

# DEEP HOLE DRILLER

AN ATLAS COPCO PUBLICATION FOR THE DRILLING PROFESSIONAL No. 2, 2009

**CORE SAMPLES FROM OCEAN REVEAL  
SEA LEVEL CHANGES OVER CENTURIES**

**PREDATOR DRILLING SYSTEM™ —  
NEW OIL AND GAS PRODUCT**



**ATLAS COPCO DRILL RIGS HELP  
BRING QUALITY DRINKING  
WATER TO PEOPLE IN AFRICA**



# FEATURED

Vol. 2, 2009



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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'S ROLE IN INTERNATIONAL WATER DEVELOPMENT

It's interesting to note that there is an entire industry dedicated to reporting how poorly the world's governments and non-government organizations have brought potable water to people in drought-laden countries. Television commercials are replete with images of people in need of safe drinking water to survive – with messages similar to “for less than a dollar a day you can change the life of a child in need.”

For Atlas Copco this message is both painful and frustrating.

Atlas Copco has five product companies that manufacture drill rigs, drill strings, compressors and tooling for more than 50 customer centers around the world. The challenge becomes how to work with our customers and other organizations to deliver the required products and services into this emerging market.

In each issue of *Deep Hole Driller*, Atlas Copco presents numerous success stories of drillers and drilling contractors like yourself. Many are from the North American market, but we see such successes duplicated around the globe. In this issue we are featuring customers from parts of Africa.

The T3W is by far the rig of choice in Africa because of its rugged design and mobility, but we also manufacture smaller rigs in India and Europe that are sold into this market



### EDITORIAL

By John Stinson  
Global Business Manager,  
Atlas Copco Drilling Solutions LLC

for shallow wells in remote locations.

At Atlas Copco we are constantly improving our equipment offering and developing our people and services in these emerging markets that need water support so badly. From Russia, Africa, Australia, China and Latin America, our business and product managers work with their counterparts from

other Atlas Copco locations to deliver solutions that will work best in any market. You will see on page 4 how we are growing our business in Western Africa to better support our customers in that impoverished region.

But Atlas Copco is not all about profits and the bottom line. In 1984, at the height of the drought in middle Africa, Atlas Copco established a non-profit organization called *Water for All* to help bring water to people in need through employee contributions. Only recently *Water for All* has expanded to include Atlas Copco employees in the USA. And although this endeavor has been primarily for Atlas Copco employees, anyone can contribute. (Read more about *Water for All* on page 18 of this issue.)

A lot of hard work has been done to get water to those who need it, but there is still much more left to do. Atlas Copco Drilling Solutions is committed to this market and to this challenge.

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**Atlas Copco**



# THIRSTY IN WESTERN AFRICA

*Many still have to walk to the nearest well to collect and carry home their daily water supply. Contractors often rely on Atlas Copco rigs to get safe and accessible drinking water to the booming population of Western Africa.*

**A**s you travel Western Africa, you quickly realize that the local people speak many dialects. For example, Burkina Faso has 21 dialects and Ivory Coast boasts a whopping 82. So, it is extremely helpful to have a common trade language. Linguistically, Africa is divided into French and English. One is spoken as the first language and the other as the second in most Western Africa countries.

Western Africa is in the middle of a population boom. For example, the capital

city of Ouagadougou, Burkina Faso, currently has 1.4 million people, but the population is expected to reach 4.6 million in just 15 years. This rapid growth will create an enormous demand for water within the region. To meet this demand, the government has dedicated money to fund more than 1,300 water well projects in remote villages. Global government entities and non-government organizations (NGOs) will also contribute to the fund, bringing the number of new wells to approximately 3,000.

Ouagadougou has a good highway system branching out in various directions from the city. Once off the established paved highways, however, the road quality quickly deteriorates to gravel then dirt paths ... and ultimately to no road at all, only foot paths.

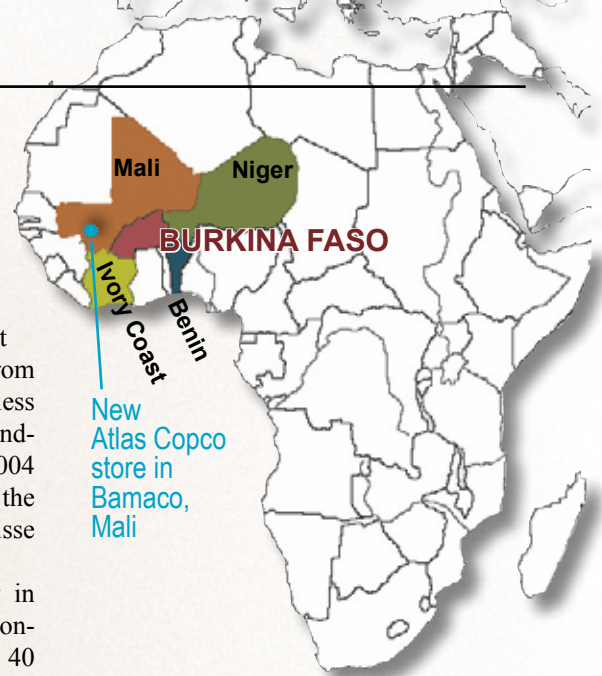
In these remote areas where there is no electricity, the hand-pump well is vital. This type of well is constructed with a walled area around the pump to protect the hydrant area from animals as there are no fences to contain sheep, goats and



## DEEP HOLE DRILLER

co's customers in Western Africa is Geofor International. Owner, Soglie Panguéba, started the company in 1998 and has since purchased six T3W rigs. Geofor leads the region in depth of experience. Over the years the company has completed a long list of projects that includes everything from community water systems with stainless steel water towers to hundreds of hand-pump systems in small villages. "In 2004 alone, we installed 500 wells," said the company's technical director, Simplisse Soglie, nephew of the founder.

