THE INTERNATIONAL MAGAZINE OF THE BP GROUP **ISSUE 1 2015**

BP MAGAZINE

RIDING THE WAVES

As BP Shipping embarks on its second century, *BP Magazine* reports on its key milestones over the past 100 years, and meets some of the people serving on its vessels today.

Welcome. This year marks the centenary of BP Shipping. Much has changed since its first vessel – the *British Emperor* – was launched, and in this edition, we take a look at some of the biggest moments in its history (page 26). We also talk to Captain Bob Gribben, the master on board the *British Emerald*, to find out how life at sea has changed (page 38). Elsewhere in the magazine, we get some expert advice from a geophysicist on how to 'read' seismic data (page 12); we visit BP's Cartaret oil terminal in New Jersey, US, to find out how it keeps 19.8 million citizens on the move (page 20); and Her Royal Highness Princess Laurentien of the Netherlands explains why raising literacy levels is good for business (page 50). From now, *BP Magazine* will be moving to an entirely online home, with new features published every month. If you'd like to receive a monthly email highlighting our new stories, please email *bpmagazine@bp.com*

Lisa Davison> Editor

BP MAGAZINE
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4 Fast lane Find out how work at Castrol's Wayne Technology Center helped develop the new Castrol EDGE lubricant, and the role the product is playing in a new land speed record attempt.

EDGE OF HISTORY

Speed demon: The 13.5-metre Bloodhound SSC (supersonic car) will attempt to break the land speed record over two years in a specially-prepared area of the Northern Cape, South Africa.

Castrol has assisted land speed record attempts for almost 100 years, so it's fitting that its latest lubricant – Castrol EDGE – is just one of its products helping to support a new record attempt due to take place over the next two years in the South African desert.

REPORT> AMANDA BREEN **PHOTOGRAPHY>** STEFAN MARJORAM / JOSHUA DRAKE
ILLUSTRATION> FLOCK AND SIEMENS

Behind the wheel: below left, Wing Commander Andy Green OBE holds the current land speed record and will be behind the Bloodhound steering wheel; below, Sam Chen, senior polymer research technologist, selecting additives for blending for Castrol EDGE, at the Wayne Technology Center in New Jersey, US; right, Mary Zhang, formulations technologist, evaluates the shear stability of motor oil for Castrol EDGE.

How fast can you go – without taking off from the ground – when you build a 'car' by bolting a cluster of hybrid rockets to a Eurofighter Typhoon jet engine, and placing a Royal Air Force wing commander at the controls? The British engineering team behind the latest land speed record attempt is confident that this combination of hardware and skill will see the Bloodhound SSC (supersonic car) break the 1,000 miles per hour (or 1,610 kilometres per hour) in the South African desert by the end of next year.

Currently under construction in an unassuming warehouse on the outskirts of the UK city of Bristol, the 13.5-metre (44-foot) supersonic car will undertake the challenge over two years in a specially-prepared area of the Northern Cape, the largest and most sparsely populated province of South Africa.

Bringing together the best of British engineering talent from private industry and academia, the team behind the Bloodhound Project also includes the current land speed record holder, Wing Commander Andy Green OBE, who will be at the steering wheel, as well as former record holder Richard Noble OBE, today's project director.

There's a wealth of other experience backing the Bloodhound SSC as well. BP's lubricant brand, Castrol, has supported 21 land speed records since 1922 and its green and red colours will appear again on the side of this vehicle, with a number of its products pumping around the car's interior – from brake fluid to rocket system greases, the different lubricants and greases will be exposed to the most extreme 'motoring' conditions.

The supersonic car will use a 550 horsepower Jaguar V8 engine – not to drive the actual vehicle, but to pump oxidiser into the rocket. Inside that engine, Castrol EDGE will be keeping all the various parts moving as they should.

It's a demanding role but, in fact, the average new car in 2015 requires similar protection and strength within its engine. Today's engine oils operate under higher temperatures and greater stress than ever before. To address these challenges, BP's chemists and engineers in its lubricants business have generated a new molecule to provide extra strength in the oil films of its Castrol EDGE product range.

The right chemistry

This technology journey began several years ago in a laboratory in New Jersey, US. "We're always looking at different chemistries or components that may allow us to enhance performance attributes of our lubricants," says Mario Esposito, Castrol's team leader for polymer development and passenger car oils, at the Wayne Technology Center.

"Our research initiatives are essential," he adds. "We formulate our lubricants around individual, proprietary ingredients, creating a 'hand-crafted' differentiated offer, and with Castrol EDGE, we aimed to develop a performance additive that made the lubricant stronger."

Castrol's team of chemists built that molecule from scratch, as polymer research manager Richard Sauer explains: "We were assessing a range of transition metals, such as iron and copper, trying to identify which

one would bring value to a finished oil. We needed to assess the advantages of each element, looking at factors such as engine deposits and wear control.

"We looked at how a metal may be incorporated onto a polymer chain to complete a finished engine oil with the desired performance attributes. Generally speaking, functional polymers bring extra performance characteristics to a completed formula. As well as identifying the chemistry, we also had to work on putting together a viable commercial process."

Titanium strength

Through their analysis, the chemists pinpointed a titanium molecule that displayed the sought-after characteristics: the additive changes the freezing pressure of the lubricant under extreme pressure and it actively thickens and reinforces the oil film. In an engine, that means it offers greater protection at high-pressure contact points, giving the oil the ability to keep metal surfaces apart more effectively with a cushioning effect.

The laboratory results needed rigorous testing in the real world to make sure that the claims could be substantiated. Castrol's team in Pangbourne, UK, led this phase of development to formulate the oil and test the effects of titanium to reduce friction and resist film breakdown.

"The next stage involved blending the new formulation by our laboratory technicians to optimise the viscosity of the product and later run the prototype formulations through engine tests," says Simon Gurney, automotive engineer and senior development technologist. "We test parameters, such as impact on engine wear, sludge build-up and piston cleanliness. Some tests can take several weeks to run – the longest was a 900-hour engine test. These are extreme by nature, creating conditions that will never be seen in a car on the road."

Tests also followed with original equipment manufacturers (OEMs) and other research facilities. "We worked with a Scottish university to independently test the additive under very high pressure," says senior technologist Gareth Dowd. "This confirmed that adding the titanium improved fluid strength by changing its physical behaviour." »

CASTROL EDGE: HOW DOES IT WORK?

When the titanium-containing molecule comes under pressure in the engine, it momentarily causes the oil to form a semi-solid, almost like cushioning pads between the points of contact. The oil stiffens under pressure and the titanium enhances this – when the pressure is relieved, the oil converts back to its usual liquid state and flows around the engine. With its unique titanium technology, Castrol EDGE is ready to perform however driver and engine demand.

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Simon Gurney

Technology in action: above, the cockpit inside the Bloodhound SSC; below Maura Tillotson, investigational analytical chemist, performs an extraction to isolate polymer for further analysis for Castrol EDGE; and opposite, a formulation technologist at Wayne Technology Center blends motor oil for Castrol EDGE.

Global product

Results confirmed that Titanium FST™ (fluid strength technology) doubles the film strength of Castrol EDGE, preventing oil film breakdown and reducing friction. The culmination of more than seven years' effort by Castrol experts came earlier this year when the product was launched in Europe and the Middle East, joining US and Asia markets, where it has already been on sale.

"This is now a global product with a global ingredient," says Tony Smith, Castrol senior advisor for claims and demonstrations. "The titanium additive contributes to a stronger lubricant for today's engines that are shrinking in size but producing more and more power.

"To synthesise a molecule and make it a commercial reality takes a huge global effort over many years – colleagues from manufacturing to supply chain, marketing to chemical inventory registration are all involved."

But the work does not stop there. Even when a Castrol product is on the shelves, technologists still need to keep a watchful eye on ever-changing legislation that prompts alterations to industry specifications and evolving vehicle designs by OEMs. It's a pretty safe bet that manufacturers will continue to demand the highest quality consumable fluids to help engines run cleanly and reduce emissions in the years to come.

"At Castrol, we know the importance of looking at trends, and not only responding to industry requirements – but going beyond them," concludes Smith. "Challenges for the future will include lower viscosity oils and changes in fuel types, such as biofuels. We're working to be ready in advance of all these needs, with more new and unique Castrol technologies."

Going supersonic

In the meantime, Castrol EDGE and other products in the Castrol family will be an integral part of the Bloodhound SSC in the series of vehicle runs that will ramp up through the subsonic (up to 550mph), transonic (up to 760mph) and supersonic ranges. Putting those speeds in perspective, Wing Commander Green says: "For many people, 'fast' is the speed of Formula One vehicles, around 150 miles per hour, but our Jaguar Rapid Response Vehicles' 'fire engines' will travel at that speed, if necessary."

It seems the concept of speed is fascinating for many – and the project aims to not only break a world record, but also break down some barriers, where other motor sports perhaps fail. "We want to make sure that we appeal to everyone – male and female of all ages – because we're also trying to inspire a new generation of engineers and innovators," says Tony Parraman, the project's head of sponsor liaison.

"Driving very fast up and down a desert is an achievement – it shows human endeavour and passion – but we need more relevance to everyday life and that's why we launched an educational aspect to the project. Many of our supporters, such as Castrol, have a genuine interest in skills development, as they are engineering companies that are looking for a future pool of home-grown talent."

As such, the project is running an ambassador programme where trained individuals visit schools to share more about the Bloodhound SSC and the opportunities that science, maths, engineering and technology (STEM) subjects can offer. Castrol staff are among those participating in this global initiative, with sessions to date in schools in Turkey.

With shared values in areas such as education and engineering expertise, the partnership with Castrol fits on many levels, according to Parraman. "We're delighted that we're working together; with Castrol's long heritage and success with land speed world records, as well as their extensive technical skills, it's a fantastic partnership," he says.

"Challenges for the future will include lower viscosity oils and changes in fuel types, such as biofuels. We're working to be ready in advance of all these needs, with more new and unique Castrol technologies."

Tony Smith

Driving seat: Wing Commander Andy Green in his Bloodhound project uniform.

BEHIND THE WHEEL OF BLOODHOUND SSC

Wing Commander Andy Green OBE is the current world land speed record holder and will drive the Bloodhound SSC. He spoke to *BP Magazine* about what lies ahead.

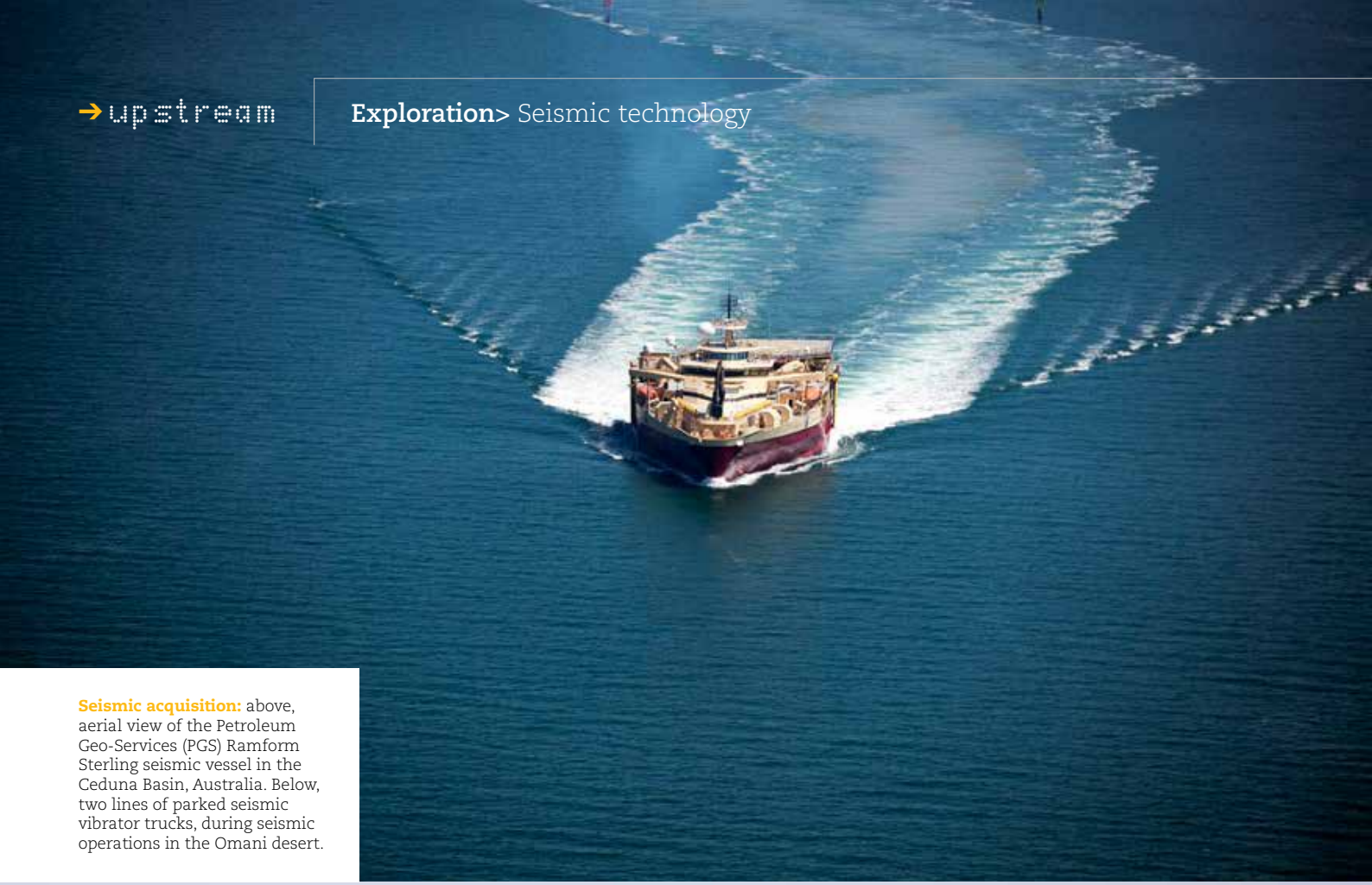
"How do I prepare for this challenge? I'm in the Royal Air Force and have flown fast jets for two decades; I set the current and only supersonic land speed record and I've spent seven years working with the team that has an intimate understanding of every piece of this car, so I can be absolutely confident that it is being manufactured to the highest and safest standards.

I have to be reasonably fit to climb into that cockpit; I have an office-based job now, but I still do some aerobatic flying on weekends to keep the mental processes up to speed, as well as my g-force tolerance. I'm also undertaking some race-car training on a track to hone my abilities to recognise how a vehicle behaves at speed. Although it may not seem that travelling 180 miles per hour on a race track is all that relevant to reaching 1,000 miles per hour in the desert, lessons from one can be applied to the other. In the Bloodhound SSC, when the rocket is firing and the car is accelerating at maximum speed with minimum stability, it will be sliding on all four wheels, so it's important to understand which end is sliding and what impact the steering wheel or wind conditions might have. I've practised this a lot because I need to understand these processes, rather than panic while I'm travelling supersonic.

