psi compressor; Drill hours — 7,500

Atlas Copco TH60/ 2003 in EXCELLENT condition with 26,500 lbs of pullback; comes with the bonus of a diesel fired pre-heater 6" hammer holder

Get more details on these and MANY MORE online. www.atlascopcomarketplace.com

Sold through Atlas Copco Construction Mining Technique USA LLC 888-456-6017

T3W and TH60:

Improvements in technology and efficiency in design

T3W

An “in/out box” saves up to 100 hp while mud drilling or tripping pipe.



Atlas Copco spent much time and research improving rigs that were considered industry mainstays.

Scott Slater, Business Line Manager, Oil & Gas and Water Well, shares his thoughts on why the improvements were for the better:

“The T3W evolved in hard rock areas because we were able to meet the needs of engine power, cooling and air pressure and volume. The T3W had a deck engine, which meant you could put as much air on it as you wanted. Today, with the horsepower available under the hood, the transfer cases that transfer power are so far superior than they used to be. These new TH60s can be used in the same applications as a T3W. They have the same longevity, with the advantages of reducing weight in the rear axle.

The new TH60 has impressive deck space, allowing you to add custom auxiliary options. Many prefer the engine up front because it reduces noise and heat for the operator.

As an added plus — greater commonality of parts between the T3W and the TH60 will help with fleet inventories for parts and service.”

<http://pol.atlascopco.com>

The former T3W and TH60 used five pumps to do what they can now do with three.

On a new 40,000 pound pullback drill, the current main pump supplies oil for the setup functions, jib and winch controls, table slide, carousel, breakout, rod spinner, water injection, and the fast and slow feed. The fan circuit also employs a dedicated pump and motor and the rotation circuit has a dedicated pump and motor.

Atlas Copco chose to utilize load sense pumps:

- To reduce the number of pumps in the circuit *and*
- To increase hydraulic efficiency and increase feed and winch speeds

On the earlier machines those functions ran with fixed displacement pumps, and the engine ran at full rpm in order to quickly trip pipe with the rotary head or casing hoist. With the fixed displacement pumps dumping over relief, the rig was consuming a lot of horsepower. All five pumps were spinning at maximum rpm and pumping oil over reliefs or running through directional control valves.

In the new T3W and TH60, however, the load sense pump will NOT flow oil for which there is no specific requirement.

Pressure will build in hoses (when one function is being used but not another), but for any energy to actually be consumed, the oil must flow through that function. Load sense provides the ability to run at idle and still provide enough oil to run the casing hoist or fast feed at full speed.

Improved Classics

Don't just take our word for it.

Driller Scot Unterseher said, "Control is overall better on this rig. Although the control panel is completely different, after a couple weeks I was comfortable with the changes and they have made me more efficient."

Unterseher pointed to the digital diagnostic gauge: "Everything I need to know is right here," he said. Before, he could get information, such as engine data and fuel levels, in the cab, "but now I have it right here in front of me and I can concentrate on drilling. The load-sensing hydraulics are a great feature for saving fuel. You can hear how much less the engine has to work when tripping. I have more power and use less fuel."

Unterseher has a long list of other things he likes better about the TH60 — from the updated cab, complete with air conditioning, power windows and a smoother ride, to the air regulation feature that has more versatility and control.

<http://pol.atlascopco.com>



For driller Scot Unterseher, the TH60 is all he has ever known. So when he made the transition from the former TH60 to the newly redesigned TH60, he was unsure of what to expect ... but he's happy with what he discovered.

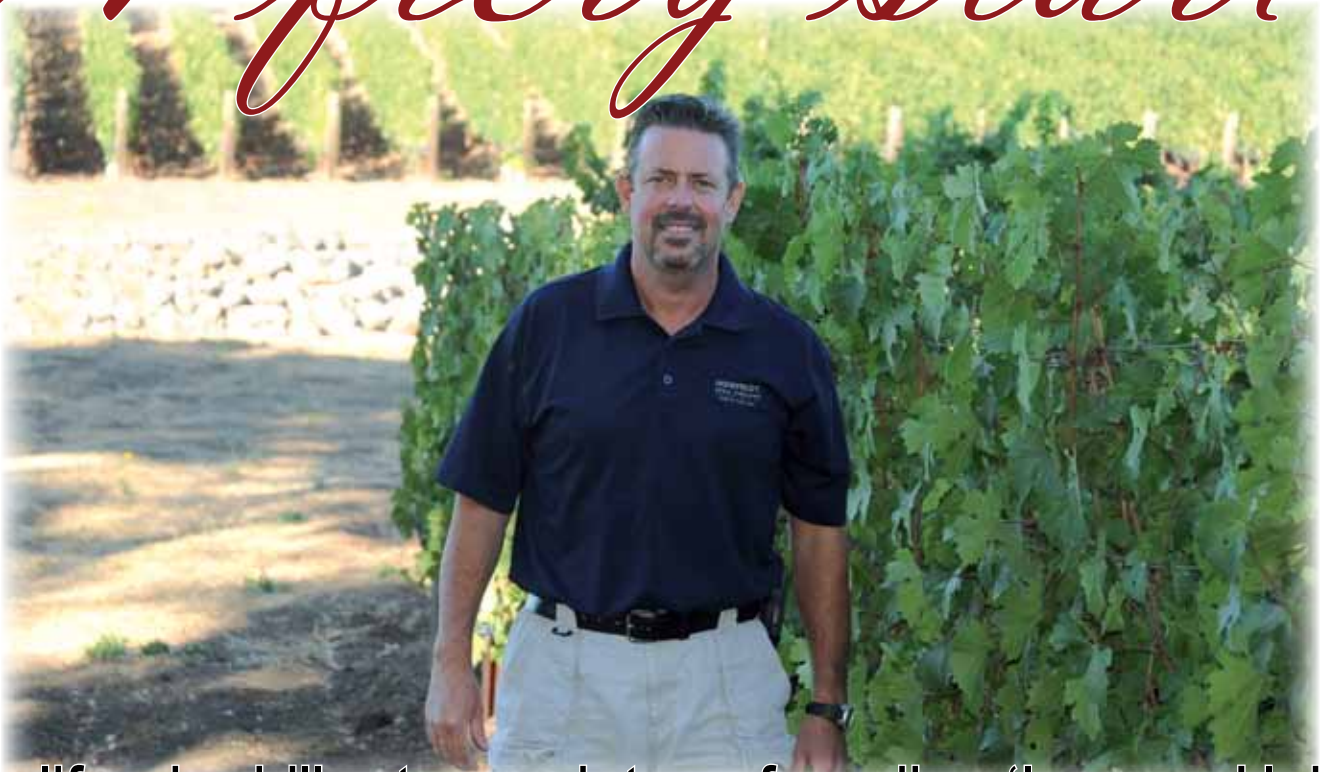
TH60

PTO disconnect disengages the airend from the engine when not in use, saving up to 100 horsepower. This is easily done from the operator's console.