Another major drilling company in the area is ATP, which also offers construction and paving services. About 40 percent of ATP's business is water well development using its fleet of four T3W rigs. ATP's oldest T3W is 20 years old. The newest is a 2002 model. ATP keeps its aging fleet in good shape by following a routine maintenance schedule. The company's hydraulic engineer and manager of the drilling operation, Kobore Inoussa, rotates the fleet, so that every 20 trips each rig is serviced and its fluids are changed. During the rainy season from July through September, it is impossible to get into the countryside to drill, so ATP's rigs go into the shop in Ouagadougou for a complete check and overhaul.



Oumar Pat O, the president of SAAT, another Atlas Copco customer, recently purchased two Atlas Copco T3Ws. When asked why the T3W, O said, "For Africa, the best rig is the T3W." O got into the drilling business because he saw the need for a quality rig that could withstand the harsh African environment. O's son, Oumar, who manages the drilling business, sees increasing the number of water wells as an opportunity to give independence to the people. This philosophy of promoting self reliance carries over from the family's other business, a thriving Kaizer motor

# AFRICA

other roaming herds. This physical barrier ensures that the well is not contaminated from animal waste or leaching surface contaminants. The concrete pad has a trough that allows water to flow to a concrete tank so animals can drink from the same well.

### T3W™ STANDS OUT

Atlas Copco has a number of water well customers in Ouagadougou. They all currently work in Burkina Faso but also cross borders into the surrounding countries of Benin, Mali, Ivory Coast and Niger.

When looking at the favored equipment in this part of the world, there is one drill that stands out above all others: Atlas Copco's T3W.

The oldest and largest of Atlas Cop-

The drilling crew from ATP in Burkina Faso relies on the Atlas Copco T3W. They are shown working at left.



scooter assembly and distribution business.

Getting parts and service to the remote areas in Western Africa is a major undertaking, so Atlas Copco is opening a new customer center in Bamako, Mali, in September of this year. This new customer center will be headed by Laurent Nicoud, a Frenchman who was raised in Ivory Coast and has spent more time living in Africa than in France.

“In Africa, the elephant is respected because of its strength and power.” Nicoud



◀ Sogli Pangueba started the drilling company Geofor International.

His nephew, ▶ Simplisse Sogle, is technical director of the company.



Laurent Nicoud will run the new Atlas Copco office in Bamako, Mali.



**“In Africa, the elephant is respected because of its strength and power. Atlas Copco is the elephant of the drilling business. Our ability to use the size and strength of Atlas Copco to open an office in Bamako will offer technical service and support for the local customer as well as consumables and parts support.”**

— Laurent Nicoud, Atlas Copco store manager at new location in Mali

In most villages, activity at a drill site is a major event and draws many spectators.



said. “Atlas Copco is the elephant of the drilling business. Our ability to use the size and strength of Atlas Copco to open an office in Bamako will benefit Africans.”

When the new facility opens, Bamako will offer technical service and support for the local customer as well as consumables and parts support – a big advantage for the customer.

“It’s not just proximity we will bring to the customer in Western Africa, it’s a higher level of quality,” said Nicoud. He points out that quality is obviously expected from Atlas Copco, and providing that quality with an African perspective is equally important. That includes training, service, parts and whatever the customer needs.

“I am committed to my customer’s productivity, and that means being the Atlas Copco they need me to be.”