I remember every single moment of my previous land speed record. I have to remember details of what's happening while I'm driving, because I need to brief the engineering team between each high-speed run; I climb out of the car and need to impart a hundred small details in a matter of minutes. It's crucial to absorb as much as possible – while I'm working to keep the car straight; triggering the rocket inputs at the correct time; monitoring the vehicle handling all the way up through the transonic and supersonic ranges; watching the loads on the wheel bearings; and keeping a quick eye on everything from the rocket oxidiser temperature to the cooling of the piston engine.

Once I've reached the end of a run and slowed the car to a walking pace, I'll drive a giant U turn to face the opposite direction for the next attempt. We'll have 40 minutes to refuel, check all the data, replace water, reload the braking parachute, and many more tasks before I need to be back in the cockpit to complete the other run before an hour expires.

So, it's a busy job. But the best preparation is to be a fast-jet pilot!" ■



Seismic acquisition: above, aerial view of the Petroleum Geo-Services (PGS) Ramform Sterling seismic vessel in the Ceduna Basin, Australia. Below, two lines of parked seismic vibrator trucks, during seismic operations in the Omani desert.

THE SEISMIC DETECTIVES

In the past 20 years, technology has transformed the way in which the oil and gas industry acquires and processes seismic data – information produced using sound waves – but it would be nothing without the geophysicists and geologists to analyse it.

REPORT> LISA DAVISON **PHOTOGRAPHY>** RICHARD DAVIES / AARON TAIT / BP'S EXPLORATION TEAM

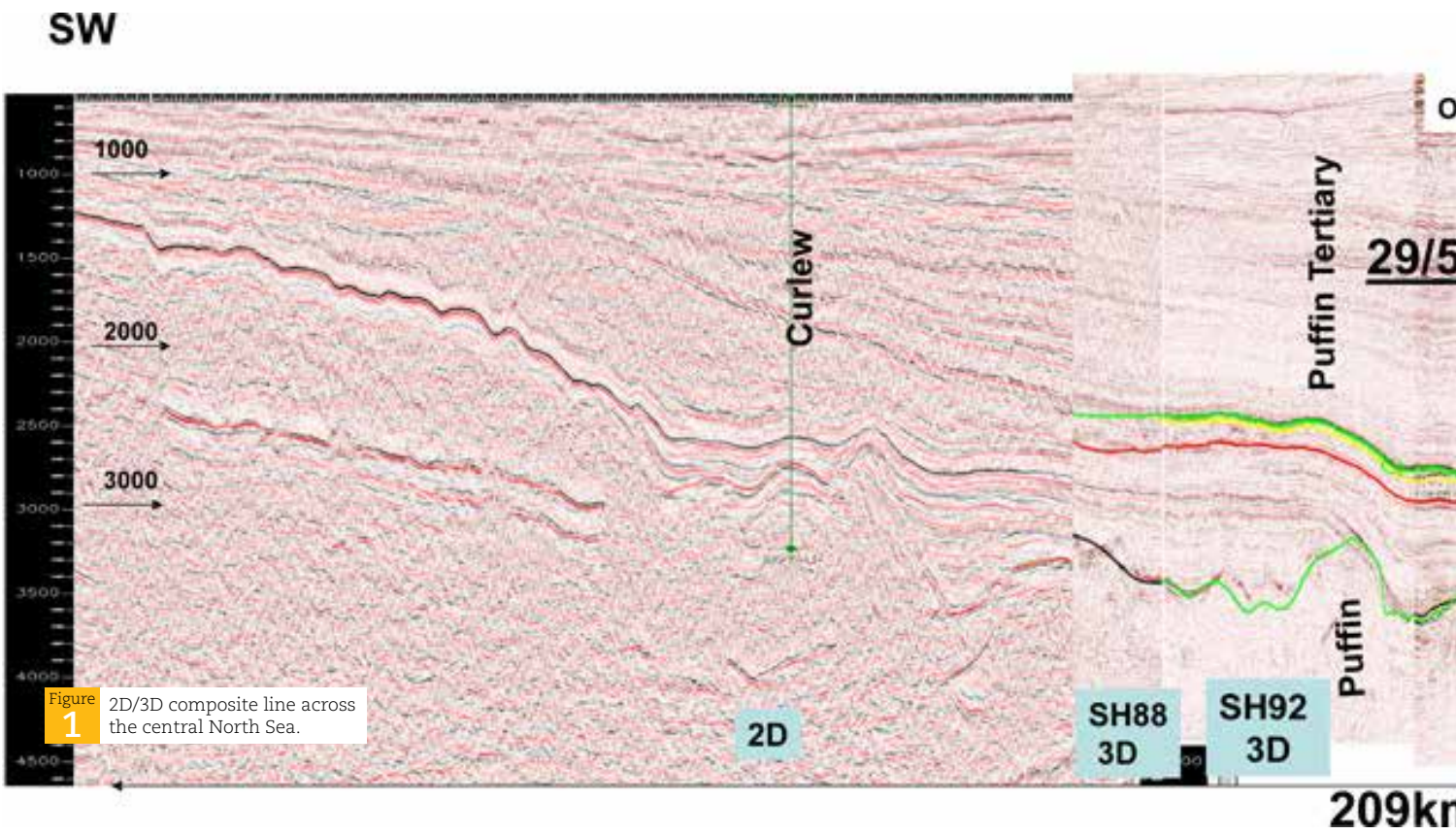


Figure 1 2D/3D composite line across the central North Sea.

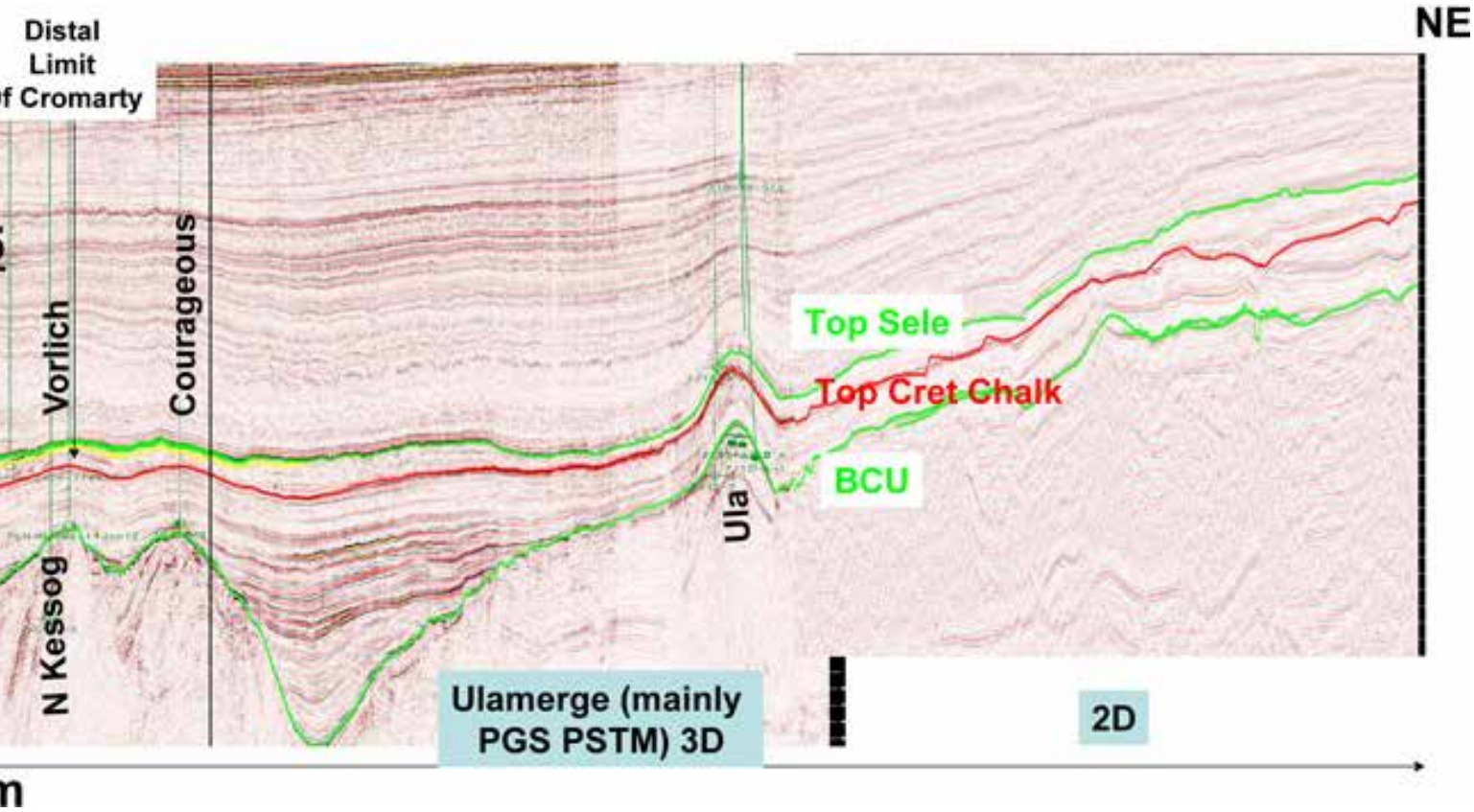
The study of rock formations lies at the heart of the industry's search for oil and gas: understand a rock's structure and you understand whether it has the potential to hold precious hydrocarbons. In the industry's earliest days, this meant mapping a region's topography and geology by hand, searching for and studying formations for clues as to what might lie beneath them. If you were lucky, you'd find actual oil seeping up from below ground.

In the 1920s, though, a new technology was introduced that used sound waves to create a 'picture' of the geological structure deep below ground. Seismology would go on to revolutionise the industry's ability to 'see' below the surface and, today, it is the foundation of any search for hydrocarbons.

It works by transmitting sound into the Earth and then recording the reflection – or echo – using sensors called geophones – or offshore, hydrophones. Different types of rock have different effects on the way in which a sound wave is reflected, along with its strength. Waves return as either a positive or negative reflection and sometimes the interpreter can directly infer the presence of hydrocarbons from the magnitude and polarity of these reflections.

Terry Redshaw worked as a geophysicist at BP for 30 years and describes his job as being a little like a police detective. "I like to think of it as if we're accusing a piece of rock of harbouring oil and gas and to do that we need to gather evidence to build a case that is strong enough for BP to invest money into drilling a prospect."

Oil is lighter than water, so once generated, it will 'float' up through layers of porous and permeable rock until it either seeps out at ground level or hits an impermeable rock layer, known as a seal. Sometimes, the combined geometry of the seal and reservoir forms a trap. In its most basic form, a trap can be a concave-downward fold or dome – rather like an upside-down bowl. This trap prevents the hydrocarbons from rising farther. Spot these formations on a piece of seismic and you have your first clues.



"We have an expression in exploration, 'thinking like a molecule'," says Redshaw, "so we're trying to figure out where might hydrocarbon molecules hide? We look for certain elements – a source rock that produces hydrocarbons and a seal that prevents them from floating higher. We can also sometimes see how the seismic response changes depending on the fluid that is in there – for example, water behaves differently from gas, which behaves differently from oil."

FIGURE 1
2D/3D COMPOSITE LINE ACROSS THE CENTRAL NORTH SEA

The oldest and simplest form of seismic data is a 2D seismic line (see figure 1). It works by collecting reflections over a grid pattern of cables, bouncing sound waves from beneath the line. The reflected signal is recorded at regular intervals and the data is then processed to create a cross-section that looks like a vertical slice through the underlying rock. This process gives a good general understanding of the area, although the small number of cross sections on the grid means that the 'picture' has significant gaps.

"You use your 2D line to search for clear structures, bumps that suggest seals and faults that might have trapped oil or gas. This image shows several separate lines from the same area that have been spliced together to develop a single long line – something that we often call a 'hero line', since it allows a heroic interpretation of the basic structures within the basin and, therefore, helps the interpreter understand the evolution of the basin with time. You can see a number of surfaces with lots of bumps across them. We know that oil wants to get to the shallowest point possible, so these bumps might form potential traps. That's one of the first things you look for.

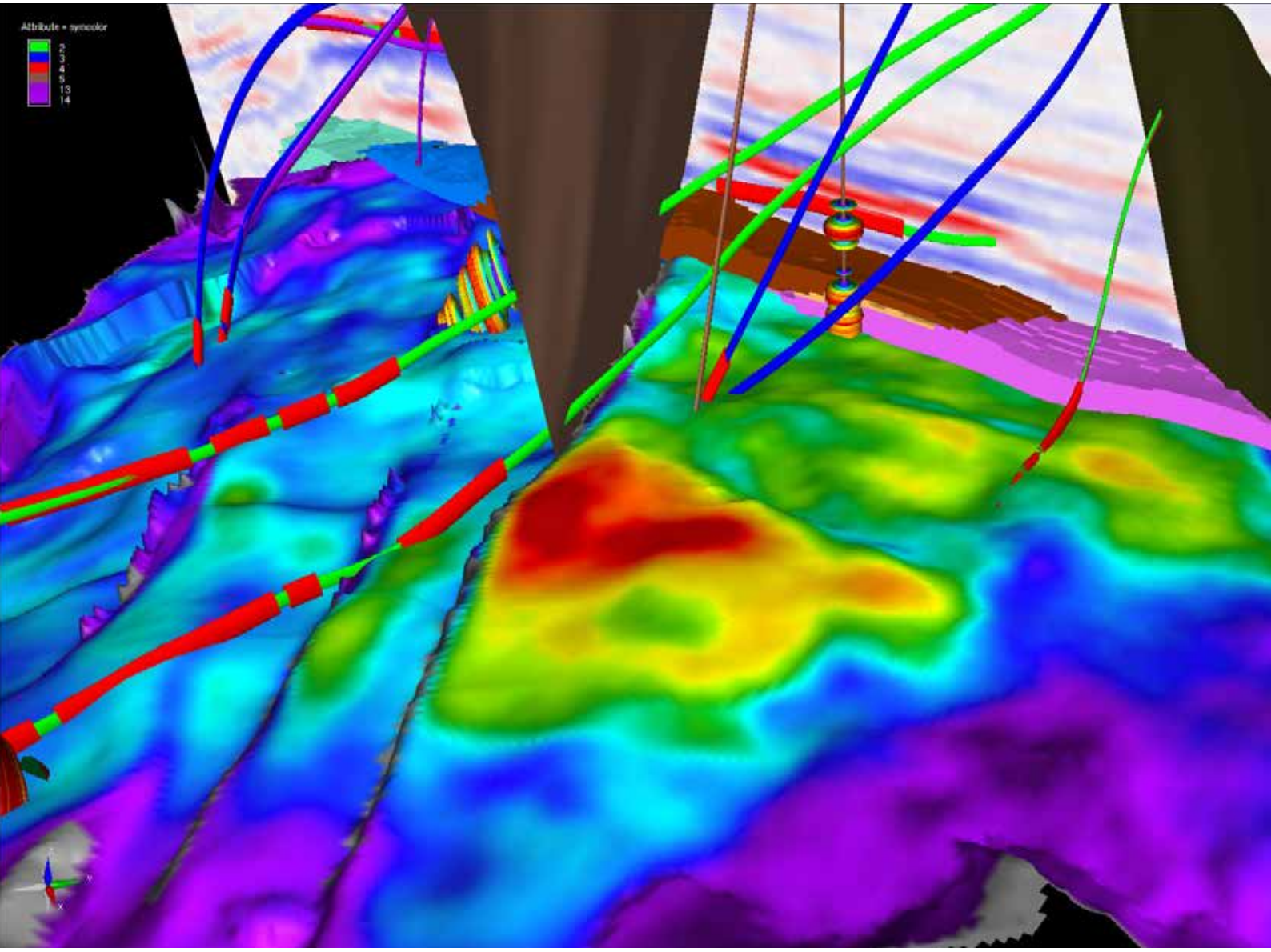
"How you interpret your data depends on your level of knowledge in the area you are exploring. As this is a North Sea line, our knowledge is pretty high – we know where the layers of sand are and where wells – indicated by the vertical green lines – are located. We always tie our seismic points to existing points of knowledge. If you don't know the area very well, you might map a whole series of these horizons to give you more clues."