More improvements on new T3W and TH60.

- New TH60 and T3W have 40,000 or 70,000 pound pullback.
- A 30,000 pound winch option
- 20-inch table opening for larger casing
- Meet current U.S. emission standards and have designed in additional engine cooling.
- Larger sheaves in both the 40,000 and 70,000 towers to increase cable life and efficiency.
- Changing from pneumatic regulation on the airend to an Electronic Air Regulation System, or EARS. EARS circuit allows better air flow control. Example: the rigs can take a 1,070 cfm compressor down to about 160-180 cfm.
- Incorporation of pressure compensated and load sense valves into the hydraulic system and fan control system.
- The fan control element of the EARS system more precisely controls the fan speed to the cooling requirements of the compressor and hydraulic oil. This reduces wasted horsepower by only running the fan at the speed dictated by the cooling requirements and further improves efficiency.

A fiery start



California driller turns vintner, founding 'Igneous' label



Don Huckfeldt lives in one of the most recognized wine regions in the world, California's Napa Valley. His well drilling clients produce some of the most prestigious wines on the market – in the world, for that matter. With connections like this, a few acres of prime real estate out behind his drill shop, and a passion for good wine, Huckfeldt is also becoming successful in a second profession — vintner.

The environment of a vineyard site includes diverse soils, sun exposures, microclimates and all attributes of the water used for irrigation. Each variable is a musi-

It's a trend with some growers to create greater uniformity in their grape production to create a common marketable product. Huckfeldt fits into a select category of vintner, one who strives to complement the nuances of the terroir to produce a distinctive wine, true to the boundaries of his vineyard.

cal chord in the overture that produces the texture, balance and flavor that interact to produce the harmonies in wine. This complexity of environmental factors, called terroir, is the underlying factor that makes one Cabernet Sauvignon grape taste different than another.

As grapes have been growing in this region for over 100 years, one would think that all that is knowable is known. That's not true. Each year the balances of nature change, causing the balance of the wine to change. What stays the same are the properties that come from the earth.

Napa Valley is currently subdivided into 14 subappellations. Huckfeldt's region will soon become its own appellation, Coombsville. As far as neighborhoods go, Huckfeldt's neighbors produce some of Napa's most famous and highest dollar wines, including Caldwell and Quintessa

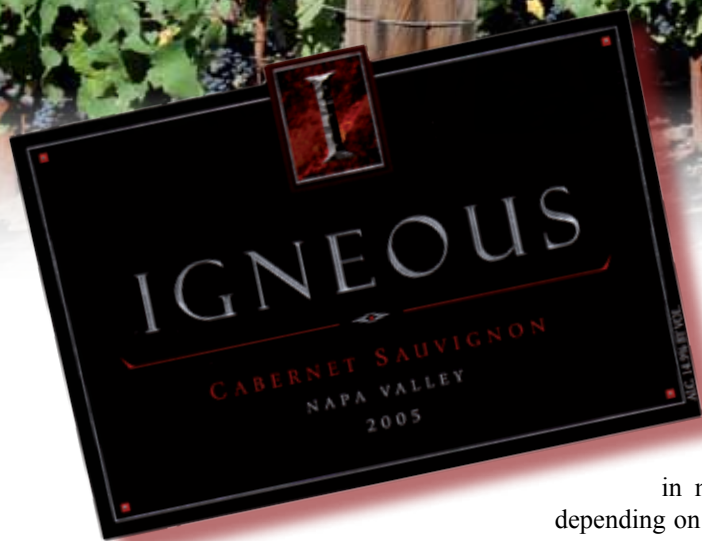
Wineries.

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FROM THE LAND

Napa has a complex coastal geology developed over millions of years that includes sedimentary serpentinite and greenstone and volcanics from basalt to rhyolite. As a driller, putting the name of the rock indigenous to the vineyard was only natural, and in terms of terroir, it is the base from which the grapes derive their flavor.

Igneous is Huckfeldt's wine brand, taken from the volcanic, overburden and



◀ An Igneous wine label on the 2005 vintage.

alluvial deposits in his vineyard.

Huckfeldt's wine is 100 percent estate grown, adding to the defining signature of his wines.

Huckfeldt's three-acre vineyard is divided by a dry creek bed snaking through the middle, causing variations in air flow and water drainage as well as sun exposure on each side of the vineyard. The soil is volcanic white tuff with gravels and cobbles derived from igneous materials.

A wine producer often orchestrates a blend from several grapes or chooses to showcase a particular vineyard. Huckfeldt's vineyard produces Cabernet Sauvignon, Merlot, Cabernet Franc and Petit Verdot, each gathering different flavors from exposure to the land and air. For those non-wine drinkers, if the predominate grape used in the wine blend is Cabernet Sauvignon, that is what you see identified on the label.

Huckfeldt works with experts to manage his vineyard and create his wine. Vineyard manager David Abreu and winemaker Kirk Venge are Huckfeldt's partners in creating his *Igneous* brand. These men are extremely well known in the industry and, like Huckfeldt is with drilling, extremely qualified in their field.

As wines go, *Igneous* is a high qual-

ity wine. At restaurants it will sell for \$150 in Napa to \$250 or more in major cities like Las Vegas, depending on the quality of the restaurant. Huckfeldt planted his first grapes in 2002 and recently introduced his 2006 vintage to the market.

The 2006 and 2007 vintages rated a 91 and 93 respectively on Robert Parker's quality scale. To rate 90 puts a wine in the "outstanding" class on a scale that goes to 100.