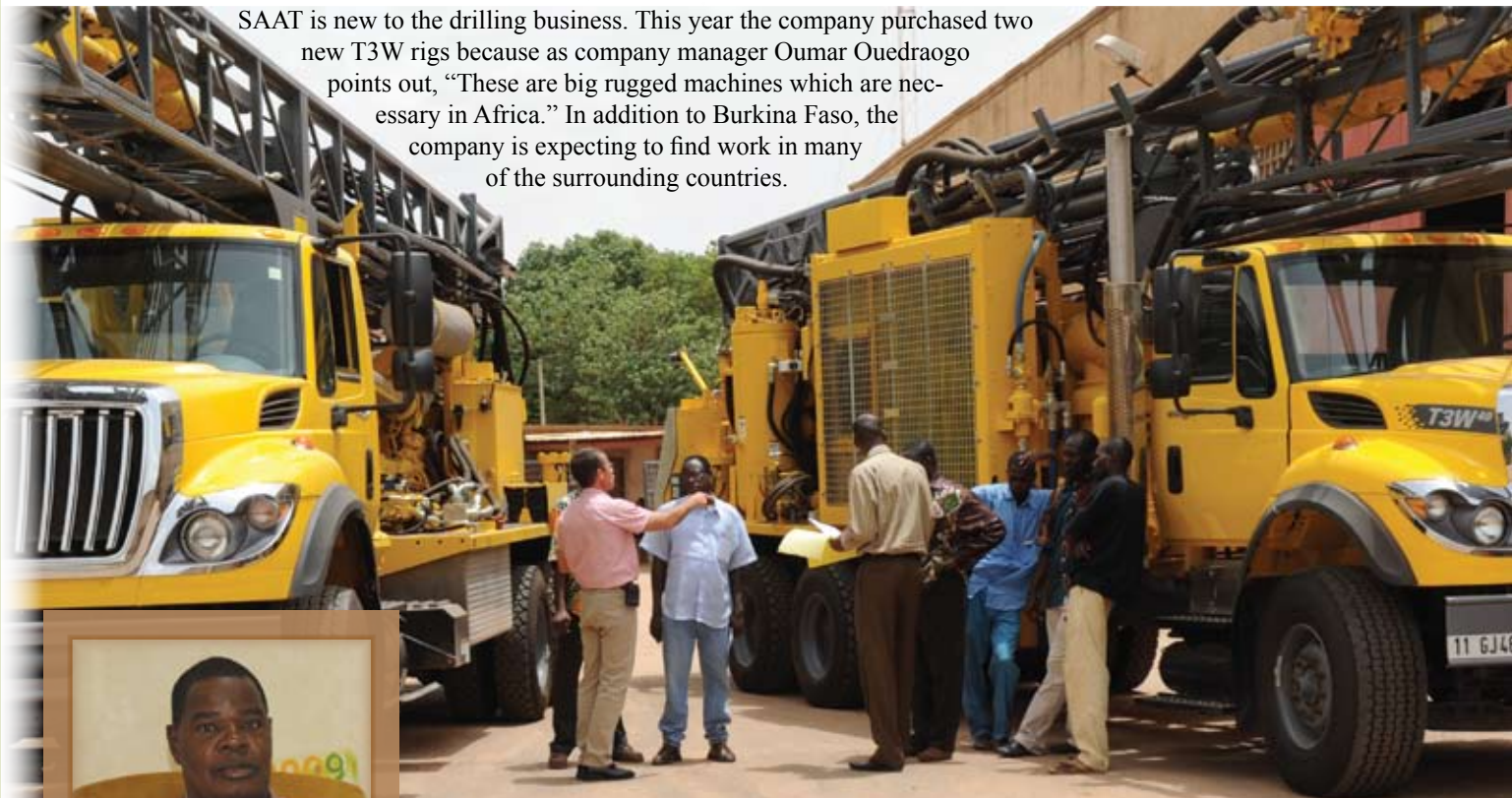
**DHD 2 09**



Burkina Faso has 1.4 million people, but is expected to reach 4.6 million in just 15 years. The country is working to get adequate water for its citizens.

## NEW DRILLING COMPANY PURCHASES TWO ATLAS COPCO T3Ws

SAAT is new to the drilling business. This year the company purchased two new T3W rigs because as company manager Oumar Ouedraogo points out, “These are big rugged machines which are necessary in Africa.” In addition to Burkina Faso, the company is expecting to find work in many of the surrounding countries.



◀ Pat Ouedraogo owns SAAT. Above, Atlas Copco representatives and SAAT workers inspect the new T3Ws.

The Atlas Copco T3W has proven itself reliable and productive for major drilling companies in Western Africa.

# *A nation's water*





Even in a developed African nation such as Kenya, water supplies are limited and people in both urban and rural areas struggle to get the water they need. A Kenyan government program steps up, using Atlas Copco drills, to get quality water to its people.

**K**enya, nearly split in two by the Great Rift Valley, is renown for its geographical diversity that includes a fertile, agriculturally rich region in the west that graduates to a semi-arid climate and eventually becomes desert at the eastern border with Somalia.

Water is at such a premium in this part of the world that some people in Kenya are lucky to even have access to surface water. Twenty-two year-old, Monica Yator, moved to the city of Nairobi to pursue an education. She said that her family, who still lives in her home village, gets their water from a stream and has to add a drop of chlorine to sanitize the water for drinking. This is the same water used for livestock, irrigation and laundry. Kenyans living in areas that don't have surface water must walk miles to and from a community well to obtain potable water – carrying 5-gallon (20-liter) containers as far as 12 miles (20 km) in each direction. “This responsibility falls on the women in the family and is a full-time job,” said Gerald Wanjohi, aftermarket manager for Atlas Copco’s Eastern Africa office.

The National Water Conservation and Pipeline Corporation, a department under the Kenyan Ministry of Water, is required to drill 200 wells per year to supply water to the general population. Including its latest acquisition of four Atlas Copco T3Ws, National Water has a fleet of 18 drill rigs. Supplying water to the masses requires everything from large, deep bore-holes for cities of millions with public water tanks to shallow wells with hand pumps for small rural areas.

It’s the job of Maintenance Manager,

Robert Mwangi Wachira, and his deputy, Musa Osieko, to keep this fleet operational and coordinated, which is a monumental task. Both men are mechanical engineers who understand what is required to manage a fleet. They also know the extreme terrain over which the rigs must travel. Most of us in the western world take roads for granted: in Kenya, roads can be a luxury. More often than not, crews must navigate little more than a foot path to get to their destination. However, the T3W is designed to handle harsh terrain.

To keep their rigs in the best working order, National Water has worked with Atlas Copco’s Eastern Africa office in Nairobi to tailor a DrillCare\* service program that fits National Water’s situation, taking into account the harsh environment the rigs are subjected to. Rig accessibility and training are also incorporated into the agreement.

Keeping parts and consumables in stock for standard service and emergency



\*DrillCare™ is an Atlas Copco maintenance program that helps achieve superior productivity.

situations is part of the DrillCare agreement, but keeping a regular preventive maintenance schedule and audit program is even more important. Having a major problem in a remote area could keep a rig out of service for long periods of time. It would take days or even weeks to get the rig from the remote regions back to the maintenance yard for service.

Atlas Copco Service Technician, Boniface Maweu, makes regular service visits to the rigs wherever they go. He carries all the required parts as well as some emergency parts for the 250-, 500- or 1,000-hour service intervals. While on site, he also inspects the rig, following a regular program of checks to make sure everything is running properly. A National Water crew member is responsible for daily inspections and lubrication.

For Robert Mwangi and National Water, this service program works. “This is a good program for us because we can’t add people with this expertise. We work closely with Atlas Copco and communication is necessary to keep this working.”

It can take days to reach a drill site because of the remote locations, so it’s imperative to know exactly where the rig is located. Imagine looking for a needle in a haystack. That’s what it would be like for Atlas Copco’s serviceman to find a drill crew without communication from National Water’s office. And keeping hours on a rig is not as easy as just stopping by to check the meter. Added to that, because Kenya borders a hostile country, it is also necessary to ensure proper security when working in that region.