The green and red horizontal lines shown here mark two different layers of rock formation, known as horizons. The green horizon is known as the Top Sele formation and the red is Top Cretaceous chalk. They mark the area in which hydrocarbons are likely to be found.

"Each time you get a reflection in the seismic data, you have a change in rock type," says Redshaw. "You can trace these reflections across the line and eventually across the area, building up an understanding of the basin and those structures where hydrocarbons may be hiding."

Using the seismic line, the history of the basin and its changes can be seen over millions of years. "It's a bit like filling a bath," says Redshaw. "If you fill it, then freeze the water with some distortions and then fill it up further, the new water is going to fill the low bits of the existing topography first. Sediments act in the same way."

In this example, over time, the structure does eventually start to flatten out, which has important implications for calculating when a trap might have formed. Determining when the oil or gas was expelled from its source rock, or whether the trap was in place at the time that the hydrocarbons were released is also a key consideration that geoscientists try to estimate from the seismic data. The deeper a structure is, the more rock that is pushing down on it, which means the gaps between rock pores will be smaller and the flow of hydrocarbons more sluggish. Shallower – or younger – reservoirs may yield better flows because the pores are less compressed. »



"You need to map the overall container. The 2D gives me an idea of the container's shape, while 3D gives me the scale of that container – its walls, essentially."

Terry Redshaw

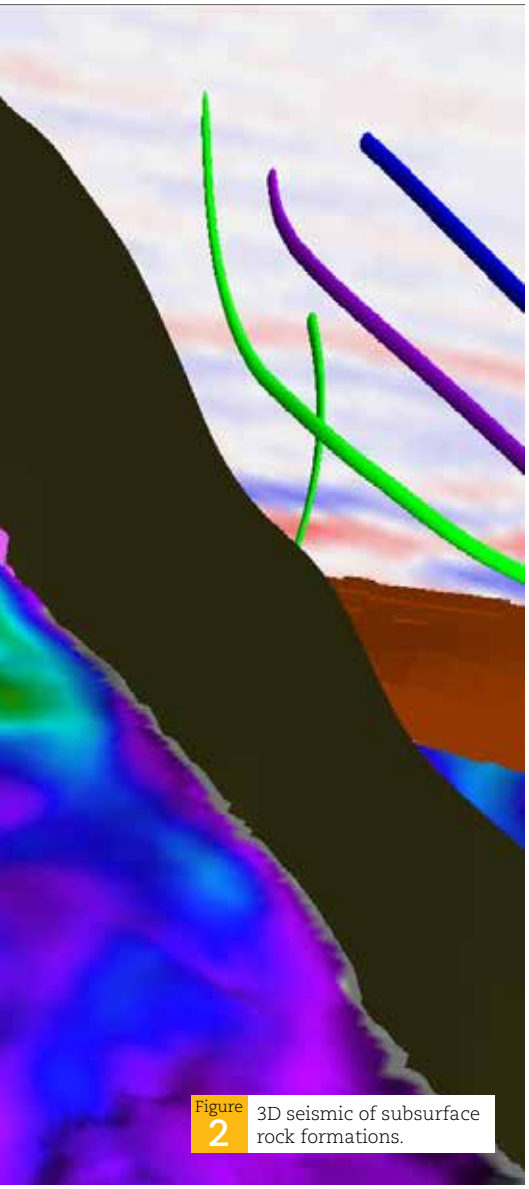


Figure 2 3D seismic of subsurface rock formations.

FIGURE 2
3D SEISMIC

During the 1980s, the industry began to develop and use 3D seismic technology, marking another dramatic change in the way geoscientists could see subsurface rock formations. 3D seismic is created by sending multiple soundwaves under the ground from closely spaced lines, so as to provide an image taken from many points to ensure dense surface coverage. The efficiency and angle of this coverage are key aspects of designing seismic surveys and BP has developed several new techniques over the past decade.

For example, BP developed a technique for onshore seismic studies using simultaneous source trucks to survey large areas more efficiently – in the past, these trucks had to move in the same direction and vibrate at the same time in order to not distort the returning sound waves. With this new technique, the trucks move and vibrate independently. Meanwhile, offshore BP has developed a technique called 'wide azimuth towed streamers' (WATS), which uses a conventional seismic vessel with streamers of receivers towed behind it, along with additional vessels acting as offset source boats, to collect the reflected sound waves. This technique has helped BP to create images of difficult areas by ensuring a large number of potential reflection pathways between sources, horizon of interest and receiver. In other words, while 2D gives you an outline, 3D fills in the gaps.

Redshaw says: "With 2D, you don't know what is happening between one seismic line and another. However, a lot could be happening in the rock. Because we have so many more lines in 3D, you can start to look at the data from any angle you like, or even get a complete view all the way around a structure. You can also build maps on top of reservoirs, and look at amplitudes and detailed faults within the reservoirs."

This image (above left) is an example of a piece of 3D data. The blue, green and purple lines represent wells that have been drilled. Within the structure itself, different colours – or amplitudes – represent different reflection strengths.

"In this image, red is usually the strongest amplitude and purple the weakest," says Redshaw. "The yellow and green could indicate gas, as this gives a brighter reflection than oil. The blue here probably indicates water."

The position of potential water in a reservoir is just as important as where the oil and gas might be. "It's useful to know where the water is and how much might be down there. A large aquifer located near a hydrocarbon trap could help to keep up pressures in the reservoir as you extract the oil and gas, so long as there is good 'communication' between the rock pores to allow movement. The position of water also allows you to determine where to place water injection wells, should you need to improve reservoir pressure."

Using 2D and 3D together, geoscientists can start to make judgements on how much oil and gas might be in place – in other words, how big the container is. "In order to drill, we have to be able to say there is a structure in place and estimate how big that structure might be," says Redshaw. "You need to map the overall container. The 2D gives me an idea of the container's shape, while 3D gives me the scale of that container – its walls, essentially."

THE FOURTH DIMENSION

The latest developments in seismic technology have added a fourth dimension to the available data – time. By reshooting seismic at regular intervals over a field's life, a new picture starts to form that shows geoscientists how a reservoir is behaving. When oil is taken out of a reservoir, the pressure drops and fluids move to readjust. If the reservoir is connected to an aquifer, then the water levels might rise to counteract that pressure drop. In Figure 2, you might expect to see your blue areas rising and your red, green and yellow areas getting smaller. This movement allows you to make decisions about if, when and where to drill further wells.

Redshaw explains: "Using 4D seismic helps us manage our reservoirs more effectively, deciding where to put our producing wells, our water injection wells, and how many, all in order to maintain production levels over the life of the field." »

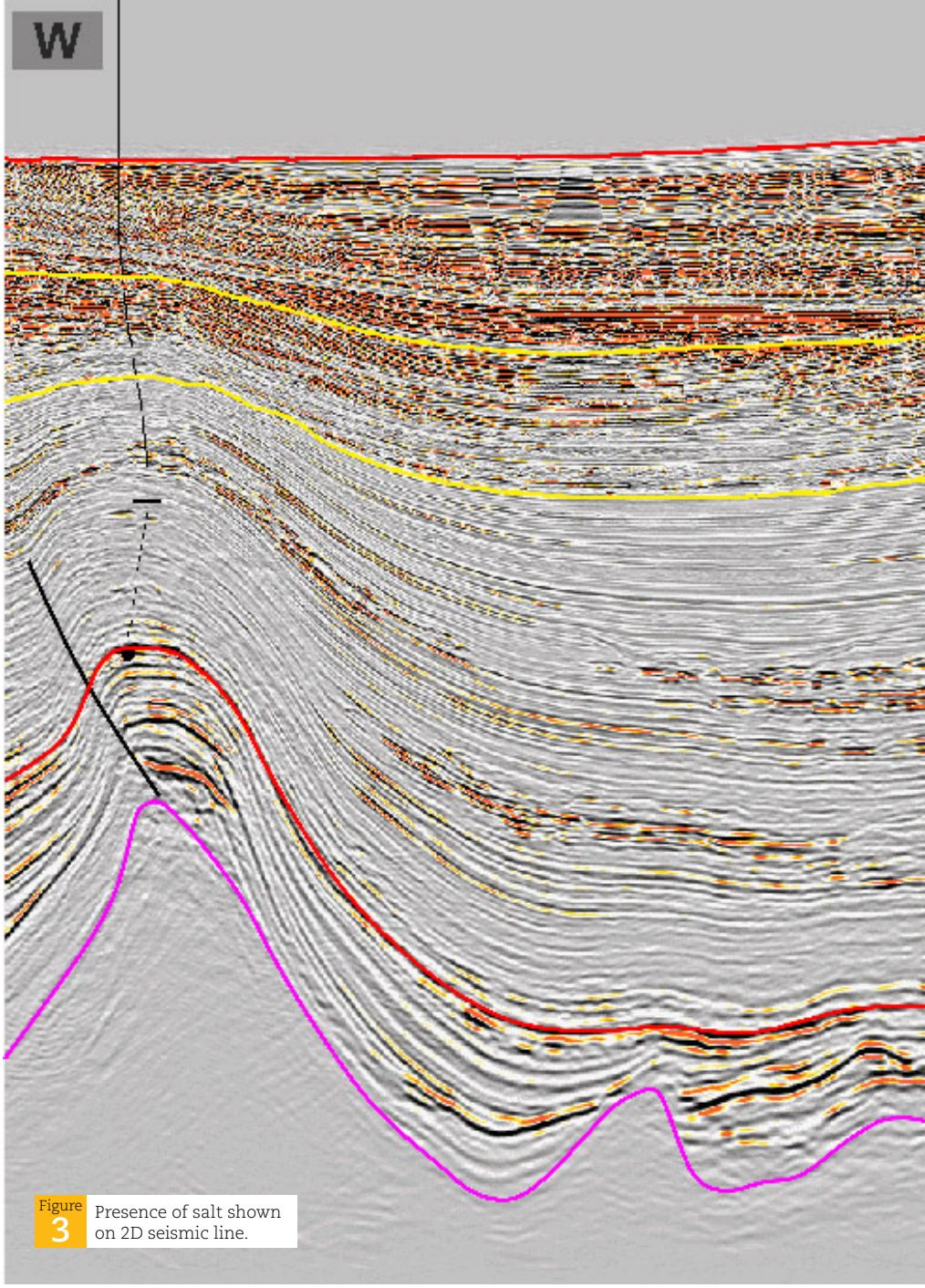


Figure 3 Presence of salt shown on 2D seismic line.

FIGURE 3
SALT

While the developments in seismic technology have transformed the industry's ability to see below the Earth's surface, there are certain structures that continue to create challenges. Different rock structures have different levels of reflection and velocity – the speed with which a sound wave moves through something – and some can be harder to 'see' through than others. Salt is one of them (see right).

"Salt has a high velocity and, structurally, is very uniform," says Redshaw. "Both of which cause us problems. Just as light bends when it passes through water, sound waves bend in different velocities. So, instead of your energy reaching the reservoir, it's bent away by the salt." As a result, areas of salt on a seismic image lack detail.

Salt also has a relatively low density, which means that, like oil and gas, it wants to move up through rock. "It's squeezable, too," says Redshaw, "a bit like toothpaste. Wherever there is a weakness in the rock formation, the salt will squeeze through the gaps. The salt can lie over a reservoir obscuring our vision.

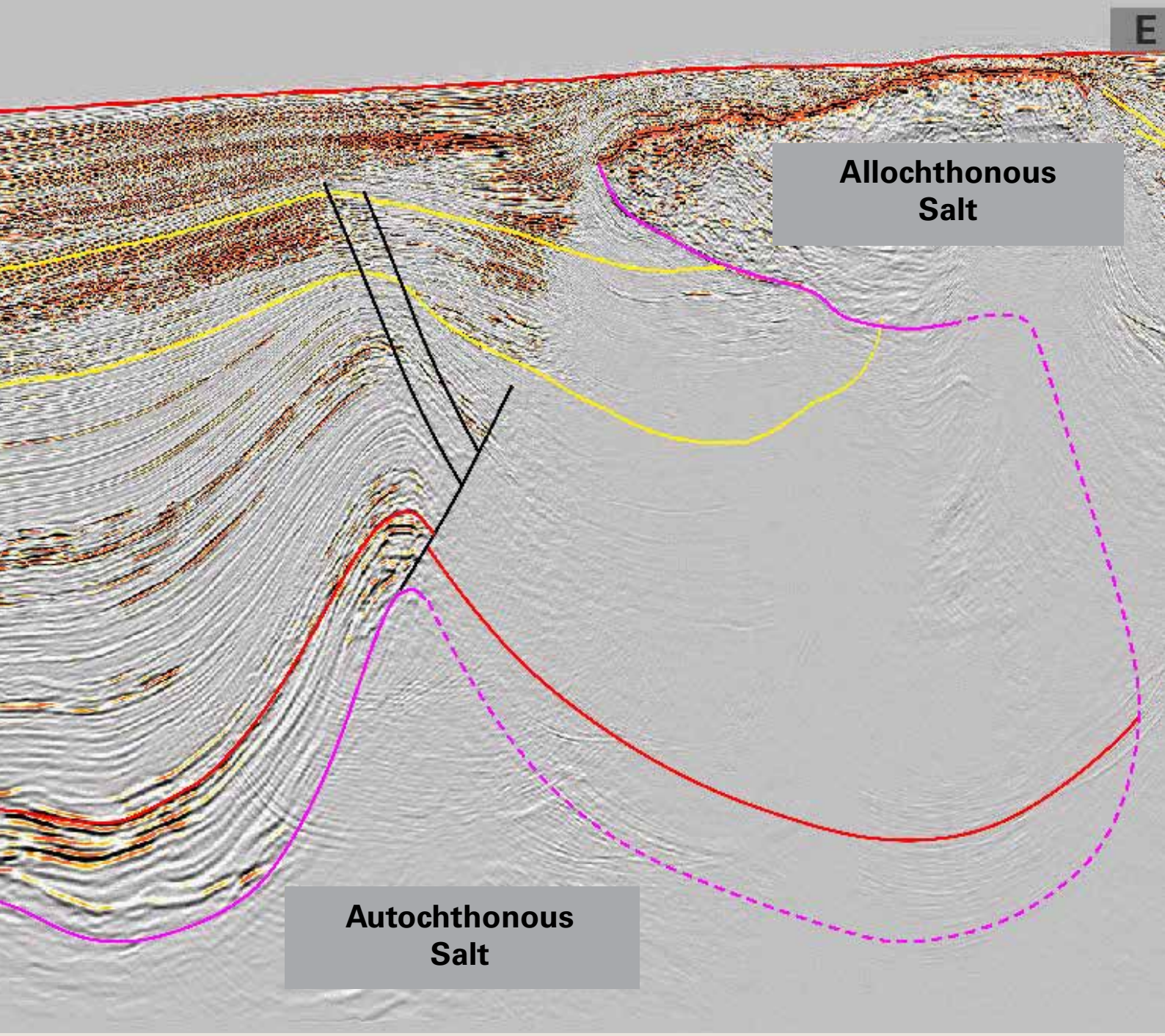
"The flat colours on this piece of seismic represent salt and it's flat because you are simply not getting as much of a reflection back from your sound wave. At this point, geologists have to be creative, interpreting the things they can see to make judgements about the things they can't."