Wine connoisseurs know Parker as the world-renowned expert whose opinions are

published bi-monthly in the wine industry's leading publication, *The Wine Advocate*. Parker is recognized by most as a leader in understanding wine. The first time Huckfeldt met Parker he introduced himself as a well driller and wine maker and the second time they met, Parker announced, "Hey, it's the well driller."

Well drillers know more things about water and finding water than most people could ever understand. Huckfeldt has taken that understanding and given it a life of its own, the fiery distinction known as *Igneous*. ▶



Don Huckfeldt and Matt Malinowski examine cuttings from a 400-foot water well boring.



Don Huckfeldt stands in the back. In front are, from left, drill assistant Eric Simenstad, Brian Walter, Atlas Copco regional manager, and chief driller Matt Malinowski.



What driller has to say about the Atlas Copco TH60:

Huckfeldt Well Drilling's chief driller Matt Malinowski is an old hand with the TH60. Recently the company took delivery of a new Atlas Copco TH60 water well drill and Matt was the lucky driller to take over the controls.

It was quite different at first according to Matt, but he quickly got comfortable with it. "This is my fourth TH60. Most had small changes but from a control point this new one is totally different – in a good way," he said. "First off, the configuration is different. The old version required some crossing over on the hands, depending on the function. The new rig has left hand function on the left and right on right ... it's just more comfortable."

The first well drilled with the new rig was a 15 inch borehole with 10 inch casing to 750 feet. "I had no problems and liked working the new rig," points out Matt. "The new electronic controls are always the same, no matter the load, it's much easier to feather. There is no jumping around with the hydraulics, it's a constant uniform travel," cited Matt.

Overall, Matt likes how the new rig can cut a well's production time. "Actually, the first time I ran the hoist it surprised me! The speed difference for tripping is pretty amazing. Really it's about greater control."

He cites a combination of things that give him greater control: regulating the air pressure and volume on the machine, rotation speed, faster rotary top head travel speed. "If I don't like something I make a change, simple as that, I have greater control. It all makes a little difference; I can cut well completion time by a third, easily."

Of the company's three TH60s, all are air and mud combination rigs, ready for whatever formation is encountered. Matt thinks about 75 to 80 percent of his wells are some or mostly tricone work, but the versatility of the TH60 really pays off. "The TH60 allows me to be efficient regardless of the drilling method. In three consecutive holes I could run a 15 inch hole opener, an 8 5/8 inch hammer or a 9 7/8 tricone, that really shows the ability of this rig."

"I had no problems and liked working the new rig. The new electronic controls are always the same, no matter the load, it's much easier to feather. There is no jumping around with the hydraulics, it's a constant uniform travel."

—Matt Malinowski, driller



DHD 3 09



Mustang

hits the road to show off its geothermal features



Since making its debut in the United States, Atlas Copco has been taking its Mustang 4-F1 compact rig on the road. Recently, the Baltimore branch of Atlas Copco Construction Mining Technique (CMT) held a two-day demonstration event for its regional sales team and customers to highlight the Mustang's features – particularly those that make it ideal for geothermal drilling.

“The Mustang has been used in Europe for the past 30 years,” said Peter Redaelli, product specialist for the Mustang. “While it’s new to the U.S., it has been used extensively overseas and has a long track record of success.”

The Mustang is ideally designed for geothermal drilling applications, particularly in the residential market. This has been a major factor in Atlas Copco’s decision to bring the Mustang to the U.S.

“A lot of it was a sense of responsibility that Atlas Copco has to the marketplace – to bring in something more eco-friendly and to show that we’re onboard with the green energy movement,” added Redaelli. “We’re trying to do what we can to help support this growing market.”

Several features set the Mustang 4-F1 apart from other drill rig models – particularly larger water well rigs – in geothermal drilling applications. A smaller track-mount- ▶

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ed rig that is only 8 feet wide, 21 feet long, 21 feet high when powered up, and weighs less than 18,000 pounds, the Mustang can access tight spots, easily maneuver over curbs, and move across landscaped yards, leaving a much smaller footprint and less chance of cracking and damage.

The Mustang 4-F1 has a Tier 3, 100 hp Deutz diesel engine with a 21-gallon fuel tank that burns 2.5 gallons per hour. The compressor puts out 350 psi/700 cfm of air and runs quietly. The lubricating system allows adequate lubrication of the DTH hammer. The Mustang can also be equipped with a Bellin mud pump with an output of 160 gallons per minute or 360-400 psi.

The rig is efficient to operate, ergonomically designed and easy to use by a single operator. With a single pull of a lever, the positioning device moves the feed accurately and safely into place. The position of the compact tiltable rod rack, winch and rod breaker facilitate quick and easy rod changes and guarantee high productivity.

The Mustang 4-F1 can drill down to 490 feet with 5- to 6-inch down-the-hole equipment. The rotation unit can effortlessly lift the drill string up and out of the hole. For



recovery of casings, the Mustang can be equipped with hydraulic jacks with a lifting capacity of 26,500 pounds and a variety of jaws to handle most common casings used in geothermal applications.

Above, John Hislop, Business Development Manager – Overburden, explains various types of casings and their applications during the demo.

“We’re starting to see a lot more inquiries and requests from our customers for this kind of equipment today.”

— Peter Redaelli,
Product Specialist



Although used in Europe for 30 years, the Mustang is new to the U.S. market. Here, Atlas Copco sales personnel get a hands-on opportunity and detailed information about the rig.

Other options on the Mustang include a 100-psi pneumatic tool service connection to run pneumatic tools such as bit grinders and impact wrenches. Additionally, an optional 200-amp hydraulic welder is available.

These demonstration events not only allow Atlas Copco to inform customers about the Mustang, but also about geothermal drilling opportunities. There are approximately 50,000-60,000 new geothermal heat pumps installed each year, and this industry is growing at an annual rate of 15 percent. With this in mind, Karl Gawell, executive director of the Geothermal Energy Association, offered encouraging news about the geothermal industry.

“Forty percent of the calls we get in our Washington office everyday are people looking for ground source-geothermal heat pumps,” said Gawell. “They are looking for information. I think the biggest problem is that there aren’t enough (drillers and installers) ready to go. People complain that they can’t find system designers or drillers within 200 miles of where they live, or that the installers can’t get to them for at least a year. So if you’re looking for jobs, this market is ready to go.”