Osieko pointed out how much he appreciates each eight-man crew, giving them credit for the good condition of the equipment. He also recognizes the difficulty of the job. The crews work hundreds of miles from their homes for up to a month at a time, with an allowance to cover expenses when on the road. These men often live with the rig during that time.

**“It’s not enough to just put the complete system in place. It’s also necessary to train the community to ensure everything is used properly.”**

National Water  
Maintenance Manager  
Robert Mwangi Wachira

In Kenya, a single 1,000 ft (300 m) bore hole can take as much as 10-days to drill and case. Once the crew gets to the area, “It could take days just to prepare the site,” said Osieko.

National Water’s crews utilize both mud and air drilling, depending on the geology which includes every variation of rock. Mud drilling is common in the eastern half of the country which endures the harshest environments. In the Rift Valley near the town of Nakuru, the ground consists of igneous rock with many voids that cause problems with circulation. The Rift Valley is a wide cut in the earth – miles wide – dotted by many dormant volcanoes.

“I never know what I’m drilling in this area,” says master driller Fredrick Maina. And with nearly 30 years at the controls operating many types of drills all over Kenya, he has seen it all. Today Maina is commissioned to drill a 920 ft (280 m) well, 10 inches (25 cm) in diameter. The water will be used to supplement the municipal water supply of Nakuru, a city with nearly 2 million residents. Currently, the water comes from a river well up the Rift Valley.

“We had problems [on this site] from the start,” says Maina. The crew continuously encountered voids in the volcanic formation which resulted in lost circulation. “In this case, we switch to mud or attempt to case through the formation,” said Maina.

The standard well construction consists of casing with 10-inch (25-cm) steel to solid rock, then continuing to the depth

predetermined in geological reports. Because of the huge variations in geology and site location, “Some 984-ft (300-m) holes are finished in three days, some take weeks – some just end up dry,” said Maina.

Maina said learning to operate the new T3W was no problem after running the variety of rigs he has worked with over the years. “It’s just like driving a new car, learning the gear shift and other functions just takes some time.”

### THE BIG PICTURE

When completed, the well at Nakuru will pump into the city’s water tank. A second construction crew will come in and build the appropriate facility which could include a complete system with water tank, pump and generator to bring the water to the surface. National Water also works with the community to develop the maintenance program for the installed facilities.

In some areas the people have been using surface water for drinking and washing, so education is also required “It’s not enough to just put the complete system in place,” said Wachira. “It’s also necessary to train the community to ensure everything is used properly.”

Placement of water systems is the responsibility of the Ministry of Water. Through an evaluation process they determine the need and drill the wells. Drills also move throughout the country as necessary to compensate for annual drought.

Ultimately, the goal is to provide potable water in close proximity to every citizen who needs it. “Just like a doctor manages a patient’s needs, developing water solutions for Kenya includes identifying the need for each area,” said Osieko.

Ultimately, National Water’s goal is to support the water needs of the Kenyan people. With Atlas Copco as a partner supporting the rigs and tooling, that goal is a little closer to being accomplished.

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Cost of consumables is important to everyone, but, when drilling in a remote location and looking at the big picture, every factor counts. National Water recently tested a variety of hammers to determine the best choice for consumables. It was determined that although “third-party” hammers were less expensive initially, they required more fuel to drill the well. Another determining factor is that when a rig is days from the shop, it is necessary to have tools that work. As a result of this testing, National Water will be purchasing Atlas Copco QL60 hammers for future production drilling.



## DEEP HOLE DRILLER

Robert Kinyua, product manager for waterwell equipment in Atlas Copco Eastern Africa, said that the relationship between Atlas Copco and National Water has continued to grow in strength since the first T3W rigs arrived in 2007.

**“The relationship has now matured into a partnership where we are constantly interacting and exchanging information on the performance of the equipment. We are now even training personnel from other countries and international organizations on the model we have adopted so they can replicate it back home.”**



▲ Robert Kinyua (product manager), Gerald Gaching'a (Aftermarket engineer), Musa Osieko (deputy maintenance manager), Robert Mwangi Wachira (maintenance manager).

▼ Atlas Copco service personnel (from left) Boniface Maweu, Gerald Gaching'a and Gerald Wanjohi pose with a drilling crew in Kenya.



# A WELL OF HOPE

*Using Atlas Copco equipment, UNICEF helps Ethiopia solve its water plight.*

Anyone who remembers watching the world news in 1984 and 1985 will surely remember the images of drought and famine that killed a million people in Ethiopia. It's those images that make Ethiopia synonymous with the need for water relief. UNICEF has been in Ethiopia since 1952 offering water and sanitation solutions to the people who live in this mostly agricultural-based country.

The images of famine that unfolded on the news 25 years ago are not the Ethiopia of today, although economic and social hardships still continue. Arid regions



According to Omogne, the wells are not difficult to drill in the area as the depths are normally no more than 187 feet (60 m). They would like a flow rate of about 60 to 80 gpm (4 to 5 lps). On the well photographed, the total depth was 131 feet (40 m) for a total of 24 gpm (1.5 lps).

in the country require more focus on water relief, but in most of the country the people live off the land in family units, depending on subsistence farming and carrying water – often for miles – for potable use.

A central mission of UNICEF is to bring the basics of safe water, sanitation services and improved hygiene to drought-prone and underserved areas. To accomplish this, the United Nations-funded organization has acquired the largest fleet of water well rigs on the planet. Today UNICEF has 10 rigs operating in Ethiopia alone including Atlas Copco Explorac R50™ rigs manufactured in Sweden and TH10™ rigs built in India.