BP's WATS 3D technology enables it to transmit sound waves at different angles, allowing some of the sound waves to reach the formations below the salt – effectively, 'seeing' below what was previously an opaque canopy.

Redshaw continues: "Sometimes, you can see the top of the salt cap, but not the bottom. It's very important for our analysis that we can see the top, the bottom and the sides, otherwise we can't account for the amount of distortion the salt is creating. We're now exploring new areas that would once have been impossible."

"Just as light bends when it passes through water, sound waves bend in different velocities. So, instead of your energy reaching the reservoir, it's bent away by the salt."

Terry Redshaw



WHERE MIGHT SEISMIC TECHNOLOGY GO NEXT?

Increasingly, BP is using ocean-bottom seismic acquisition, which involves placing geophones on the seabed. There is less interference at this level, so the sound waves' reflection can be improved. Sometimes, the cabling is laid permanently, making it even easier to acquire new data over the same area.

"We have some great examples from Trinidad and Tobago, where the quality of the ocean-bottom seismic data is so good now that the team has been able to prove resources directly from the data itself," says Redshaw.

Meanwhile, a lot of work is being conducted to build detailed velocity models to improve seismic analysis in order to offset data distortion from structures such as salt caps. And, the industry continues to look for ways of using different types of sound wave to create its images.

"Seismic energy can be created in two ways, through pressure waves where the wave bounces back and forth in the direction it's travelling, or through 'shear waves', which bounce sideways, perpendicular to the original wave," says Redshaw. "Virtually all our seismic images are built using pressure data, but there is a lot of interest in how we might use these shear waves, because their velocity doesn't alter as much as the corresponding pressure waves."

As the challenges of finding and extracting oil and gas grow, so, too, must the seismic technology continue to develop. "It's all about getting more sound waves into the Earth, more processing and interpretation to keep us moving forward," says Redshaw. "It's not the only data we have to work with – our well data is very detailed, but seismic gives you the chance to look at thousands of square kilometres deep below the ground. It's still our major tool in the business." ■

At work: an operator conducts a storage tank inspection at BP's Carteret terminal, located on the New York Harbor, US.

LOCAL HERO

BP's Carteret fuel terminal might not be one of its best-known locations, but with around 2 million gallons of gasoline and diesel shipped from the site on a busy day, it's a bustling facility that serves a staggering 19.8 million people in the New Jersey/New York region.

REPORT> ERIC HANSON **PHOTOGRAPHY>** LES STONE

When you think of New Jersey on the US East Coast, you probably imagine smoke stacks and *The Sopranos*. Think of BP in the US and it's likely that its operations in the Gulf of Mexico and Alaska spring to mind. And yet, without BP's New Jersey-based Carteret fuel terminal the New York City region would run short of motor fuel. Nowhere was this more vividly illustrated than in October 2012, when the US eastern seaboard was struck by Hurricane Sandy (see page 25).

The terminal, operated in conjunction with an adjacent Kinder Morgan fuel facility, is situated in the industrialised northern part of the state near a tidal straight with the Old Dutch name of Arthur Kill (roughly meaning, *back channel*).

The facility provides fuel products to serve a population of 19.8 million in the New Jersey/New York region – the largest metropolitan area in the US. Only Mexico City has more people in North America. On a busy day, around 2 million gallons of gasoline and diesel are shipped from the facility to retail sites throughout the area. The terminal supplies more fuel to the region than any other facility in the market.

And, while it may not be as large and as complex as a refinery, or as impressive as an offshore oil rig, Jim Bergeron, marketing supply manager for BP's east of Rockies fuels value chain, says, "This terminal is a major component of the region's economic engine."

Carteret's role is unique, because, in addition to being able to store and load fuel for retail delivery trucks, it is also equipped and staffed to blend the fuel. This is vital to customers who require competitive finished product ready for market. The basic unfinished components that eventually make up the gasoline and diesel that the customer buys at the pump are brought into Carteret via the Colonial pipeline, as well as by barge or ship.

"Refineries make gasoline components that can be used in various recipes to make fuel, much like a food recipe, like making a cake," says Dale Schlottmann, global light ends operations manager. "We do the same thing by blending different quantities or percentages of various gasoline components to meet gasoline specifications."

Global light ends operations provide direction to the terminal to blend components in a tank. This blend must meet more than 35 specifications before being certified as a gasoline ready for market. These specifications include octane levels, emission standards for various regions, and seasonality requirements.

"We then hire a third-party laboratory to test the product and, if it meets all specifications, the lab will certify it as finished gasoline," Schlottmann says. "At that point, we authorise the terminal to transfer the fuel into a tank that feeds the trucks, which take it to market." »

BP TERMINAL AND CARTERET FACTS

168 acres

The size of the terminal site

24/7

Amount of time Carteret is in operation each and every day

1.2 million

Storage capacity (in barrels) available in 16 tanks

22,844

Population of Carteret township as at the 2010 US Census

On location: above, pipework at BP's Carteret terminal; and below, a tanker driver loading his truck.

"Refineries make gasoline components that can be used in various recipes to make fuel, much…like making a cake. We do the same thing by blending different quantities or percentages of various gasoline components to meet gasoline specifications."

Dale Schlottmann

Wilson Tubie is a shift supervisor at Carteret, and one of his responsibilities is to receive fuel orders from BP's integrated supply and trading unit and shepherd them through the blending, testing and storing process.

His work vocabulary is filled with terms like PBOB (premium blendstock for oxygenate blending) and RBOB (reformulated blendstock for oxygenate blending) as well as more traditional terms, such as naphtha, and alkylate. All of them are the components of fuel that are mixed daily at the facility.

One of the first steps in processing an order is to determine which tanks will provide the product, which lines will move it, and which tank will store it. According to Tubie, orders for regular 87 octane gasoline are received every few days, while a request for a higher octane premium fuel will be processed around every five days for loading into tanker trucks. The blended fuel is also transported to customers via pipeline or barge.

"An order of 52,000 barrels, depending on pump capacity, will take anywhere from 10 to 14 hours to complete," he says.

The finished product that is destined for distribution by truck is then transferred from storage tanks to tanker trucks via a load rack that resembles a very large service station.

New Jersey is one of only two US states that forbid motorists by law from pumping their own fuel. However, the law does not cover the terminal's big trucks and their drivers connect the rack hose and pump the liquid into the tanker. Each truck driver must complete a safety and procedure course and adhere to a strict set of rules before being allowed to load fuel.

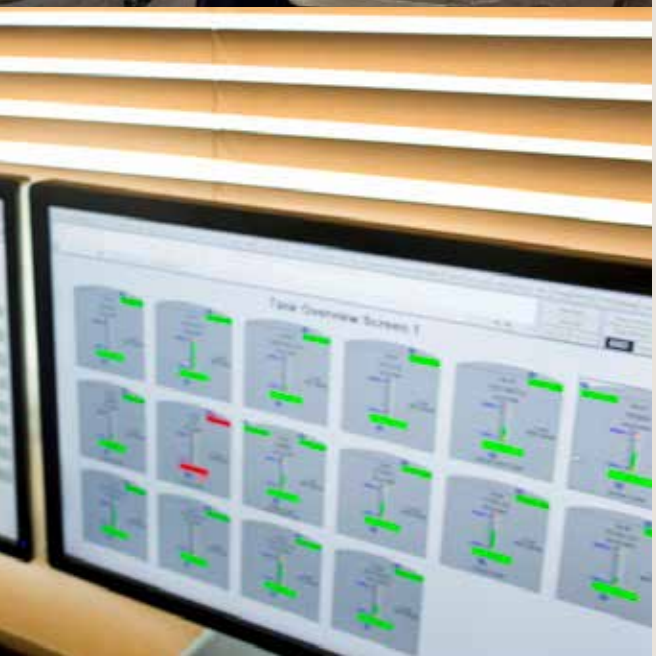
According to terminal manager Jack Cowart, all of the facility's operations and activities are conducted jointly with an adjacent Kinder Morgan terminal and BP has a close working relationship with its neighbour. The product from the tanks at each property can be seamlessly pumped back and forth as needed, giving both terminals more capacity and flexibility.

Kevin Golankiewicz, Kinder Morgan director of business development, says each partner contributes to the operation. While the two organisations have worked together for the past 20 years, that relationship has become more focused in the past five.

He says: "In 2011, we completed the expansion of seven tanks built specifically for BP, around 1 million barrels of storage. At that point, it was decided that we really needed to operate as one unit. It was a very positive change as it added to the strategic value of the whole Carteret complex."

Each day, the facility trucks out around 37,000 barrels of fuel and Cowart says he wants to raise the figure to 42,000 by 2015: "The ultimate goal is to hit the figure of 50,000 barrels daily. I am really confident that teamwork and all the skills and capabilities of everyone at Carteret will help us to reach our goals."

Daily operations: above, a view of the facility's piping manifold; right, two operators handle a large hose used to pump product into the storage tank system, seen here from a product barge; below, technicians review facility data.



RESPONDING TO HURRICANE SANDY

In October 2012, Hurricane Sandy became the second most costly hurricane in US history, affecting 24 states and knocking out power from North Carolina to New England. More than 2.6 million customers were without electricity in New Jersey while another 2 million were out in New York.

Residents and government agencies desperately needed fuel for vehicles and generators. Just three days after the storm struck, BP Carteret was distributing it.

"The Carteret team had enough foresight to position portable generators before the storm and bring them in after it hit," says Jim Bergeron, marketing supply manager for BP's east of Rockies fuels value chain. "Being the only terminal operating in the area, we got several calls from the New York mayor's office to help provide fuel to the police and fire departments."

Although more than two years have passed since the hurricane hit, the storm still lingers vividly in the memories of the people who worked through it. Not least, terminal manager Jack Cowart, who was on duty at the time, and responsible for Carteret's quick response in the face of disaster.

Together with his team, Cowart was fully prepared for the coming hurricane, thanks to meticulous planning. "We did a good job of preparing for this storm. We had five generators ready to go and we pulled out some of our pumps to keep them dry. It was a big team effort; we had the right stuff on the ground and we have a good staff."

When the storm surge pushed up the Arthur Kill and into the terminal, some parts of the facility were under 2.5 metres (eight feet) of water and Cowart remembers seeing a gigantic storage tank afloat.

But, the team got straight to work and when the facility was safe to pump fuel again, tanker trucks lined up by the dozens to fill up.

Cowart says that so many trucks showed up that the big tankers were staged on the road outside the terminal and police were brought in to make sure everything stayed orderly and went smoothly.

"We did that because they supplied all the emergency communications to the state of New Jersey and they didn't have any product to run their generators," he says. "We had a good reputation before, but after Sandy, it just soared."

Another BP New York-area terminal, in Brooklyn, did not sustain as much damage and helped to supply fuel to the region.

Cowart says the experience taught valuable lessons that one day may help the terminal team if they are faced with another large storm.

Although the terminal property sits next to the Arthur Kill, the storage tanks and other facilities are almost 1.6 kilometres (one mile) from the waterway and, while the possibility of flooding from rain was anticipated, few people expected the terminal to be inundated with salt water.

But, that is exactly what happened. The hurricane moved slowly as it approached the coastline, giving it time to push water ahead of it. Then, Sandy made landfall during a full moon at high tide, resulting in an unusually high storm surge of salt water.

The flood knocked some storage tanks off their foundations and, while some pumps had been removed prior to the storm, other pumps, motors and electrical items were immersed in seawater.

Fresh water would not normally cause problems for the pumps and other equipment but the salt water bath meant the items had to be removed, cleaned, rinsed and dried before being re-installed.

Cowart says in the future, the tanks will be ballasted to make sure they stay put in a flood situation, and pumps, valves and electrical equipment will be removed prior to the storm to protect them from the corrosion that comes from being immersed in seawater. Meanwhile, equipment and fixtures that can't be moved are being water-proofed to prevent the kind of damage caused by the flood.

In the meantime, BP has spent $100 million on projects on the terminal's facilities. These include electrical infrastructure upgrades, advanced pipe manifolds, new dykes around the tanks, and an improved electrical control centre at the facility's dock. ■

TAKE A BOW

On 30 April 1915, the British Tanker Company was established as the shipping arm of the Anglo-Persian Oil Company. As BP Shipping celebrates its centenary year, *BP Magazine* looks back at some of its milestones.

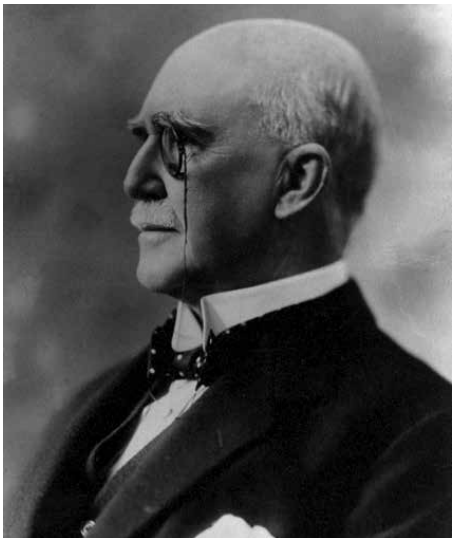
BP SHIPPING 100

REPORT> COLUM DOYLE
PHOTOGRAPHY> BP ARCHIVE / IMPERIAL WAR MUSEUM / BARRY HALTON / RICHARD DAVIES

Expanding fleet: the 12,500 deadweight ton *British Caution* is launched from the Swan Hunter yard in Newcastle, UK, in 1945. Even before the Second World War had ended, the task of rebuilding the fleet had begun.

To understand the history of BP Shipping (BPS) is to appreciate some of the key world events that have shaped the past 100 years, as well as those that marked the evolution of the age of oil and the development of BP into one of the world's leading energy companies. BPS was heavily involved in, and affected by, two world wars, the globalisation of trade, the emergence of OPEC, and the ups and downs of the world economy – all the while launching an average of one tanker every 10 weeks.