Gawell added that the geothermal industry is still very young but seeing strong growth, particularly with the economic incentives currently available. “The demand is there; the public interest is there; and now some good incentives are there. There are the state grants and the 30-percent federal tax credit. So really, this is the time to get in. As the economy recovers, the growth rate for geothermal across the board is going to stay in the mid to high double digits. It will be unparalleled.”

Gawell pointed out, however, that education, organization and investment in technology and training are critical for success. “You need the right equipment and the right training, and that’s why I’m excited to see the constant development in this type of rig. It’s companies like Atlas Copco and entrepreneurs who are moving forward by bringing in the equipment you need to help you get the job done better.”

“We believe in this rig,” add-

I think the biggest problem is that there aren’t enough (drillers and installers) ready to go. People complain that they can’t find system designers or drillers within 200 miles of where they live, or that the installers can’t get to them for at least a year. So if you’re looking for jobs, this market is ready to go.”

— Karl Gawell,
Geothermal Energy Association

ed Redaelli. “It’s up and coming, and our first step is to continue what we’re doing today – getting the word out and having demonstrations. But we’re also listening to the feedback that we get from our customers. We want to find ways to work together to find solutions to improve and move forward as we all learn this new marketplace.

“We’re starting to see a lot more inquiries and requests from our customers for this kind of equipment today, and there’s no reason to think that it won’t keep growing from there.”

DHD 3 09



For recovery of casings, the Mustang can be equipped with hydraulic jacks with a lifting capacity of 26,500 pounds and a variety of jaws to handle most common casings used in geothermal applications.



Symmetrix the solution as IKEA goes geothermal

Sixty wells, each 656 feet (200 m) deep, were drilled into bedrock in just 10 days – part of a geothermal energy system for the new IKEA store in the city of Tampere, Finland. Challenging ground conditions were overcome by Symmetrix drilling technology.

Popularity of geothermal energy is increasing rapidly. In Finland, 7,500 ground source heat pumps were sold in 2008 – a 42 percent increase over the previous year.

Kari Pyttenen of Atlas Copco discusses job progress with joint owners of Suomen Porauspalvelu, Svante Snellman and Tor Enqvist.

When IKEA's new store opens in Tampere, Finland, the 123,031-square-foot (37,500-squaremeter) building will be heated and cooled using only geothermal energy. The project is the largest of its kind in the country and part of IKEA's long-term program to have all IKEA buildings powered by 100 percent renewable energy.

LOOSE GROUND

After the groundwork was completed at the site of the new IKEA store, the surface consisted of a 10-foot (3-meter) layer of unconsolidated rock. Drilling the 60 energy wells would require a system that could both drill and advance a casing pipe at the same time.

The contract to drill the 60 energy wells

was awarded to drilling contractor Suomen Porauspalvelu. With each hole 656 feet (200 m) deep, a total of 7½ miles (12 km) of drilling was required. The wells were designed in five rows, each consisting of 12 wells.

The wells in the central row were drilled vertically. The two rows either side of this row were drilled with an inclination of 5 degrees. The wells in the outermost two rows had an inclination of 10 degrees away from the center row. The holes were drilled in this way to ensure sufficient space between the bottoms of each hole at the 656-foot (200-m) depth, regardless of deviation.

A range of Atlas Copco products were selected for the project, which included compressors, drill rods, Symmetrix P140/5-115 casing advancement system, Secoroc 4½ inch (115 mm) bits and Secoroc COP44 and TD40 DTH hammers.

Jukka Ahonen, General Manager, Atlas Copco Rotex, explains that the Symmetrix system was ideally suited to the ground conditions. "At this site, there was an unconsolidated layer of rock created by blasting and excavation work," he explains. "Passing this layer quickly and efficiently was the key to achieving high productivity."

The Symmetrix system consists of drill bits and a casing shoe that is welded to a casing tube. Using percussive drilling, the drill bit drills a hole large enough for the casing tube to advance down the hole. With this system, it is possible to install casing tubes through hard and rocky unconsolidated material and into the bedrock. The contact area of the casing tube and bedrock is sealed in order to prevent surface water entering the well.

Drilling began with Symmetrix in August by installing permanent casings with an outer diameter of 5½ inches (140 mm). After this, drilling was carried out through the cased hole using Secoroc 4-inch (115-mm) bits until reaching final depth.

The time schedule for the assignment was tight and Suomen Porauspalvelu put its entire fleet of three drilling rigs onto the project. The work, including 7.5 miles (12 km) of drilling was completed in just 10 working days.

Tor Enqvist, Joint Owner, Suomen Porauspalvelu, says, "A condition of this contract was that it could be completed within a tight timeframe. We are pleased to have managed with this challenging schedule. Since 2007, when we started our company, we have chosen to invest in modern, high quality tools and machines. By doing so we can meet our customer expectations, both in terms of reliability and productivity."

DHD 3 09

EXPLORATION OPPORTUNITY

Potential for natural gas in eastern United States increases the need for exploration drillers, such as these using the Atlas Copco RD20.

Located primarily in New York, Pennsylvania, eastern Ohio, western Maryland, and most of West Virginia, the Marcellus Shale formation is fast becoming the focus of a surge in natural gas exploration and production.

Though studies are still ongoing, preliminary estimates indicate that the Marcellus black shale beds contain anywhere from 262 trillion cubic feet (TCF) of recoverable gas to 1,307 TCF, according to Wikipedia. ▶





“It takes less than a week from the time we set up to the time we’re off location. In comparison if you were to do that with a conventional drill and set it up over the conductor to do the same work, you couldn’t afford to operate that massive equipment cost-efficiently. You couldn’t be competitive.”

—Kevin Keane

contracted to other companies. This gets through the unconsolidated soils at the surface. Then they drill the water string with a Secoroc QL series hammer. “We’ll set casing and cement that back to isolate the fresh water zones,” says Kevin Keane. Then they will drill to approximately 1,000 feet and run the intermediate string, which is also cemented. This shuts off any cross contamination. “Finally, we’ll drill to the kick point; we’ve been ranging from 3,500 to 6,000 feet in that range,” adds Kevin.

Keane’s RD20 and support equipment only minimally impact the site and they are in and out quickly. “It takes less than a week from the time we set up to the time we’re off location,” says Kevin. “In comparison if you were to do that with a conventional drill and set it up over the conductor to do the same work, you couldn’t afford to operate that massive equipment cost-efficiently. You couldn’t be competitive.”