When UNICEF purchases a rig in Ethiopia, it's donated to a partnering company that takes over the drilling. Amhara Water Works Construction Enterprise (AWWCE) is one of those partners. Chief driller, Daniel Amogne, has nine years of drilling and well construction experience with AWWCE — the last seven drilling with an Atlas Copco R50 drill rig and an XAHS 285 compressor.

At the time of Deep Hole Driller's visit in June 2009, Omogne had completed 60 wells this year, with about 30 of those being one-day projects. After a well is drilled, it is cased with PVC before the crew moves onto a new location. A second crew follows them to construct the concrete infrastructure and install the hand pump.

These wells will be used by the local people as a potable water source. Omogne and his seven-man crew, consisting of three truck drivers, three drillers and one geologist, are drilling 23 shallow wells in this immediate area near the town of Yejuba in the province of East Gojam. Ethiopia is divided into eight water districts.

This driller appreciates the Atlas Copco R50™ telescopic feature that allows him to raise the table for clearance over the casing.



East Gojam is in the Amhara district.

Omogne said, "The plan is to locate wells so that each will service 500 families." Currently the people living in this community must walk about 2½ miles (4 kilometers) for water. "The goal," continued Omogne, "is to get water close to the homes, requiring no more than a 43-yard (39-m) walk to the well head."

AWWCE uses the Atlas Copco COP 64 hammer and a 7<sup>7</sup>/<sub>8</sub>-inch bit. The R50 uses 10-foot (3-m) long drill pipe, which is easy to handle and transport. While the well is being drilled the bore hole is logged every 10 feet (3 m).

The well will be drilled to depth and cased with 5-inch production casing. A 2-inch pipe and hand pump will be used to draw the water.

Omgogne really likes the R50 and points out a key feature designed into the rig. "I think this rig is the best," said Omogne. "I like that the table raises and lowers with a hydraulic mast elevation

adjustment." This allows him to quickly insert a section of surface casing – without having to cut the section to fit – and continue drilling. The surface casing holds the collar of the hole open.

He likes his Atlas Copco compressor, too, mentioning the electronic monitoring screen that indicates all working functions. The automatic shutdown indicates loss of oil pressure, which could be very costly. "Down time is always bad, but if you can manage that by having good equipment, it's much better," said Omogne.

In partnership with the local distributor, Hagbes Pvt. Ltd, Atlas Copco has a service agreement with Unicef Ethiopia. Technicians from Hagbes, with support from Atlas Copco Eastern Africa Aftermarket Department, carry out periodic audits on all the rigs in different regions, including Amhara.

Based on these audits, maintenance needs are assessed and reports sent to Unicef headquarters for ordering parts

and service. The agreement is tailor made to fit local operating conditions like site remoteness or difficult terrains. Equipment sales are handled through the Atlas Copco Eastern Africa head office in Nairobi with support from Hagbes. The two entities work together to help to bring water to the Ethiopian people.

According to official figures, only 31 percent of households have access to safe water, and 18 percent have access to sanitation facilities. Without humanitarian organizations like UNICEF, many Ethiopians wouldn't have the opportunities they have today.

UNICEF Ethiopia plans to reach 6 million people between 2007 and 2011. Four and a half million of these will be children and women. More than 650 health infrastructures and 1,000 schools will be provided with complete WASH packages, which include safe water, sanitation and hygiene promotion.

DHD 2 09



Currently the people living in this community must walk about 2½ miles (4 kilometers) for water.

Drilling, Observation and Sampling of the Earth's Continental Crust (DOSECC) is a not-for-profit corporation whose mission is to provide leadership and technical support in subsurface sampling and monitoring technology.

Fifty-seven research organizations are members of DOSECC, which is headquartered in Salt Lake City. One of DOSECC's goals is to design, build and operate drilling systems, but most of the drilling rigs it uses are made by **Atlas Copco**. Other goals of the company are to: facilitate and support cost effective scientific drilling projects; link science and drilling technology; promote technology transfer and education, and represent U.S. interests in the international scientific drilling community.



# The art of DRILLING FOR SCIENCE

*Worldwide leader in drilling technology uses Atlas Copco equipment in exploration jobs for scientists, including its latest project off the Jersey Shore.*

**A**tlas Copco equipment is being used to retrieve evidence of climate change found beneath the Atlantic Ocean floor. Scientists from 10 countries are examining the core samples collected from 35 miles (56 km) off the coast of New Jersey to explore the Earth's past in order to help predict its future.

The New Jersey Shallow Shelf Expedition 313 is funded primarily by the Integrated Ocean Drilling Program (IODP) through the European Consortium for Ocean Research Drilling (ECORD), a con-

sortium of 17 European countries formed to participate in IODP. Funding is also provided by the U.S. National Science Foundation, Japan, China, Korea, Australia, India, and New Zealand. Additional support for Expedition 313 was provided by the International Continental Scientific Drilling Program.

DOSECC is the drilling expert on this project. They've chosen the Atlas Copco CS4002™, mounted on a 245 class liftboat (L/B *Kayd*) owned and operated by Monteco Offshore Inc. of Galiano, La. The *Kayd* can

work in water depths of 180 ft (54 meters) and still keep the drill 45 ft (14 m) above rough sea waters. DOSECC will drill three 2,460 ft (750 m) holes, using specially de-

Above, the liftboat, L/B *Kayd*, docks prior to sailing to the first drilling location. The photo was taken in Atlantic City, N.J., while the liftboat was at the US Coast Guard Station taking on supplies. The 245-foot legs are in the "up" position.

*Photo by G.J. Tulloch©ECORD/IODP, courtesy of DOSECC.*

**“The cores will show sedimentation rates and types of material found over millions of years. ... The drilling technology is absolutely critical.”**

— Ken Miller, Co-principal Investigator

signed PQ core barrels, in water about 114 ft (35 m) deep. The use of the larger PQ barrels meant that DOSECC had to use Atlas Copco's largest core drill rig, the CS4002.