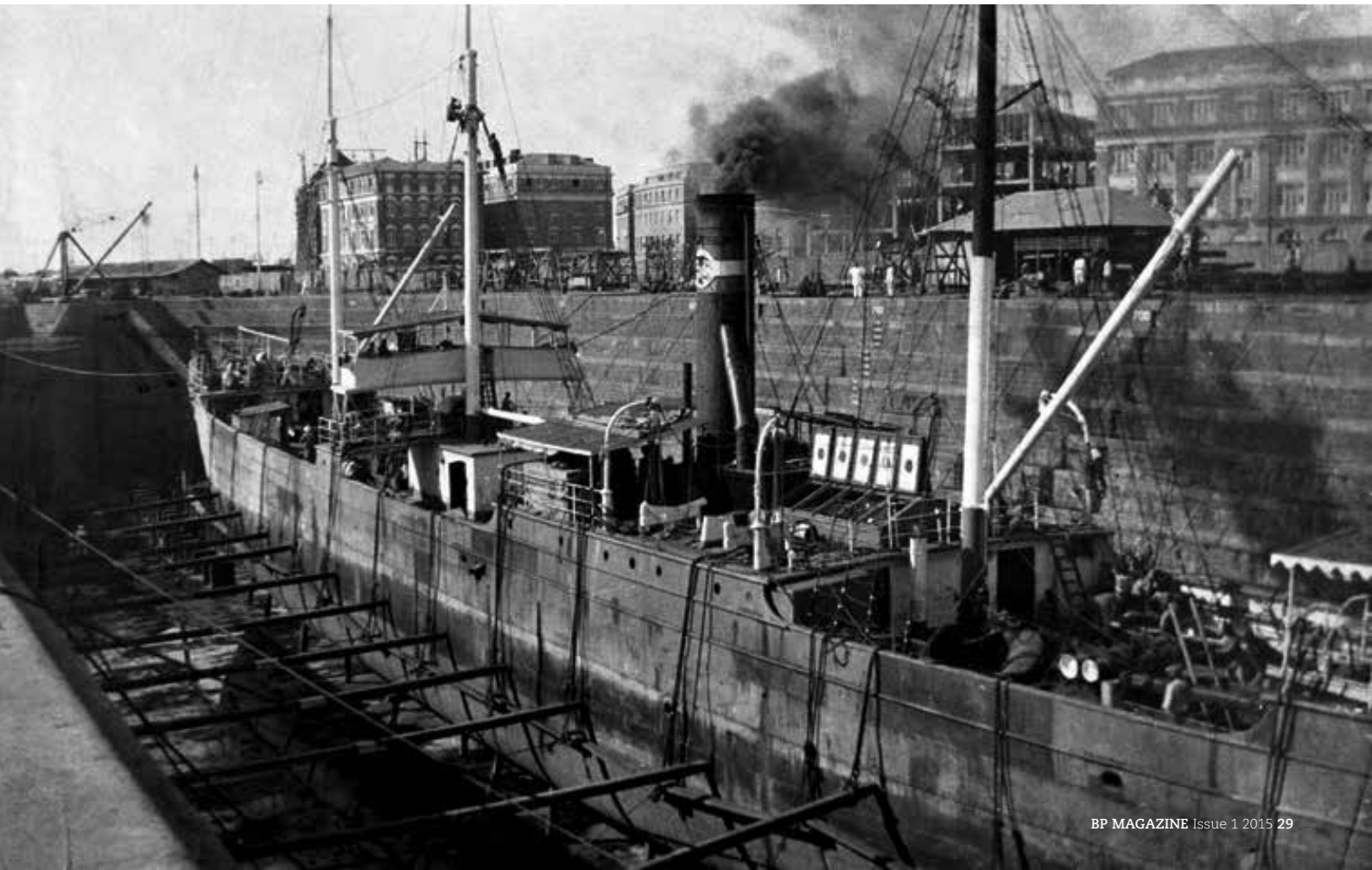
The British Tanker Company (BTC) was born out of a severe financial crisis that gripped the Anglo-Persian Oil Company (APOC) – the forerunner of today's BP – in 1913/14. APOC was formed in 1908 to develop one of the world's greatest oil discoveries at Masjid-i-Suleiman in Persia (now Iran). However, the construction of a pipeline and refinery at Abadan, on the Persian Gulf coast, to refine and export the newly-discovered oil, was behind schedule, over budget and plagued with technical difficulties. The fledgling company had no organisation or franchise to market the potentially huge quantities of crude and oil products to customers. Most crucially of all, it lacked the means to transport its oil to market. APOC owned just one ship, one barge and one tug. The *SS Ferrara* – dubbed by contemporaries as 'the most terrible thing on God's Earth' – was not even a real tanker, but a cargo ship carrying oil in small metal cases to local Persian Gulf markets.



Early days: above, a portrait of Charles Greenway, the Anglo-Persian Oil Company's (APOC) managing director and chairman; opposite top, tankers loading at APOC's Abadan refinery in Persia (now Iran) in 1920; and opposite bottom, the SS *Ferrara* – APOC's first ship, which was purchased in 1912 for transporting oil in individual metal cases. She was sold in 1923 to a new owner in Bombay, India, but was gutted by fire and sank the same year.

Yet, within little more than a year, BP's chairman, Charles Greenway, had transformed the company's precarious position and set it on a path to becoming one of the world's largest integrated oil companies. On the brink of the First World War, Britain's First Lord of the Admiralty, Winston Churchill, was keen to exploit the advantages of oil-powered ships in the face of a rapid build-up in German naval forces. A secure supply of oil was critical. Greenway's invitation to the UK Government to purchase a shareholding in the company was timely and would bring a desperately needed £2 million injection of capital. This meant that Abadan could be completed and a fleet of vessels purchased. Even better, Greenway secured a major market for Abadan's output – a 20-year sales contract for 6 million tonnes of fuel oil to supply the British Royal Navy.

So, it was that on 30 April 1915, the British Tanker Company was created. The timing of its launch was hardly auspicious. A terrible war now raged across the world, with control of the sea vital to the movement of troops and supplies. As BTC built its fleet, it took on the management of »



other vessels on behalf of the Government to support the war effort. Within a year of its inauguration, BTC's first ship – the 5,500 deadweight ton (dwt) *British Emperor* – was launched, and so began a tradition of naming each of the company's vessels with the 'British' prefix.

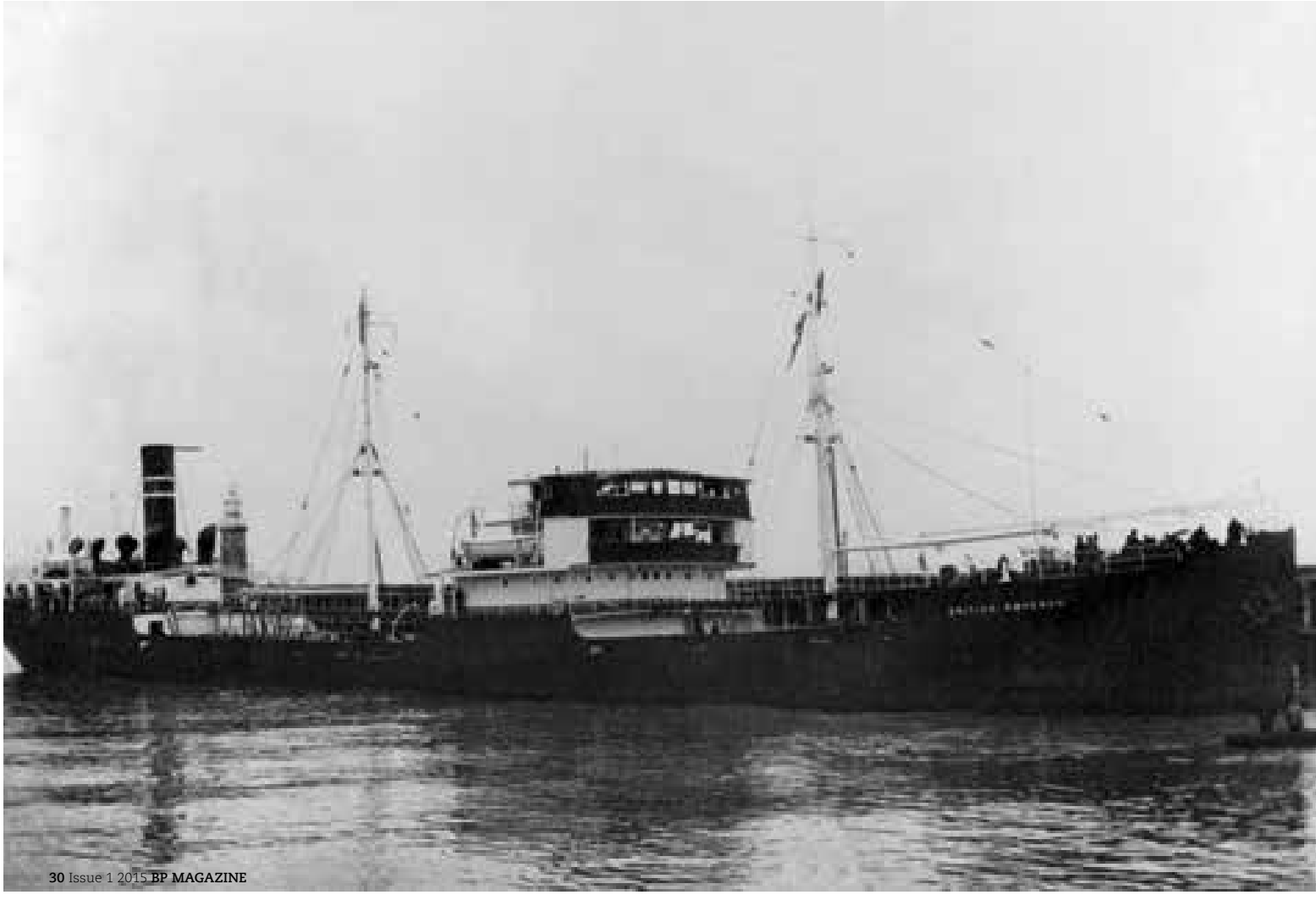
Between the two world wars, APOC (renamed Anglo-Iranian Oil Company – AIOC) rapidly expanded its oil output, built refineries in the UK and Europe, and developed fast-growing market positions, as well as found new reserves in Iraq, Kuwait and Qatar. These were heady times for BTC as it became the owner of a grand total of 80 ships. The UK's *Financial Times* described the new fleet as "modern vessels of the most approved type. The construction of this great fleet in such a short time will be a fine demonstration of the resources of British shipbuilding."

Despite the Great Depression of the 1930s, BTC came to represent the largest share of AIOC's fixed assets globally. It was delivering £1 million of trading profits each year and employed more than 3,000 staff, bolstered by a cadet apprenticeship programme.

But, world war loomed again in 1939 – a war that, this time, would have a terrible impact on BTC and its staff. AIOC and BTC abandoned commercial priorities and put all their energies and resources behind the single overriding objective of military victory for the Allies. Company seafarers saw service in both the Atlantic and the Arctic convoys, supplying oil to Russia, as well as to the North Africa campaign and the D-Day landings. Despite a convoy system, oil tankers were, in the words of Britain's future queen, Princess Elizabeth: "the 'bull's eye' of every enemy attack". Fifty ships manned by BTC were sunk, 657 employees lost their lives, and 260 were taken prisoner of war. Among that litany of statistics could be added the remarkable 203 decorations and awards that were presented to BTC seafarers.

The post-war years initiated a major ship-building programme to restore the fleet and »

Early days: below, the 5,500 deadweight ton *British Emperor* was the British Tanker Company's (BTC) first ship built to order, launched in 1916 from the Armstrong Whitworth yard in Newcastle, UK. She served the company for 25 years before being sunk in 1941; and opposite, an Allied convoy under way in 1943. In the previous year, merchant shipping losses reached a terrible peak, with 233 tankers lost from the oil sector alone – of which 13 were owned by BTC.



to respond to the rapid growth in AIOC's output, as major new reserves were brought into production. In 1948, AIOC ordered its first class of 'supertanker' – the 30,128 dwt *British Adventure*. She was virtually double the capacity of any other tanker in the fleet and the largest tanker in the world at that time. In parallel, a marketing push saw sales double to almost 40 million tonnes per year by 1950 and the total fleet doubled in numbers, to reach 152 ships, with a combined tonnage of 1.85 million dwt.

But, political tensions began to develop as a new world order saw the retreat of colonialism and the rise of nationalism. Events in the 1950s – in Iran and in Egypt – were to have particular impact on the company and its shipping arm. In 1951, Iran sought to nationalise its oil industry and a three-year enforced closure of Abadan and its associated oilfields brought emergency measures to redeploy the BTC fleet, which, at the time, amounted to more than 300 tankers, including chartered ships.

While a new reduced concession was agreed in 1954 and AIOC was renamed 'The British Petroleum Company' (BP), one political crisis was quickly followed by another. Earlier concerns about shipping via the Suez Canal were realised when the Egyptian Government nationalised and blocked what UK Prime Minister Anthony Eden called Britain's 'great imperial lifeline'. In 1955, two-thirds of Western Europe's oil imports came from the Middle East and, of this volume, two thirds were delivered via the Suez Canal. While the political storm was considerable, the Suez Crisis tipped the commercial balance in favour of building much larger tankers and taking them loaded via the longer route to western markets around the Cape of Good Hope, off South Africa. Over the next 15 years, the BP Tanker Company (BPTC) would take delivery of dozens of ever-larger ships, including its first 100,000 dwt ship – *British Admiral* – and in 1969, its first very large crude carrier (VLCC) at 215,000 dwt – *British Explorer*.

The emergence of the 'supertanker' and the VLCC not only scaled up the amount of oil that could be transported by ship, it also multiplied the potential impact should things go wrong. For BP, two particular events were to weigh heavily on the company and the wider industry. In 1966, *British Crown* exploded and caught

Then and now: top, painting BTC's oil tanker *British Adventure* in Suez Bay; above, the 111,000 deadweight ton (dwt) *British Admiral* was the first fleet ship to exceed 100,000 dwt. At her launch from the Vickers yard in Barrow-in-Furness, Cumbria, UK, in 1965, she was the largest merchant ship in Europe; and top right, BP Angola's Plutão, Saturno, Venus and Marte fields are produced via a converted hull, floating production, storage and offloading (FPSO) vessel.

fire while loading BP crude at Umm Said in Qatar. Nineteen seafarers were killed and 10 injured. While the official inquiry conducted by the UK Government's Board of Trade found the vessel to be seaworthy and no individual blame was laid, BPTC decided to retro-fit a technology known as the 'inert gas system' (IGS) to the BP fleet – something it had already begun to fit on new ships.

IGS has arguably been the most important safety improvement in the history of shipping hazardous cargoes. First deployed by Sun Oil in the 1930s, the work of BPTC staff and BP's Sunbury Research Centre in the 1960s devised a system that could address both safety and tank corrosion. The company patented the design to ensure its appropriate use and made it available free of charge to the industry. BP's work was instrumental in changing the safety focus of the industry from eradicating possible causes for flammable gases to ignite on board, to methods of neutralising the gases themselves. Its work was soon to broaden into an industry-wide study of tanker explosions that BPTC led, in association with the UK Chamber of Shipping.