Keane’s work ends where the horizontal drilling begins – a job that requires a much larger rig. “You won’t see the RD20 doing the large Marcellus wells,” says Mike Hetzler, manager, Rotary Drill Sales, Stockdale Mine Supply. “The RD20’s range is approximately 6,500 feet or less. Once you’re at the outside edge of the ability of that machine, larger equipment would be needed. That’s why the Predator line was developed.”

The RD20’s maximum pullback capability of 120,000 pounds, however, makes it ideal for the vertical predrills to prepare the site. “An exploration company can save a lot by having Keane come in and do this surface drilling, and a big reason Keane uses the RD20 is because it’s basically a simple and therefore very reliable design,” says Hetzler.

Keane also uses a DTH hammer to drill the wells, which also minimizes the impact on the

With the potential of such a huge untapped resource so close to the high-demand markets of the East Coast, the Marcellus Shale formation has become a huge opportunity for drillers across the country, including Keane & Sons Drilling of Bradford, Pennsylvania.

Established in 1973 by Joe Keane, Keane Drilling Company drilled its first well in the Appalachian Basin with a 24L spudder. Soon after the purchase of his first work over rig in 1982 his sons, Shawn and Kevin, entered into the workforce and starting taking over the day-to-day operations. Today, Keane & Sons Drilling Corporation has a fleet of seven drill rigs, including six Atlas Copco RD20s, three of which are currently drilling in the Marcellus Shale formation. In 2008, these six rigs drilled over 470 wells.

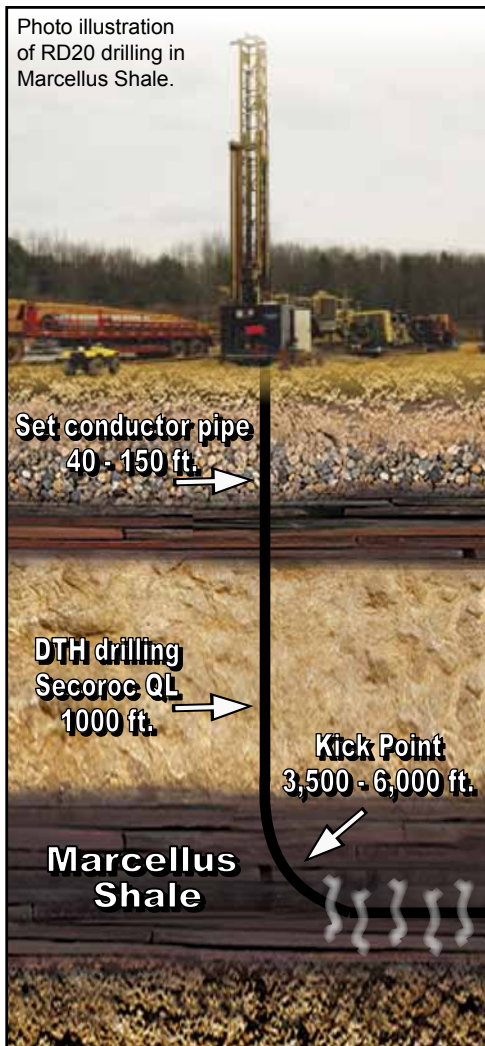
PREPARING THE SITE

Currently, Keane & Sons is drilling wells for oil and natural gas exploration and development companies. According to Shawn Keane, Marcellus operators are strategically drilling wells to ensure their leased acreage is held. It is believed that each well that is drilled secures the lease on 640 acres, and ideally exploration companies secure contiguous pieces of property. Once the well is in place, exploration drilling can proceed at a later date.

To set the process in motion, Keane arrives on site with their Atlas Copco RD20 and sets surface conductor pipe to depths ranging from 40-150 feet; occasionally this work is

Conductor pipe, also referred to as drive pipe, is a large diameter pipe used to prevent unconsolidated soil from caving into the hole as the upper portion of the well is being drilled.

Photo illustration of RD20 drilling in Marcellus Shale.



Shawn and Kevin Keane, owners of Keane & Sons Drilling, and Mike Hetzler, manager – Rotary Drill Sales, Stockdale Mine Supply, stand by the RD 20 as it drills another well at the Marcellus Shale formation.

<http://pol.atlascopco.com>

environment. “A lot of drillers have come here from out West thinking they could drill the whole thing on fluid, and unfortunately for them, that was met with resistance,” says Hetzler. “The DTH hammer is neater and cleaner. There’s no fluid and no mud tanks. If this was a fluid hole, the rig would be surrounded by pumps, tanks and reservoirs to contain all the material. You’ve eliminated the need for that by using compressed air, which is faster, more efficient and therefore less expensive.”

Hetzler explains that drilling a 6¼ inch hole with a DTH hammer is significantly faster than doing so with a tricone bit at the Marcellus Shale site. Although the cost of the pneumatic tooling is relative to the project and the site conditions, a tricone bit would be less reliable and less efficient, making a DHD with a diamond bit a better choice for completing the hole without worry of an unneeded trip to change bits.

DRILLING THE LATERAL LEGS

Once the vertical well is in place, the conventional drill continues the drill string horizontally through the shale. Until recently it has

been difficult to extract the natural gas, which is trapped in the tiny fractures throughout the shale. Fracturing the shale is challenging. If it’s done incorrectly, the natural gas can’t be recovered from the avenue that’s been created for it possibly rendering the well unusable or too costly to operate.

“They are still in the early stages of completely understanding how to fracture the shale right now. It’s still early on, but they are getting better. The results have been incredible,” says Shawn.

Horizontal drilling exposes as much of these fractures as possible

to the well bore for maximum extraction of the natural gas. In fact, there’s no comparison to a vertical well in the same formation. For example, a typical single-stage vertical well might produce about 200,000 cubic feet a day. However, horizontal wells have been reported achieving initial flows anywhere from 6 million to 12 million cubic feet of gas per day of production.

The horizontal legs range anywhere from 3,000 to 5,000 feet. There might be anywhere from eight to 16 stages or perforations at different points on the horizontal leg, and the fracture will go up through these perforations.

Determining where to place ▶

the stages is based on trial and error. Geologists and drillers are working with different increments or spacing to fracture every piece of rock. Ideally the correct spacing — perhaps in 200-foot increments along the horizontal leg — will allow the fractures to meet so that all the rock is fractured from that well bore. This results in complete drainage from the shale in that location.