Ken Miller is the co-principal U.S. investigator for the project and professor in the Earth and Planetary Sciences Department of Rutgers University, New Brunswick, N.J. He said that when he first started thinking of this study in 1988, the idea of global warming was still new and was debated in the scientific community. Now, everyone agrees that glaciers are melting at a faster pace than ever and he's interested in learning how that will change the world's shorelines. Past samples taken from drill sites indicate that sea levels have risen 13 ft (4 m) over the last 5,000 years. Now, sea levels are rising at an accelerated rate of 1.2 ft (.4 m) per 100 years and that's expected to keep increasing.

The expedition will collect cores from sediments deposited some 14 to 24 million years ago, a time of considerable sea-level fluctuation due to climatic variations. Scientists will analyze these cores to accurately reconstruct global sea-level changes during that period and to assess the imprint of those changes on the development of the sedimentary sequences off New Jersey. It is thought the shoreline has varied from 71 miles (115 km) landward and 93 miles (150 km) seaward from today's location.

The New Jersey project has two goals: to establish a time and magnitude of sea level changes over the past 35 million years and to better recognize the imprint of sea level changes in shallow waters of all ages and all locations. Scientists will better understand the complex ties between climate, sea levels and earth systems on continental shelves, in particular. Then, they can anticipate future changes that may come as sea levels rise due to glacial melt.

Atlas Copco's CS4002 is a part of a mission-specific platform that is well suited for recovering core samples from

The platform 35 miles off the coast of New Jersey keeps the drilling work with the Atlas Copco CS4002 above rough waters.

*Photo by E. Gillespie@ECORD/IODP, courtesy of DOSECC*



the sand-rich shelf sediments. DOSECC Education and Outreach Manager David Zur said, “The cores will show sedimentation rates and types of material found over millions of years. Any information we can get will tell us more about climate change and sea level change and that’s important, especially in populated areas such as the northeast United States.”

Miller said, “We’ve done 13 sites on shore, and we weren’t reaching the sensitive intervals that we needed. Reaching the correct depth is critical.”

Now, he said reaching the right depth is possible with DOSECC's expertise and equipment. “The drilling technology is absolutely critical. When [DOSECC started using] the CS line, it made such a difference.” Miller said he receives samples now

that are at least 30 percent better than what he received years ago from core drilling.

### PRECISE WORK WITH THE CS4002™

DOSECC Operations Manager Chris Delahunty said, “We absolutely love the CS4002 model. We’ve had it for 18 months and haven’t had any major issues. It’s powerful with plenty of torque and pullback.” DOSECC is using a casing hammer system, where the drill rod goes through a 6⅝ inch casing, giving the drill string stability as it reaches its depths through the water and down into the bed of the ocean. CphiD LLC of Draper, Utah, was the mastermind behind the design and construction of the platform. Through several iterations



A crew is transferred from the supply boat to the Kayd.

Photo by E. Gillespie©ECORD/IODP, courtesy of DOSECC.

and layouts a suitable cantilever structure was designed and built specifically for the deck space of the L/B *Kayd*.

Drilling for scientific purposes rather than for obtaining the standard exploration samples is tricky work for the drillers. When a small portion of a sample can represent 100 years of time, a good sample is more important than anything. Delahunty said, “We are most interested in quality and taking our time to do it right. Every millimeter matters.”

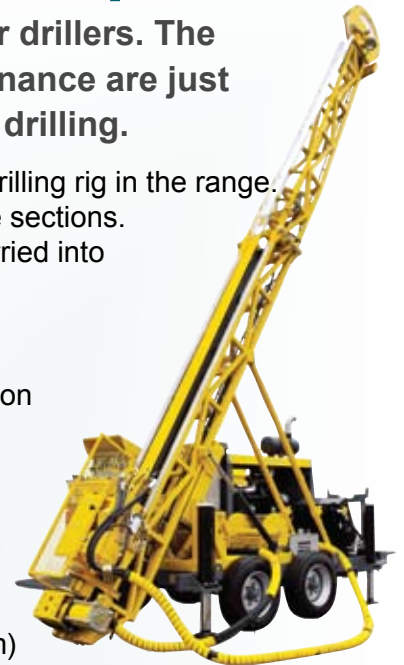
The CS4002 is also used in core drilling for other purposes and was recently truck-mounted when used for gold exploration. The CS4002 is easily dismantled for the required scope of work and then remounted for transport if needed.

For the NJ project, the coring is done in 10 ft (3 m) sections; samples are collected in 2.44-inch (6 cm) Butyrate plastic liners specially made for the project. The ends are topped with color-coded caps indicating the orientation of the core.

## More about the Surface Core Drills used by DOSECC

Atlas Copco surface exploration drill rigs are built by drillers for drillers. The rugged design, long feed, P-size rotation head and easy maintenance are just some features that make the CS-series a sound choice for core drilling.