As BP's volumes of oil grew, the shipping arm came to rely upon the chartering of others' ships, as well as its own, for transportation. This brought its own risks. *Torrey Canyon* was on a single-voyage charter to BPTC when she grounded near the Scilly Isles in 1967, spilling some 100,000 tonnes of oil and contaminating the coastline of England and France. Her Liberian-registered owners operated three ships on behalf of Union Oil of California. BP had no legal liability for the loss of the cargo, the ship or any resulting claims for oil pollution, damage to shore property or wreck removal. Nonetheless, the incident seized public attention in and beyond the UK and France and it was a sharp reminder to BP that in the court of public opinion, issues of legal liability cut little ice. It was 'BP's oil' that was perceived to be at fault. *Torrey Canyon* and *British Crown* brought about directly, if slowly, many of the features that would be introduced in the 1970s and early-1980s to increase the safety of large tankers and reduce the consequences when accidents arose. These included limitations on tank size, structural design for heavy weather, inert »

All change: in 1951, Iran nationalised its oil. Anglo-Iranian Oil Company workers were evacuated and Abadan refinery closed down. Production resumed three years later, by which time AIOC had been renamed The British Petroleum Company.

Stamp of approval: below, *Iolair*, was commemorated by Royal Mail as part of a series of stamps highlighting British engineering achievements; and right, a crew member inspects a liquefied natural gas cargo tank on board *British Merchant* while docked in Spain.

gas, improved tank cleaning, traffic control in channels and estuaries and, finally, the total segregation between cargo and ballast in the ship to provide a ballast tank barrier for areas of the oil-bearing tanks most vulnerable to an impact.

Despite these new challenges, George King, a former tanker master and managing director of BPTC, recalled: "It was a time of enormous confidence in the oil industry. Crude oil was cheap and demand was high. It seemed in the mid-1960s that progress meant going on forever getting bigger and busier. Occasionally, a still, small voice might whisper that the bubble would have to burst one day, only to be dismissed as preposterous." Inevitably, the small voice proved right and the bubble was burst in the 1970s by the Organization of the Petroleum Exporting Countries (OPEC), which sought the right of all countries to exercise sovereignty over their natural resources, and began to flex its considerable power through nationalisation and operating as a pricing cartel.

For BP, its entire integrated business was built on access to the huge reserves of low-cost crude oil that it had discovered in the Middle East. In 1971, BPTC lifted more than 4 million barrels of crude each day, with 80% from the Middle East. Purchases of crude by BP from other parties made up only 10% of its total liftings. By 1976, the position was reversed – BPTC had moved from being a vehicle to transport largely BP-produced oil to one transporting oil desperately purchased from third parties to keep its own refineries up and running. Oil was no longer cheap, as OPEC drove up prices from $2/barrel to $12 and its consumption fell faster than the general decline in economic activity around the world. This left the oil companies burdened with surplus refining and shipping capacity and, over the next 15 years, the fleet would be cut back to barely a dozen tankers, while 1,700 officers and ratings were made redundant or moved to agency manning.

Despite the setbacks, the renamed BP Shipping began to develop its offshore marine services activity, with BP's upstream as its core client. BP's major discoveries in Alaska and in the North Sea in the 1970s were supported by the marine skills of BPS staff involved with the design, build and operation of critical offshore facilities, which included: *Sea Quest* – the rig that drilled the Forties discovery well; *Iolair* – a world first North Sea semi-submersible emergency support vessel (ESV) described as "a combination of a stand-by vessel, a diving support vessel, an accommodation vessel, and a hospital with a bit of warehouse thrown in as well"; *Seillean* – the world's first dynamically positioned offshore production vessel; and the development of the Valdez terminal in southern Alaska to load North Slope crude onto ships for onward transportation.

It was from the Valdez terminal that the *Exxon Valdez* set sail in 1989, only to ground and spill oil into Alaska's environmentally sensitive Prince William Sound. For the oil and shipping industry, it represented a watershed. The following year, the US Congress passed legislation requiring a phase-out of single-hulled oil tankers in US waters by 2010. For BP, it was now starkly evident that the scale and reach of its shipping activity represented one of the biggest risks facing the company.

When *British Trent* was struck in fog by the bulk carrier *Western Winner* in 1993, causing the deaths of nine officers and crew on *British Trent*, the subsequent formal investigation reported that *Western Winner* had committed every navigational failing possible. *Exxon Valdez* and *British Trent* had shown that the risks associated with the carriage of goods at sea were defined by the standards of the entire shipping industry and not simply those of a single operator. Actively engaging with and managing the risks inherent in the shipping industry could be the only way forward for an oil company involved with the movement of considerable volumes of oil, gas and chemicals around the world – especially one that had become a supermajor at the end of the 1990s as a result of its mergers with Amoco, ARCO and other businesses.

While Amoco and ARCO didn't bring a fleet of ships to BP, their assimilation did create a remarkably rich set of oil and gas assets that presented both risk and commercial opportunity for BP Shipping. There were not enough double-hulled ships or liquefied gas carriers on the charter market to carry BP's increasing volumes to the standards expected, without incurring a significant quality premium. There was also a considerable commercial prize to be had by not simply conveying cargoes of oil but also trading and optimising around the fleet of vessels to carry them; this optimisation had previously been lost to the spot market and its operators.

While the commercial case was strong, BP judged that a new shipping strategy was a vital component in managing risk where the vast majority of its oil was still transported by sea. It was to prove a game changer. In

2001, a $3-billion ship building programme was approved that would quadruple the number of owned or managed ships – almost all double-hulled – to more than 50 by 2005 and triple the fleet capacity. At the same time, BP Shipping became responsible for matters of 'marine assurance' across the BP group. One moment its staff might be devising emergency response plans for an offshore Libya seismic acquisition survey in the Mediterranean and the next be called to inspect a pleasure boat for use by the visiting Vietnamese Prime Minister. These were vitally important marine skills and experience that would go on to play important roles in responding to major incidents, such as the Deepwater Horizon oil spill in 2010, as well as innovative new deepwater field developments in Angola and Norway.

As it celebrates its centenary, BP Shipping can reflect upon 100 years of ship design and operation involving more than 500 tankers – an astonishing average launch rate of one new tanker every 10 weeks for every year of the past century. Along the way, its people have moved much of BP's oil from field to market around the globe, demonstrated remarkable courage in war and peace, and made outstanding contributions to maritime safety and environmental performance. Since 2011, 34 new oil and gas vessels have been ordered from yards in South Korea, which will set new standards that exceed current industry regulations and anticipate future measures. From the model testing tank to sailing the world's great seas, these new highly-efficient ships are designed to underpin a second century of 'riding the waves' for BP. ■

In remembrance: above, the bell of *British Trent*, on display in the Mariners' Chapel in All Hallows by the Tower Church, London. In June 1993, *British Trent* was struck by another vessel in heavy fog, caught fire and abandoned. Nine officers and crew were killed and several more badly injured; and below, ordinary seaman Cyril Villarubia raises the BP Shipping house flag on board *British Emerald* carrying LNG across the Atlantic, November 2014.

BP SHIPPING **TIMELINE**

1915 British Tanker Company is launched

1916 First tanker – *British Emperor* – is launched

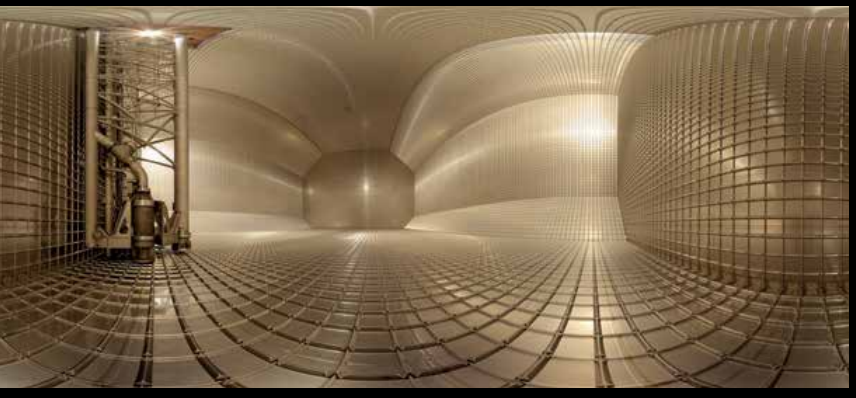
1920 British Tanker Company commences construction of a fleet of 35-40 new vessels

1934 Anglo-Persian Oil Company commences oil exports from Kirkuk, Iraq, with tanker loading at Haifa, Palestine

1939-45 50 ships manned by the British Tanker Company are destroyed in the Second World War, with 657 lives lost

1948 Launch of BTC's first 'supertanker', *British Adventure*

1956 Suez Crisis diverts tankers around the Cape of Good Hope. The Suez Canal is closed for a short time



1963 BP Tanker Company patents an inert gas system – one of the most important contributions to tanker safety

1967 *Torrey Canyon* grounds while on a single voyage charter to BPTC, spilling some 100,000 tonnes of oil

1981 BP Tanker Company is renamed BP Shipping

1989 *Exxon Valdez* grounds in Prince William Sound, Alaska, US, prompting new regulations on the production of double-hulled vessels

1990-97 New vessels are added to the BP Shipping fleet, including its first double-hull – 210,000 dwt *British Valour*

2000 $3 billion fleet renewals programme announced

2011-15 Launch of floating, production, storage and offloading vessels for Angola and Norway deepwater fields

2011-15 34 new vessels are ordered as part of the Neptune, Triton and Delphi fleet renewal projects

Leisure time: on board the 75,000 deadweight ton *British Ensign*, June 1964. As tankers grew bigger in the 1950s and 1960s, the facilities improved, with permanent swimming pools replacing earlier 'canvas baths'.

MARINE LIFE

Life at sea has changed dramatically in the century since the British Tanker Company was launched, with technology advances playing an enormous role in both navigation and communication. Captain Bob Gribben, a master for the past 22 years and currently on board the BP-operated *British Emerald*, shares some of his personal experiences of the seafaring life.

REPORT> HELEN CAMPBELL **PHOTOGRAPHY>** BP ARCHIVE / STUARY CONWAY / BARRY HALTON

Daily tasks: above, chief, second and third officers taking noon sight on board *British Duchess* 1958-65; and below, apprentices taking oil and seawater densities on *British Adventure*.

Captain Bob Gribben got his first taste of the seafarer's life as a cadet at the age of 16. Back then, crews numbered 50 or more, the sextant ruled, brief voyage details were sent by Morse code and seafarers commonly did not see their homes or families for months. Some compensation was provided by generous periods of shore leave.

A master for the past 22 years, Bob joined the BP-operated *British Emerald* in 2012, making the move from his many years on crude tankers to his first command of a liquefied natural gas tanker. He has seen a lot change over the years working for a number of operators.

One of the biggest enablers of change has, of course, been technology. Loading and unloading operations have got faster and more efficient, for example, ships spend considerably less time in port than they used to. This, combined with heightened security measures in many ports, means less opportunity for shore leave, a loss lamented by many, although some ports are more worthy of a stopover than others.

"We rarely spend more than 24 hours in port, during which time it's understandably busy, with cargo and storing, and technicians, surveys or superintendents attending," Gribben says. "It doesn't leave much opportunity for shore leave. During my earlier trips, the ships used to be in port longer and, with slower cargo operations, there was much

In memory: in September 2014, Captain Gribben was selected by BP Shipping to place a wreath at the annual Merchant Navy Memorial in London, during the service's 100th commemorative service. Captain Gribben was there to represent all of the BP seafarers who lost their lives in the First and Second World Wars. "We were very much the silent service. We went about our business in the background and being unarmed made you very vulnerable to any incoming hostilities. To be under fire and with no means to fight back takes remarkable courage."

more free time. I've managed overnight trips to Niagara Falls, trips to the Great Wall of China, Tiananmen Square and the Forbidden City, as well as the Pyramids and the Sphinx, which I doubt could be achieved in service now.

"I have fond memories of lengthy port calls and free time in Montreal as a junior officer and, more recently, trading on the Australian and New Zealand coasts. My least favourite places, though, would be those where the paperwork preparation prior to arrival is monumental."

When it comes to navigation, just as most car owners are now on first name terms with their sat-navs, it's the same for ships. But, the old equipment, of the sort now often displayed on the walls of maritime-themed pubs, still has its place, as Gribben explains: "Navigation-wise, it was all done by sextant and compass when I started out, whereas now it is primarily by satellite. The sextant is only used periodically to keep up this skill base, and training programmes in some countries, the US included, no longer teach students its use. This seems wrong to me. I remember more than one occasion when a ship's sat-nav failed but, rather than have to wait for repair or replacement, we were able to continue without a problem using the sextant. I think it's important."

Gribben says the magnetic compass remains part of the bedrock of capability to take bearings on board. He recalls one particular trip where the ship's entire bridge system went down, leaving just a compass – and a kettle – the only working equipment on the bridge as the ship made landfall. "And we still arrived on time!" he says, adding that ships are a lot more reliable now.

Another aspect of life at sea that has changed significantly is tour-of-duty length. When Gribben was a junior officer, the standard contract length was six months, compared with the usual three months, now. Crews are often still away for weeks and months at a time, but they enjoy far better connections with home, thanks to technology. Calls home used to be made by radio through coastal stations and were dependent on reception and the skills of the radio officer in tuning to the nominated frequency.

"I recall a trip with a very poor radio officer who only managed to connect me with home once in six months," says Gribben. "Coupled with no shore leave, it made for a very long tour of duty."

On the modern ship, the availability of satellite communication, internet access, streamed news, sport and Wi-Fi mean seafarers are far less isolated on those long voyages. But, the social side of living on a floating and rolling workplace for weeks at a time has changed dramatically.

"We used to have a single TV and a film projector, for which the movies were provided on reels, like the old cinema set-up," Gribben says. "I can recall heckling the 'sparky' [radio officer], along with »

everyone else when the tape broke, or when they got the reels in the wrong order. Those nights were definitely more about the social interaction than the quality of the films but, now, most officer cabins have TV and DVD capability and folks often retire to their own cabins to watch movies. Although the quality and variety of content has improved substantially, the social element has suffered."