Geologists and drillers use monitoring wells to allow them to see underground and the incremental differences between fractures to determine what will work best. As more research is done, standardized procedures can be developed.

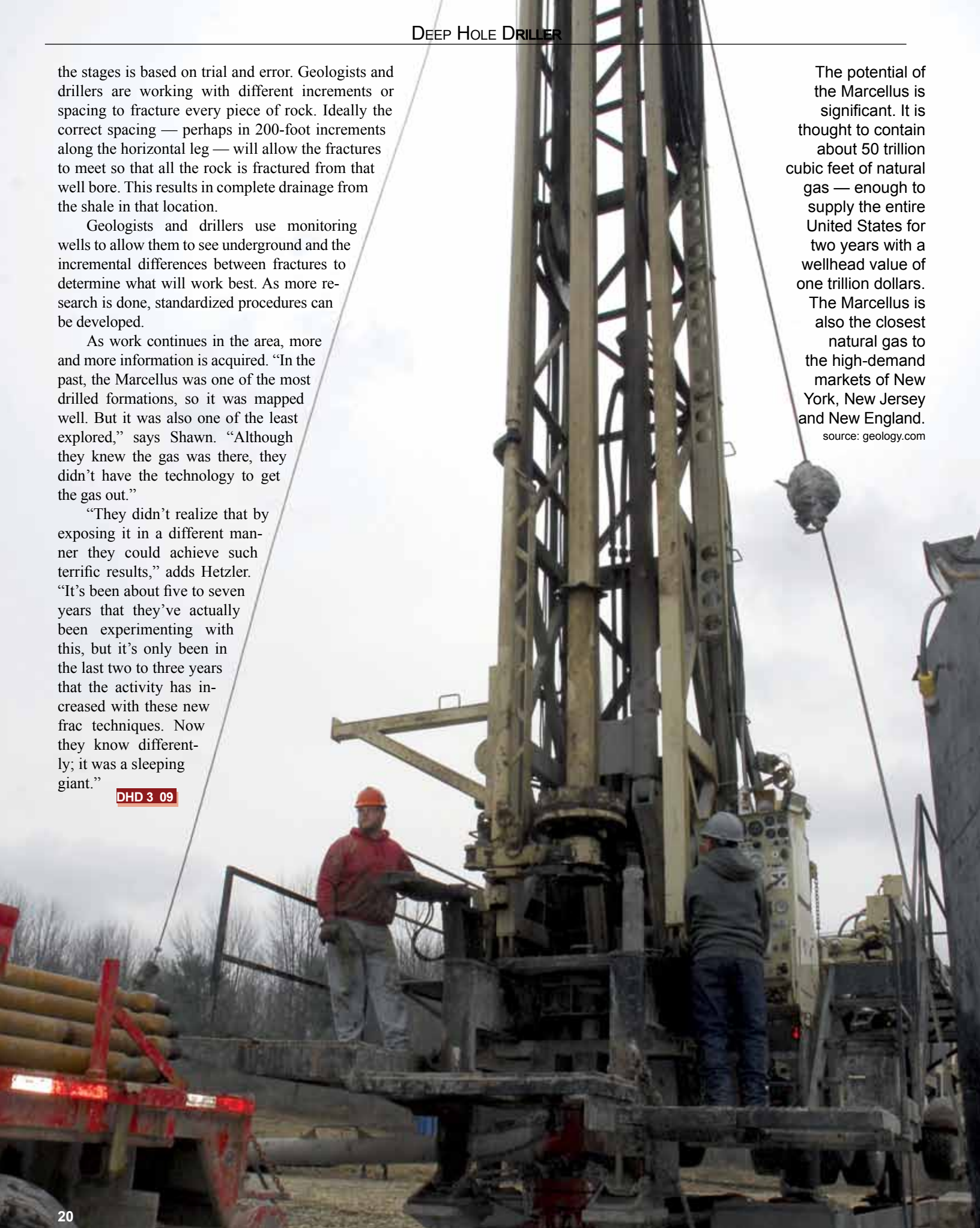
As work continues in the area, more and more information is acquired. “In the past, the Marcellus was one of the most drilled formations, so it was mapped well. But it was also one of the least explored,” says Shawn. “Although they knew the gas was there, they didn’t have the technology to get the gas out.”

“They didn’t realize that by exposing it in a different manner they could achieve such terrific results,” adds Hetzler. “It’s been about five to seven years that they’ve actually been experimenting with this, but it’s only been in the last two to three years that the activity has increased with these new frac techniques. Now they know differently; it was a sleeping giant.”

DHD 3 09

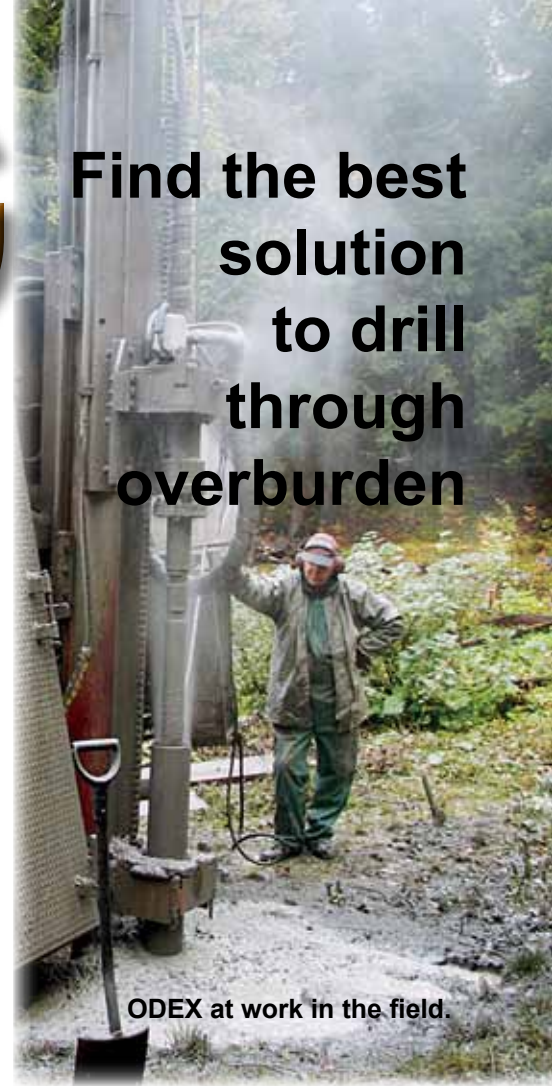
The potential of the Marcellus is significant. It is thought to contain about 50 trillion cubic feet of natural gas — enough to supply the entire United States for two years with a wellhead value of one trillion dollars. The Marcellus is also the closest natural gas to the high-demand markets of New York, New Jersey and New England.

source: geology.com



GETTING DOWN

Find the best solution to drill through overburden



ODEX at work in the field.