- **CS10 – compact and maneuverable** – Christensen CS10™ is the smallest drilling rig in the range. This trailer-mounted drilling rig has a robust, long mast that can be split into three sections. It is easy to transport between work sites and the compact size allows it to be carried into difficult terrain. Depth capacity = 2,625 feet (800 m)
- **CS14 – all around hard worker** – Christensen CS14™ is a trailer-mounted, medium sized core drill rig for surface exploration applications. The CS14 is built on the well proven concept of easy operation, simple technology, high capacity and reliable performance. Depth capacity = 4,042 feet (1,232 m)
- **CT14 – everything needed on a truck-mounted rig** – Christensen CT14™ represents one of the most flexible drilling rigs in the range. This is the smallest truck-mounted rig, yet it has all the equipment required, including components that are optional with the CS14. Depth capacity = 4,042 feet (1,232 m)
- **CS3001 – tried and proven** – The CS3001™ is a field-proven concept that has become exceedingly popular for those looking for a tough medium- to deep-hole exploration drilling rig. This truck-mounted model features a hydraulic slide mounted control panel. It can find its way to high terrain and is equipped with a high altitude kit to ensure smooth operation. Depth capacity = 6,000 feet (1,828 m)
- **CS4002 – most powerful so far** – The CS4002™ is truck-mounted and can drill quickly and efficiently. Thanks to its Tier 3 engine, emissions are also kept to a minimum. This drilling rig is equipped with a mast extension to accommodate 30 ft rods. The optional rod rack makes rod changes simpler and safer. Depth capacity = 8,030 feet (2,447 m)





## CS14™ RECORDS LONGEST SEDIMENT CORE EVER COLLECTED IN ARCTIC

A recent project in Siberia was one of the most complicated that DOSECC has experienced, and it earned the corporation a lot of attention for its significance in core drilling. The deep drilling system for Arctic operations was again developed by DOSECC, and included an Atlas Copco CS14. On that job, the CS14 drilled from a heated platform in a frozen lake.

Principal investigators were Julie Brigham-Grette (USA), Martin Melles (Germany), Pavel Minyuk (Russia) and Christian Koeberl (Austria).

Delahunty said the team planned ahead for any parts or service and brought everything they could possibly need with them to Siberia. Marc Clark, a technical service and training specialist with Atlas Copco's ground engineering division, worked closely with DOSECC's team to make sure they had the right parts for any scenario. This was unusual since DOSECC usually utilizes Atlas Copco service techs from the customer centers in their region. When needed, DOSECC uses its own organized maintenance program and Atlas Copco Genuine Parts to keep its drills running.

Greg Kerr, Ground Engineering regional manager for Atlas Copco, said, "DOSECC has been a very valuable and long-term customer of Atlas Copco. Their work takes them all over the world and into some unusual conditions – including work off floating barges and frozen lakes – so they have been able to provide Atlas Copco with invaluable feedback on our drill rigs."

On the Siberian project in May 2009, scientists from the United States, Germany, Russia and Austria completed a six-month drilling expedition to a frozen lake: Lake El'gygytyn, known as "Lake E." Lake E was created 3.6 million years ago when a meteor more than a half-mile wide hit the earth and formed an 11-mile-wide (18-km-wide) crater. There, the researchers collected the longest sediment core samples ever retrieved in the Arctic region. Information contained in the cores is of unprecedented significance for understanding climate change in the Arctic.

With respect to time in earth's history, the cores collected from three holes drilled under frozen Lake E are more than

Photo by G.J. Tulloch@ECORD/IODP, courtesy of DOSECC



30 times longer than cores from the well known Greenland Ice Sheet.

The team recovered a total of 1,165 ft (355 m) of sediment; the sediment record collected extends back roughly 3.5 million years. "Studying high-latitude systems is of great importance to an understanding of earth's climate at all latitudes," said Paul Filmer, program director in the National Science Foundation (NSF)'s Division of Earth Sciences, which co-funded the expedition to Lake E with NSF's Office of Polar Programs.

Below the lake's sediments, cores drilled into bedrock will offer geologists a rare opportunity to study meteor impact melt rocks from one of the best preserved large meteor impact craters on Earth, and the only one formed in silicon-rich volcanic rock. The team recovered roughly 131 ft (40 m) of the earliest history of the lake.

The Lake El'gygytyn Drilling Project is an international effort funded by the

International Continental Drilling Program (ICDP), the U.S. National Science Foundation Earth Sciences Division and Office of Polar Programs, the German Federal Ministry for Education and Research (BMBF), Alfred Wegener Institute (AWI), GeoForschungsZentrum-Potsdam (GFZ), the Russian Academy of Sciences Far East Branch (RAS/FEB), Russian Foundation for Basic Research (RFBR), and the Austrian Ministry for Science and Research.

With organizations such as these supporting DOSECC's work, Atlas Copco is proud to be trusted to provide drilling equipment to get the job done. Kerr said, "DOSECC's drill fleet includes Atlas Copco's CS500, CS1500, CS14 and a CS4002. It's safe to say that DOSECC has pushed Atlas Copco drills to their extreme in the most extreme working conditions and they have come out strong."

DHD 2 09

# Atlas Copco's Water for All celebrates 25<sup>th</sup> anniversary

**A**s Atlas Copco employees celebrate the 25<sup>th</sup> year of Water for All (a company organization funded primarily through employee contributions and matching funds), Atlas Copco North America, India and China have joined the group by organizing their local employees under the same banner.

Water For All, which started in 1984 in Sweden, has several thousand members from Sweden, England, Belgium, China, Germany, Italy, South Africa and Spain. In fact, Atlas Copco is on its way to achieving its goal of having 25 countries on board by the 25<sup>th</sup> anniversary of Water for All.

With the objective: "help people to help themselves," Water for All prefers to use simple techniques when working on water projects, teaching local people how to work hand pumps and how to protect the natural springs for future water quality. Water for All wants the end users to take part in and have ownership of the project. This helps ensure long-term success.

Water for All helps support charitable organizations and NGOs that complete water well work. Atlas Copco North America has just started its fundraising efforts and expects to contribute to a specific project late this year. Chris Heap, VP of Human Resources at Atlas Copco Drilling Solutions said, "We look forward



## Milestones:

- First project in Peru 1986
- First project in Africa 1991
- First project in Tibet 1995
- First project in India 1996
- First project in Honduras 1999

to being in a position to fund a project. We can look at it and say, 'That one's ours.'"

Heap serves as the Chairman of the Water for All Committee in the U.S.