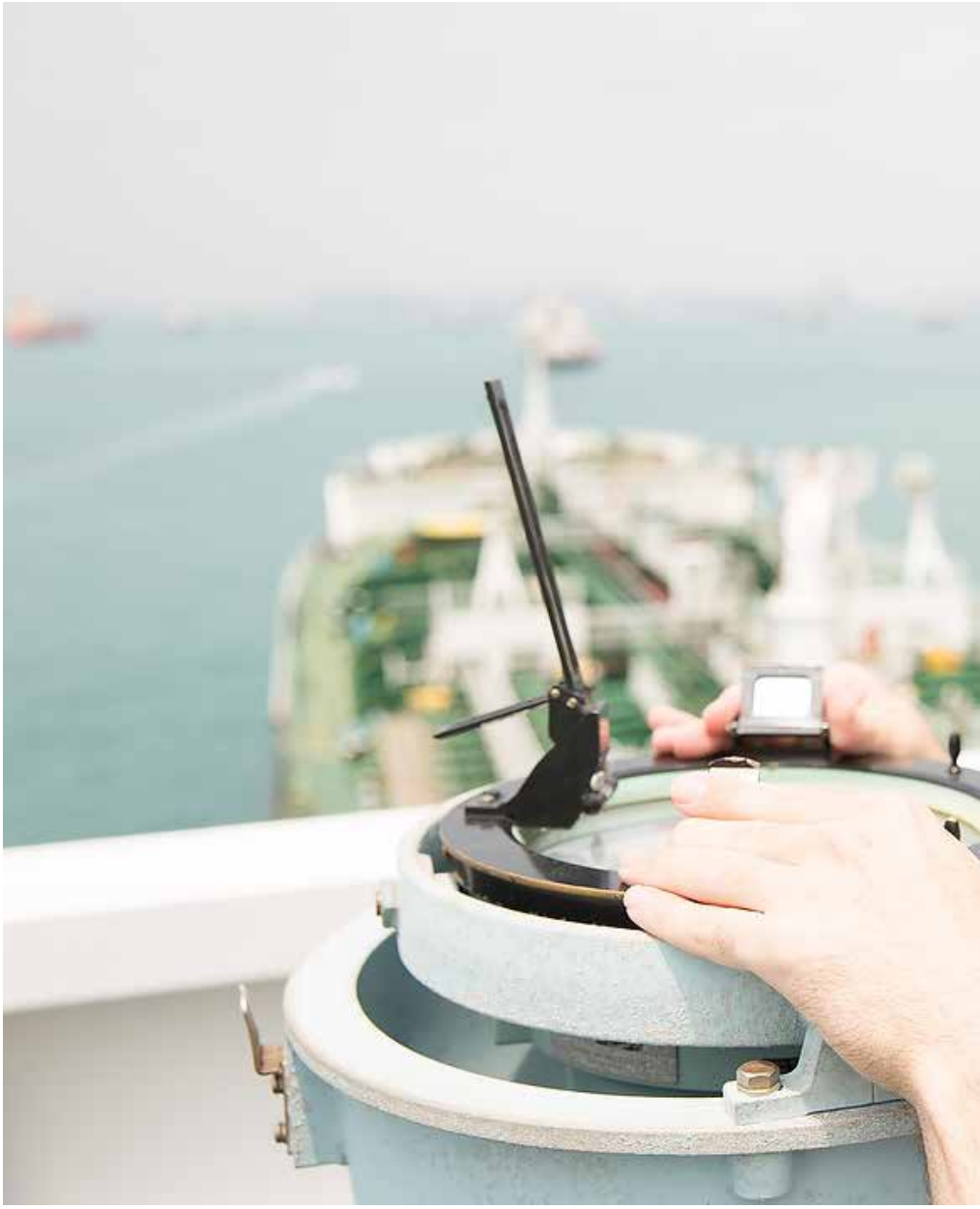
Mealtimes on board remain social occasions and food, of course, can make or break a long trip. Gribben recalls, as a young cadet, seeing for himself, for the first time and with some shock, that the rumours were true that crates of food stamped: "not fit for human consumption, for sale only to prisons and seafarers" were commonly sent to ships. Food is of far higher quality today, compared with the meagre 'rations' on offer in earlier times. One very important social event, at least, does retain a relentless sense of occasion on BP ships these days: the long-held tradition of donning uniform for the evening meal endures, and is one Gribben holds very dear.

Gribben calculates that he has completed around 500 voyages. The one that always stands out for him is his first trip in command, on a vessel sailing from Japan to South Korea, in 1992.

"It's a great feeling when you drop the pilot and set off over the horizon and it's all yours," he says. "That first ship with me as master was old and we had many challenges, some technical and some operational, but we had an excellent team on board and we overcame them all.

"There have been many good and bad ships, good and bad voyages, good and bad ports since then, but it's the people that make the voyage memorable for the right reasons, irrespective of all the other factors, and I've had the privilege of sailing with some great personnel."

Now, well into his fourth decade on the waves and with no intention of seeking a shore career, what keeps him going back to sea? "Job satisfaction, constantly challenging myself, and pride in a job done well," replies Gribben, without hesitation. "And because, even as a master, I've still got things to learn!"



On the job: far left, chief cook Felicano Escabarte and second cook Reynold Zubiaga serve out the evening meals prepared from a list of crew requests, in the galley on board the BP LNG tanker *British Ruby*, located off the coast of Spain; left, crew members in conversation on board the BP LNG tanker *British Merchant*, located off the coast of Spain; and bottom, at work on *British Chivalry* in Singapore.

CLOSE ENCOUNTERS

"My wife sailed with me for a couple of trips when I was a junior officer," says Captain Bob Gribben. "I was showing her on the chart the site of the *Titanic* sinking, as we were due to pass over it later in the day. As I took the evening watch, an iceberg loomed out of the fog around 100 yards off the starboard bow. Even though we could now see it clearly and at an alarmingly close range, we still could not detect it on the radar.

"The berg had a gently sloping face and our radar beam must have been deflected away from, rather than reflected back to, our receiver, so it wasn't detecting it. Once it passed by, we were able to detect the rear vertical face of it for the next 24 miles [39 kilometres] on the radar. The captain stopped the vessel and we did not proceed any farther until the following day."

Another natural and no less memorable sighting for Gribben was the first time he witnessed the Aurora Borealis, encompassing the entire 360° horizon. Incredible though it was, he did not immediately realise the significance.

"I'd been seeing the Northern Lights every night for a week while trading to Montreal and thought it must be routine in the area," he recalls. "While I thought it was amazing, I didn't appreciate the significance of it and didn't call the captain and his wife to come and see it. He gave me a roasting the next day when I told him.

"Many years later, as captain sailing along the northern coast of Borneo, the third mate told me he'd seen a volcanic eruption on the shore the night before. I couldn't believe he had not called me to come and see it. It was a real flashback to my own lack of appreciation of the rarity of such examples of natural phenomena 30 years earlier." ■

THE CALL OF DUTY

Ever since its formation in the early days of World War One, BP Shipping has played a strategic role in times of conflict. Here, *BP Magazine* reviews some of the impact, not only on its cargoes and operations, but also on the lives of the sailors who often faced great peril in the line of duty.

REPORT> ANDY JAROSZ **PHOTOGRAPHY>** BP ARCHIVE / IMPERIAL WAR MUSEUM

Wartime threat: while the Atlantic convoys were at risk from U-boats, the British Tanker Company's ships also came under attack from aerial bombardment.

It was in 1946, while launching the brand new British Tanker Company (BTC and later renamed BP Shipping) tanker, *British Princess*, that the then Princess Elizabeth paid tribute to those who had served in the Second World War in the tanker fleet. She said: "No greater heroism has ever been shown than by the men who served in our tankers. Their achievements were of vital importance but seldom spectacular, and it was not often that they received the thanks they deserved. But, in their own quiet, devoted way those men endured almost greater hardships than anyone."

BTC tankers had played an instrumental role in the trans-Atlantic convoys of oil and essential goods that supplied Britain and its allies during the war years. But, while the convoys provided safety in numbers, they were also vulnerable targets for the Luftwaffe and the U-boats, and, as a consequence, merchant shipping losses were extremely harsh in the early years of the war.

When Germany invaded the Soviet Union in 1941, Arctic convoys were established and BTC ships were again involved in transporting oil and essential goods from the US across the Arctic Ocean into northern Russia. As if the enemy wasn't dangerous enough, Arctic temperatures of 60 degrees Fahrenheit below freezing and 24-hour daylight left the convoys dangerously exposed. It is no surprise that these journeys were known by the men involved as 'the suicide missions', and acknowledged by Churchill as 'the worst journey in the world'.

Stuart Allen served on the *British Patience* and recalled his experiences on an Arctic convoy from Glasgow to Archangel in September 1944. "From Glasgow, we went round to Loch Ewe to join the convoy, which was made up of around 30 escorts and 30 merchant ships, mainly carrying military equipment, such as tanks, aircraft and munitions. Most were American vessels, with only a few British ships in the convoy. There was always a rescue ship at the rear end of the convoy with the job of picking up survivors if a ship was torpedoed.

"We soon encountered a U-boat pack somewhere around the Faroes, but it was chased away by our escort. We went north, to around 76 degrees north, way above Bear Island, before coming back down towards Murmansk. Half the convoy left there and we left from Murmansk and went down to the White Sea with a Russian escort. They spent all night dropping depth charges. It was difficult to pick up submarines because of the density of the water, so they tended to drop depth charges to deter them."

Allen passed away in March 2015, however in June 2013, he received the Arctic Medal for his service on *British Patience*.

Service record: left, battling heavy seas in Arctic Convoy JW53 to Russia in February 1943; the *British Fortitude* was hit by a torpedo in 1943 and the document to the right is a summary of the events that followed. The chief engineer, Mr McCuaig, took charge of operations in the engine room and got the vessel's pumps working in the face of onrushing water, and the ship eventually arrived safely in Guantanamo Bay on 8 March. Below is a photograph of McCuaig in his merchant fleet uniform. The AIOC chairman later personally awarded him a gold pocket watch (also pictured below) inscribed with the words: "In recognition of his courage and skill which enabled his ship – substantially damaged by submarine – to reach safety, 1943." McCuaig was subsequently awarded an OBE for his actions.

Ministry of War Transport Book. 58.L.4

M.V. "BRITISH FORTITUDE"

98

Summary of events following torpedoing based on Master's report.

The m.v. "BRITISH FORTITUDE" bound for Curacao to load a cargo of petroleum, formed part of a convoy which had sailed from Milford Haven on 5/2/43.

At 1920 on 23/2/43 in position 31°12'N. 27°29'W. about 368 miles from Santa Maria, Azores, the vessel was struck by a torpedo on the starboard side in way of the after tanks, the explosion blowing away a large part of the shell plating and tearing Nos.8 & 9 cargo tanks, after cofferdam and bunker spaces open to the sea. The engineroom bulkhead was badly strained and water was leaking into the engineroom.

The ship remained in an upright position but was settling by the stern and it was feared the damaged bulkhead would not be able to stand up to the pressure of water; if this gave way the vessel would be totally disabled and would have to be abandoned. The water was rising in the engineroom and quick action was necessary to get the pump underway and keep it under control.

The Chief Engineer, Mr.McCuaig, took charge of operations in the engineroom and in face of inrushing water under great pressure, he got all available pumps working. On seeing the testing valve had been broken off the bulkhead, he calmly proceeded to the Lathe, turned a wooden taper plug which he inserted in a length of 2" piping and wading up to his waist in water he succeeded in inserting the plug in the hole and afterwards shoring the plug into position with a plank from the ship's side frame, across the end of the pipe holding the plug and secured to an upright stanchion.

Through this action on the part of the Chief Engineer the pumps were able to keep the water under control but the general position was still critical. The bulk of the oil fuel bunkers had been lost and the vessel was now left with only enough fuel for 9 days steaming.

The vessel was able to keep her position in the convoy and on the 27th of February the position was much easier as regards fuel, 70 tons of which had been recovered by the ship's salvage equipment which gave the vessel another 3 days steaming and hopes were high on board at the possibility of reaching Curacao.

The vessel kept up a speed of 9.5 knots and by the 2nd of March position had further improved. Cargo pumps had been got under way and the pressure on the engineroom bulkhead was reduced by discharging ballast. The reclaimed fuel oil was burning well under the boilers and there was now every possibility that the ship would reach her destination.

On March 3rd the fuel position had so far improved that it was decided to make for Guantanamo Bay where vessel arrived safely at noon on the 8th of March.

When asked about the bravery of the tanker crews, he said, in a matter-of-fact way: "We were just trying to do a job. There was a war on and we were trying to keep things on the move. The Merchant Navy is there to transport goods and materials. In this case, it was wartime, so it was war materials and other essentials. This was our job."

The BTC tanker fleet paid a heavy price during Second World War, with the loss of 657 employees and 50 company-manned ships. Yet, without the bravery and resourcefulness of the company's men in the most extreme circumstances, these numbers would have been considerably higher.

One of the more remarkable survival stories involves the crew of *British Premier*, torpedoed on Christmas Eve 1940 in an attack that resulted in the loss of 31 men. Only a few men survived, and having retrieved a wooden dinghy from the burning vessel, ordinary seaman Evan Griffiths, along with ordinary seamen Basil Davies and Walter Russ and able seaman Bob Austin, embarked on what became a 41-day ordeal that took the four men to the brink of starvation. They chose not to summon help from a passing enemy submarine. Rain showers enabled them to stay hydrated, but food supplies ran »

Wartime honours

Honours and awards earned by BTC personnel (1939-1945)

- 1 Albert Medal
- 36 BEM
- 79 Commendations
- 5 Dispatches
- 6 DSC
- 3 DSM
- 1 DSO
- 14 Lloyd's War Medal
- 23 MBE
- 31 OBE
- 3 Royal Humane Society
- 1 Soviet Medal for Valour

out after 31 days. Sharks circled their boat as the desperately hungry men tried to capture seagulls and fish. They clung to life for 10 days without food until they were rescued in a skeletal state by a destroyer.

Seaman Griffiths was later awarded the Lloyd's War Medal for 'courage and resource at sea', as well as the British Empire Medal.

In 1982, BP Shipping tankers were once again called upon to serve, this time during the Falklands War. An essential requirement of the mission was the capability of refuelling at sea, and six vessels from BP Shipping's River class fleet were commissioned for the task. The *British Esk* and *British Tamar* had already been fitted with the necessary gear to facilitate refuelling at sea, and the modifications required to four other tankers were quickly made in preparation for their South Atlantic mission.

All crew were fully briefed by a member of head office staff and told that they would be sailing into a war zone. John Carrie, fleet manager for BP Shipping at the time, recalls giving the briefing on *British Trent* when she came into Portsmouth Harbour. "If anybody wanted to be replaced on the ship (bearing in mind that the normal tour of duty was four months and we had no idea how long they were likely to be away), no 'black mark' would go against their name." Only a small number chose to come off the ships, mainly due to upcoming weddings or impending fatherhood.

LONDON MEDAL COMPANY

In action: above, the Lloyd's War Medal; below, a Royal Navy Sea King helicopter embarks some of the 271 survivors of *HMS Sheffield* onto BP Shipping's *British Esk*, May 1982; and right, the LNG ship *British Innovator*.

During the two-month-long conflict, the Atlantic served up its typical atrocious mix of conditions, including force 10 storms, but nothing prevented the refuelling operations from taking place.

In his gratitude for the contribution to the task force, the First Sea Lord gave the following tribute: "I should like to thank the Merchant Navy on behalf of the Royal Navy for their magnificent performance in the Falklands Islands Campaign. I doubt that at any time in history an operation of this magnitude has been conducted in the onset of an Antarctic winter, from a base 8,000 miles away, without warning. The co-operation between our two navies was quite outstanding, unequalled even in the two World Wars; many feats were achieved of which the Merchant Navy may be rightly proud and Royal Navy deeply grateful."

Even in peacetime there are regular incidents that require the crews' experience, skill and courage to protect themselves and others from the perils of the sea. During a Caribbean voyage aboard *British Innovator* in 2009, second officer Simon Page was alerted by watchman Edwin Hitalia to a faint light in the distance. On a hunch that something wasn't right, the second officer called the ship's master Chris Durman, who immediately manoeuvred the vessel for a closer look. In the limited moonlight, they made out the dim outline of a small boat and a man frantically waving his arms, trying to get their attention. What followed was a well-ordered rescue operation, where the master brought the ship into position alongside the small boat and a line and lifebuoy were thrown into the sea to bring two exhausted men to safety.

The two men were from Tobago and suffering from exposure, malnourishment and dehydration, having drifted for 10 days and survived on raw fish. They were extremely relieved to get a hot meal and a change of clothes, even if they were brightly coloured boiler suits.