THE PROBLEMS: As much as 90 percent of the land surface of the earth is covered with loose, unconsolidated material – soil, clay, silt, sand, gravel and boulders. Drilling through this overburden is problematic since the earth often caves in behind the drill bit, making it difficult to retrieve the drill string. In practice, the bore hole is often lost before a casing tube can be inserted to support it.

Cavities in porous ground interfere with the circulation of the flushing medium and prevent drill cuttings from being flushed out of the hole. In places where overburden and cavities are mixed, or when the ground's "drillability" is unknown ... how does a driller decide which tools to use?

THE SOLUTION: Atlas Copco's ODEX and Symmetrix overburden drilling and casing systems.

ODEX is a reliable system that works well with softer formations and boulders when water well drilling. It has a smaller size range, using up to 10¾-inch (273 mm) OD casing in depths up to 328 feet (100 m).

Symmetrix provides fast penetration in the toughest conditions up to 984 feet (300 m) deep. Its casing starts at 3 inches (76 mm) and can handle casings up to 48 inches (1.2 m).

Symmetrix is made for the harder formations – even in hard glacial rock and New York schist. It can also drill horizontally.

When allowed by state or national laws, it is possible to reuse casing with Symmetrix. This can be useful in jobs with loop work, such as geothermal. Sometimes ground conditions don't let casing be pulled, however.

THE DETAILS OF ODEX

ODEX enables you to drill and case holes simultaneously. Casing diameters from 3½ inches (89 mm) with ODEX 76 to 10½ inches (273 mm)

with ODEX 240 can be used to a maximum depth of 328 feet (100 m).

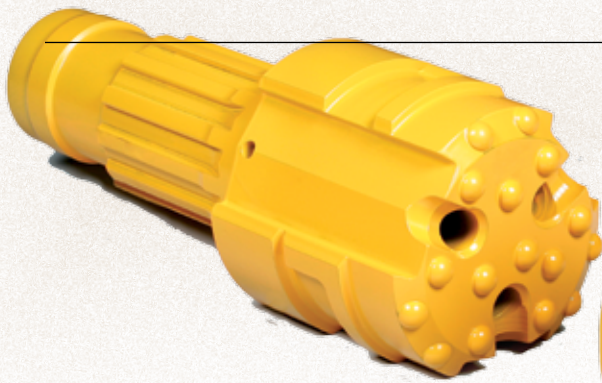
A pilot bit and eccentric reamer drill a hole slightly larger than the external diameter of the casing tube. This enables the casing tube to follow the drill bit down the hole.

Part of the impact energy is diverted to the casing tube via a shoulder on the guide device, which in turn impacts a special casing shoe at the lower end of the casing.

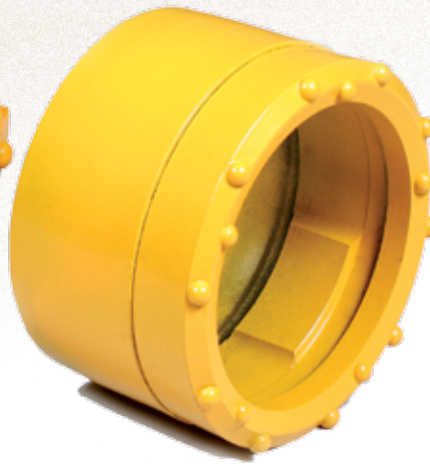
In both DTH and top hammer drilling the casing is driven down without rotation. When the casing enters the bedrock, drilling is stopped briefly, and reverse rotation is applied, which causes the reamer to turn in, thus reducing the overall diameter of the drill bit assembly.



ODEX



Symmetrix



Symmetrix heavy-duty system is shown below with a solitary ring bit, which can be connected to a casing shoe by the optional welding ring.

Heavy-duty Symmetrix Systems:

Intended for breakthrough drilling where the ring bit is recovered for re-use. System can also be used for drilling deep vertical holes if there is no requirement on a large ring bit inner diameter.



Then the entire drill string can be pulled up through the inside of the casing tubes, leaving the casing tubes embedded in the bedrock. Drilling can then be continued into the bedrock using a conventional drill string.

Steel tubes in standard dimensions are used for the casing. They are welded together and left in the ground after the hole is completed (ODEX W). For applications where the casing will be reused, it pays to use threaded casing tubes (ODEX T).

To improve flushing, ODEX has backward pointing flushing holes.

In difficult conditions a foaming additive can be added to the compressed air to further improve flushing performance.

ODEX can be used with any pneumatic or hydraulic top hammer that has independent, reversible rotation, with sufficient torque to match the hole diameter and depth requirements.

FOR TOP HAMMER DRILL RIGS:

- ODEX 76, ODEX 90, ODEX 115

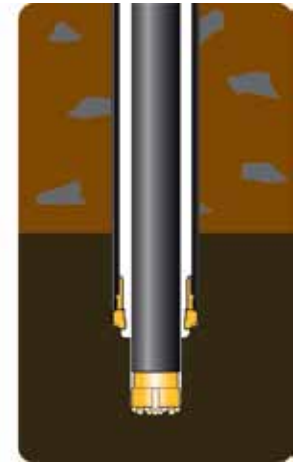
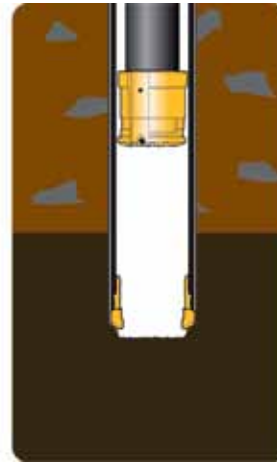
ODEX FOR DTH DRILL RIGS:

	Hammer (inches)	Depth
•ODEX 90	— 3"	196 ft (60 m)
•ODEX 115	— 3" and 4"	328 ft (100 m)
•ODEX 140	— 4" and 5"	328 ft (100 m)
•ODEX 165	— 5" and 6"	328 ft (100 m)
•ODEX 190	— 6" and 8"	328 ft (100 m)
•ODEX 240	— 8"	328 ft (100 m)

Guide devices are available to fit all common hammer types.