Heap said he's been impressed with the generosity of Atlas Copco employees, especially during a time when many charitable donations are down.

Water for All was formed in 1984 after a terrible drought in Peru and has helped provide water to the most needy areas of the world since then. It has supported partners around the world, in countries ranging from Afghanistan to Malawi

and Peru. Installing water pumps in schools and villages and protecting natural springs has created sustainable water supplies for more than one million people.

"We are very happy to see so many of our people take an interest in this important issue, which is not only about health and sanitation, but also about creating significant social benefits. Having clean water in schools means better access for children to education," says Jo Cronstedt, Vice President

Public Affairs at Atlas Copco, Sweden. "The response has been astounding, for instance in China where Water for All now has close to 3,000 members who contribute a monthly amount from their salaries."

Water for All celebrated its 25-year anniversary with an August event in Sickla, Sweden. The event included lectures on water issues and information on projects from partnering organizations.

**If readers would like to make a donation, Atlas Copco will accept outside contributions. Send checks payable to Atlas Copco North America — Water for All to either:**

Chris Heap  
Atlas Copco Drilling Solutions LLC  
2100 North First Street  
Garland, TX 75040

Carol Skrodski  
Atlas Copco Compressors LLC  
94 North Elm Street, 4th Floor  
Westfield, MA 01085

*Donations are not tax exempt because Water for All does not yet have charitable legal status. Also, Atlas Copco matches employee donations only.*

# Predator Drilling System™

## shown at OTC; production begins 2010

**V**isitors at this year's Offshore Technology Conference in Houston were the first to see Atlas Copco's Predator Drilling System prototype. Upon successful testing, the Predator will go into full production beginning in 2010.

Shane Lein, product manager for oil and gas drilling rigs, Atlas Copco Drilling Solutions, said, "We are excited about the opportunities for the Predator and are looking forward to talking with potential clients about the Predator's advantage over existing equipment."

One of those major advantages, according to Kevin Moran, is the fast setup time with the Predator Drilling System. Moran, engineering project manager with Atlas Copco Drilling Solutions, said, "A drill in this class normally spends less than half of its time actually drilling holes. The rest of the time is spent mobilizing, rigging up, handling pipe and standing by while other operations are completed. We took all of this into consideration during the development process. In addition to designing a rig to drill oil and gas wells to a specific depth, we focused on reducing non-drilling time and cost, increasing operating performance, and enhancing safety."

The Predator can drill vertical, directional and horizontal wells. It is designed to compete in the 200,000 pound (90,719 kg) hookload range, and features automatic pipe handling, a top drive, and PLC controls in a three-load, two-man crew configuration. The 950-horsepower hydraulic unit brings advanced technology to the smaller spec rig market. The innova-

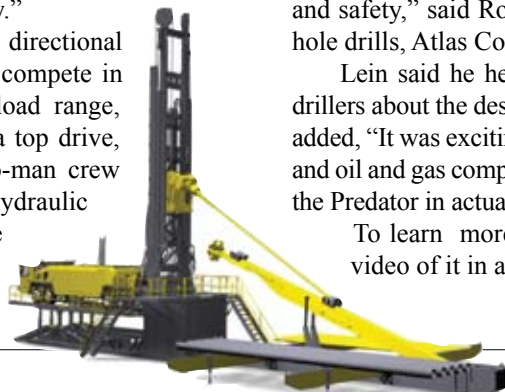


tive drilling system includes a mobile rig, a substructure and a pipe handling system.

"These three components are designed to work together to achieve a new benchmark in drilling performance, operating cost and safety," said Ron Buell, business development manager, deep-hole drills, Atlas Copco Drilling Solutions.

Lein said he heard positive comments at the OTC show from drillers about the design, mobility and capabilities of the Predator. He added, "It was exciting to have both drilling contractors and operators and oil and gas companies express their interest in being able to watch the Predator in actual drilling operations."

To learn more about the Predator Drilling System and see a video of it in action, visit [atlascopcooilandgas.com](http://atlascopcooilandgas.com).



The **SUBSTRUCTURE** is strong and large with crew efficiency and safety in mind. The **HANDLING SYSTEM** sets up the BOP after surface casing has been set. The crane boom, operated by remote control, can be positioned over hole center or can reach off the work floor to pick up loads from the ground. The air/mud manifold is also located on the substructure for quick ground-level hook up.



The **SKATE** is a complete pipe handling system designed to work with the Predator rig and substructure. It is a single skid-mounted load positioned directly behind the substructure and attached to it. The skate is designed to handle drill pipe, collars and casing. It can handle Range II (30') or Range III (40') oil field drill pipe as well as Range II or Range III lengths of casing up to 24 inches (610 mm) in diameter. Unlike manual pipe handling systems, the skate can maintain a constant, fast speed for hours.



The **CARRIER** has a full-width, low-profile cab with the amenities found in conventional trucks. The carrier drive also has the ability to drive in "creep mode," a feature that gives the driver precise control and vehicle placement in off-road or extreme driving conditions.

# Are you tough enough?



**The Atlas Copco T3W dominates drilling on a continent where getting to a job often involves travelling across hundreds of miles of grueling terrain.** Add to that searing heat and a hostile environment and you can see why both the drillers and their equipment must be tough enough to withstand the rigors of the work — day in and day out. Atlas Copco's waterwell series of rigs have a proven reputation and can reach water wherever it is and whenever it's needed. Atlas Copco recognizes that when a customer invests in capital equipment they expect follow-up support. Atlas Copco's global coverage offers a complete range of parts, service, sales, rentals, repairs and consultants. This issue of *Deep Hole Driller* illustrates the challenges faced in some of the most extreme conditions. Starting on page 4, meet some drillers in Africa who are tough enough for the job.