THE DETAILS OF SYMMETRIX

Symmetrix represents the latest in drilling technology, a symmetrical drill bit system that simultaneously advances casing while drilling the hole.



SYMMETRIX SYSTEM WITH LARGE PASS-THROUGH INNER DIAMETER

1. Casing is installed until bedrock.
2. Drill string is pulled out from the hole.
3. Drilling of the well continues with a DTH bit, which passes through the ring bit.

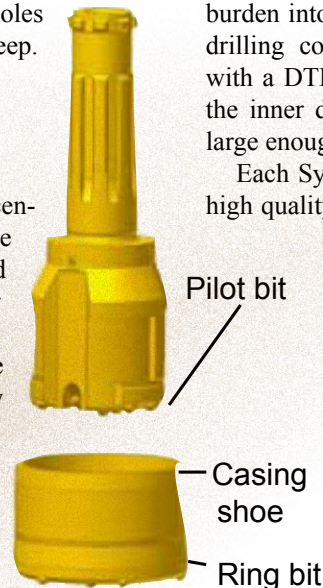
Symmetrix is made for 3-inch (76 mm) casing up to 48-inch (1.2 m) casing for vertical AND horizontal holes 656 to 984 feet (200 to 300 m) deep.

THREE COMPONENTS OF SYMMETRIX PATENTED SYSTEM:

•A **pilot bit** drills away the center part of the hole and guides the drill string. The pilot is attached to any common DTH hammer shank or top hammer rod thread.

•A **casing shoe** welded to the casing pipe is pulled down by the impact of the hammer and pilot bit.

•A **symmetrical ring bit** is locked into the pilot bit drills the void for the casing to advance down the hole.



In well drilling with Symmetrix, the casing is drilled through overburden into the bedrock and then the drilling continues into the bedrock with a DTH bit. This works because the inner diameter of the ring bit is large enough.

Each Symmetrix bit is made from high quality alloy steel, and has been precision machined to produce a perfect bit body, heat treated to the required harness, and fitted with durable tungsten carbide buttons. Ballistic buttons are available upon request and are ideal for cutting clay.



New QAS 600 generating set

Atlas Copco's new QAS 600 generator is the largest model in the QAS range. Rated at 575 kVA at 60 Hz, the QAS 600 is powered by a Volvo TAD 1641 GE diesel engine that drives a Leroy Somer alternator with PMG-Technology, and a 239-gallon standard fuel tank that ensures continuous operation at full load for a complete shift.

With standard features that maximize safety and minimize environmental impact, the QAS 600 is designed for easy transportation and onsite handling, making it ideal for rental, industrial, public utility and construction applications.

The QAS 600 is housed in zinc plated steel with a powder coat finish. The housing has also been designed to reduce noise. The QAS 600 operates at 77 dB(A) at 60 Hz, making it ideal in noise sensitive areas.

The enclosure features an integrated lifting structure that includes forklift slots, which facilitate safe and efficient handling, and an integrated bumper to protect against impact. The lifting structure is positioned at the center point of gravity, and is designed to support at least four times the maximum weight. The sturdy spillage-free frame is a 110-percent containment base for all the necessary liquids such as oil, coolant and fuel.

The new QAS 600 features a dedicated compartment for the electrical system, making it safe to access when operating. Isolating the electrical system from the engine compartment reduces vibration and temperature impact. Furthermore, the compartment door is sealed to help prevent water and dust infiltration.

Atlas Copco introduces advanced formula synthetic compressor oils – PAROIL S and PAROIL S xtreme

PAROIL S and PAROIL S xtreme from Atlas Copco help ensure that air compressors maintain optimum levels of performance while reducing operating costs.

These new and improved formulas not only offer the most advanced protection to the critical components of a compressor, but also provide exceptional durability in even the most severe conditions, including very high pressure and pipeline applications.

PAROIL S and PAROIL S xtreme are fully synthetic premium quality oils that offer a high viscosity index. The quality lubricator additives allow for oil change intervals of 1,000 hours without any loss in performance or compressor longevity.

PAROIL S has been formulated to meet

the demands of air compressors working in severe conditions. Although primarily designed for high-pressure applications, PAROIL S can be used in all Atlas Copco portable air compressors operating in ambient temperatures between -13° F and 122° F.



Atlas Copco's PAROIL S xtreme is designed to provide optimum levels of performance and protection for all compressors, including two-stage, in applications up to 507-psi operating continuously in ambient temperatures above 86° F.

Both oils facilitate separation and drainage of condensation in the compressor. Balanced composition of the anti-foam and air release keeps the oil clean and prevents blocking of the oil separator, guaranteeing a low oil carryover.

Atlas Copco launches DrillAir™ Open Unit

Atlas Copco's Portable Air division completes its DrillAir range with an Open Unit, delivering up to 727 l/s flow (1550 cfm) at 25 bar (365 psi).

Atlas Copco develops its machines with the toughest conditions in mind. The new units are built in a new dedicated open unit design, and deliver higher capacity, higher pressure and a longer component life span in a very effective and efficient way. Ease of transport and installation makes these units ideal for specialist applications and Original Equipment Manufacturer system integration.

Not only is fuel consumption optimized with the exclusive FuelXpert™ system, the components will also last longer thanks to the Oiltronix™ technology.



Compressor Models:
XRVO 727 / XRVO 1550 CD7 and
XRXO 667 / XRXO 1400 CD7

Atlas Copco names a Center of Excellence for Oil and Gas Market

Oil and gas drills within the Atlas Copco's deephole product line will have a Center of Excellence based in Denver. As in Milwaukee with water well rigs, there will be an extensive parts inventory on hand, and service technicians

will be brought in for ongoing training. Derek Anderson, oil and gas specialist, and Keith Engelman, Denver's branch manager, will lead this effort; a new salesperson for consumables will soon join the branch as well.

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