As Simon Page later reported: "It was a job well done. From the initial sighting to the rescue and recovery of the fishing boat, the whole operation took a little over 90 minutes. The professionalism shown by all on board, from messman to master, is a credit to both the company and to the Merchant Navy. We can all take great pride in knowing that we played a part in saving two lives."

The rescue by the crew of *British Innovator* is just one of many such instances over the past 100 years, where the commitment and quiet determination of BP crews have enabled them to assist others who have needed help at sea. During that time, BP Shipping supported the wider group as it has dealt with the challenges of an unpredictable global environment, and, in doing so, it has played a pivotal role in supporting the UK during some of its most difficult times.

Northumberland Gazette

RECOGNITION OF SERVICE

Alan Davies, (pictured above), was awarded an Arctic Star medal for his service in the Merchant Navy during the Second World War. Alan served on the oil tanker *British Corporal*, which was part of Convoy PQ14, from Reykjavik, in Iceland, to Murmansk, in Russia, in April 1942. During the war, Alan also served on other BTC oil tankers that took part in various convoys across the Atlantic. At the time of Convoy PQ14, he was a third officer. He subsequently went on to become commodore of the BPTC fleet. He spent his entire working life of more than 40 years serving with BPTC. The last ship he commanded was the supertanker *British Respect*, the largest vessel to take part in the Review of the Fleet that was held at Spithead on 28 June 1977, to commemorate the Silver Jubilee of the Queen's accession to the throne. ■

Interview: Sam Nuttall

LITERACY

A PRECONDITION FOR SUCCESS OF PEOPLE, ORGANISATIONS AND SOCIETY

For a surprising number of people across Europe – one in five adults – low levels of literacy can turn simple activities, such as opening a bank account or visiting the doctor, into insurmountable hurdles. Recognising the implications for business and society as a whole, BP Netherlands became a founding partner of the Reading & Writing Foundation in 2004, an innovative non-governmental organisation established to mobilise society to help prevent and reduce illiteracy in the Netherlands, and across Europe. Its founder and honorary chair, Her Royal Highness Princess Laurentien of the Netherlands, explains why literacy is a growing priority for companies.

Imagine your life and daily tasks, such as paying bills, online banking, understanding instructions on your medication, buying a train ticket, filling in forms or a job application. Now, imagine undertaking these same tasks but having trouble reading or writing. Imagine how helpless you'd feel. Your friends and family may not even know about your problem. You would probably hide your inability. Imagine how stressful this could be.

This is the reality facing one in five adults in Europe who are functionally illiterate. It means they don't have the necessary reading and writing skills to cope with many everyday social and professional situations. It makes them vulnerable and excluded, as so much of our personal and professional interaction takes place via the written word. Apart from debilitating personal implications, this has a tremendous impact on society. Countries generally experience lower levels of wellbeing and productivity, as well as increased social security and healthcare costs. In the Netherlands, the costs add up to an estimated €556 million a year.

Literacy also affects another issue that is core to all businesses: safety. Accidents caused by low levels of literacy have occurred at 5-10% of all companies. This is not just about employees' ability to read safety documents or posters. Safety is also about a mindset, a culture of transparency and the ability to understand co-workers' instructions. Functional illiteracy, often still a taboo, is a frequent barrier to skills and behaviour.

I am convinced we can eradicate functional illiteracy. We should strive for a 100% literacy. Why? Because every child can, in principle, learn to read and write. And, everyone deserves a chance to fully participate in their community and in society. There are countless places of intervention, there are countless chances to reach those who need help but are, perhaps, too ashamed to admit it. So, what does it take to reach our ambitions?

> *"We should strive for a 100% literacy. Why? Because every child can, in principle, learn to read and write. And everyone deserves a chance to fully participate in their community and in society."*

First, we have to break the taboo and raise awareness about functional illiteracy. Those who feel embarrassed should feel that there's nothing to be ashamed of and that there are ways to learn to read and write, regardless of age, background or level of intelligence.

Second, we have to develop creative solutions. The Reading & Writing Foundation co-operates with more than 800 partners , such as social services, banks, doctors, hospitals, companies and libraries. We empower them to identify citizens, clients and employees with reading and writing difficulties, to direct them towards solutions and to team them up with a trained volunteer, who acts as a coach. We have piloted this approach

in six regions and the results make a clear case for scaling-up this 'eco-system' nationally.

Third, we need the support of multiple partners, including companies. This is not a charitable cause, however. If companies say that they are committed to productivity, the wellbeing of their employees, safety and literacy is not a 'nice to have'; it is a 'need to have' that cuts to the core of a company's licence to operate. Strategic corporate engagement goes way beyond a charity donation.

Reduction and prevention must go hand-in-hand when it comes to addressing illiteracy, and at the Foundation, we have been engaged in broad societal mobilisation for the past 10 years. We know that few other activities beat the positive impact on a child's language and social development of reading aloud, yet in the Netherlands, 25% of parents don't read to their children. Fathers rarely read, and yet research shows that when they do, they're doing an excellent job. Against this backdrop, an alliance of leading literacy organisations – including the Reading & Writing Foundation – started the Fathers for Reading campaign. The campaign is supported by BP Netherlands and 75 other organisations and well-known personalities. The year-long campaign calls upon all fathers to read aloud to their children more often.

We are never too old to learn, and everyone deserves a second chance. Literacy is a precondition for the success of people, organisations and society. Not just in developing nations, but also in developed countries, such as the Netherlands. Imagine what it's like in the country where you live! ■

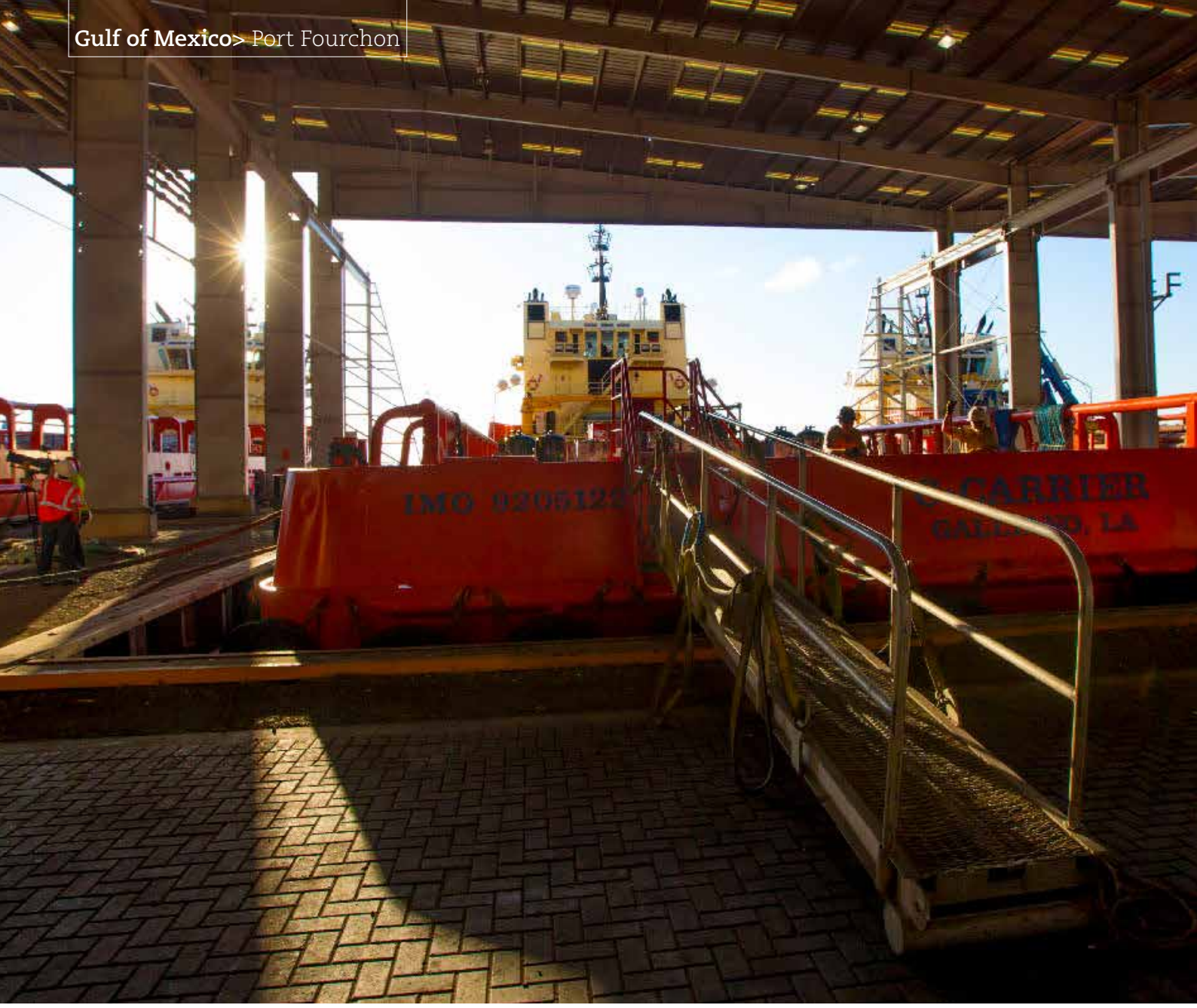
Her Royal Highness Princess Laurentien of the Netherlands is founder and honorary chair of the Reading & Writing Foundation, honorary chair of the Dutch Public Library Association, and UNESCO Special Envoy on Literacy for Development.

Shipping out: cargo handlers load an offshore supply vessel with cargo at Port Fourchon, which sits at the mouth of Bayou Lafourche, off the coast of southern Louisiana, US.

FIRST PORT OF CALL

First developed in the 1960s to bring in bananas from South America, Port Fourchon is today a thriving hub for the Gulf of Mexico's offshore industry. BP Magazine *reports from the facility, where 11,000 tonnes of groceries are sent out to BP's facilities ever year.*

REPORT> ERIC HANSON
PHOTOGRAPHY> MARC MORRISON



Located on the Louisiana coast, the port at Fourchon has long been a lifeline and support system for the Gulf of Mexico's (GoM) offshore energy industry. However, it had a very modest beginning.

"When it first started back in 1960, the plan was for it to be a new port for bringing in bananas from South America," says Chett Chiasson, executive director of the Greater Lafourche Port Commission. "That didn't happen because the banana trade went to Mississippi. But we found something a little more lucrative and that has been the oil and gas industry."

Now, five decades later, the only bananas that come through the port complex are the ones heading out to sea, along with tonnes of food, tools, fuel, chemicals and the countless other items that supply the people and machines working offshore.

The activities of hundreds of ocean-going vessels have created thousands of jobs and had a huge effect on the region's economy. BP's business operations have been an essential element of that multi-million dollar financial boost.

The docks, warehouses and repair yards at Port Fourchon, southwest of New Orleans, are the major base for BP and other energy and service companies working in the GoM, with BP GoM's logistics team responsible for loading the ships. But it is not a one-way operation; many of the tools and liquids, as well as waste material, are brought back to shore through Port Fourchon.

"It is like a gigantic post office terminal," says Lee Wilson, GoM supply base operations supervisor. "All kinds of stuff comes in from all over, we sort it and then send it out where it needs to go – and then we take care of it when some of it comes back."

Wilson says the requests that start the supply chain in motion begin on the offshore facilities, where specialists keep track of what is needed and order the items.

The orders, which consist of everything from bacon to drilling mud, go directly to vendors spread throughout the region and are then shipped by truck directly to the BP facility.

Trucks of all sizes constantly cross the seven-mile bridge linking the mainland to Port Fourchon, which consists of coastal marshes interspersed with solid ground that sits just a few feet above the high tide mark.

When the items that have been ordered arrive at the BP building, staff members must first make sure everything is safely packaged and prepared for shipment.

Economic lifeblood: the activities of hundreds of ocean-going vessels have created thousands of jobs at Port Fourchon, and have had a huge effect on the region's economy.

"It is like a gigantic post office terminal. All kinds of stuff comes in from all over, we sort it and then send it out where it needs to go – and then we take care of it when some of it comes back."

Lee Wilson

"We look for leaks and we make sure that all the seals are in place, that all caps and valves are closed," Wilson says. "It is all about safety; that is the thing we think about first before we move anything."

Wilson says 11,000 tonnes of groceries are delivered each year.

"If it needs to be kept cold, the food is packed in dry ice," he says. "Some of the containers even come with their own refrigeration units, just like a small refrigerated rail car."

The purpose-built vessels that supply BP's offshore facilities are docked and loaded inside a massive building, 114 x 300 metres (375 x 1,000 feet), featuring nine berthing slips.

BP's building is one of several docking facilities owned by the Louisiana-based Edison Chouest company at the seaside complex called C-Port. Four of the slips are operated by BP, while other energy companies use the remaining five slips. The slips are large enough so that the supply ships can back into the building, stern first, just like a truck pulling into a loading dock.

Operators use overhead cranes to carefully pluck cargo containers, drill pipe and other items from the floor, and then place them expertly onto the deck of the ship. Liquids destined for the rigs are pumped directly into below-deck storage tanks on the ships.

While much effort is expended making sure that all outgoing cargo is properly packaged, handled and loaded, just as much work goes into safely returning things from offshore, says Ronny Ferguson, GoM supply base operations supervisor.

"We bring back a lot of stuff, and that includes all the garbage and waste," Ferguson says. "And, around 65% of the equipment and tools we send out comes back here."

Waste products from operational activities, such as cuttings and chemicals, are stored, treated and transported under strict regulations. Other items, such as plastic bottles and cardboard, are recycled, while household waste is taken to a nearby landfill.

The building provides workers with a relatively clean and dry place to work. Although the structure is open on two sides to allow entry to boats and trucks, the roof offers shade from the semi-tropical Louisiana sun. The roof also provides protection from rain, which used to cause problems at the facility because the floor of the building was unpaved until 2008.

"In southern Louisiana, there are storms in the afternoons and the rain blows in," says Ferguson. "With heavy trucks coming in here and forklifts running around, there was a lot of mud, and they created potholes."

Occasionally, the rain-filled potholes led to forklift accidents. "When the ground was paved over, though, our forklift incidents dropped dramatically because you walk and »

drive on a smooth surface. It is safer."

Daily life at the BP docks revolves around work, meals and sleep, and Ferguson says the routine is similar to being on an offshore rig. "Except you can take a little walk around the place if you want to stretch your legs," he says.

Most employees and contractors at the BP operation work tours of duty, usually one or two weeks on followed by one or two weeks off, and live in housing on the site. "You work your shift, eat dinner, watch a little TV and then go straight to bed," he says. "Some guys go fishing in the afternoon."

There was a time when fishing was not the only outdoor activity taking place at Port Fourchon. "Veterans say the place was so remote 25 years ago that employees would go duck hunting in their spare time," Wilson says.

Most of the open fields that were once used by duck hunters are now covered by the docks, warehouses, offices, shipyards and drydocks that are home to more than 250 companies.

James Guidry, general manager of C-Port, says the port is centrally located in the Gulf to serve offshore rigs and offers dock facilities that other ports do not. He says at a conventional dock, a ship usually ties up parallel to the shore and loads cargo either to starboard or port.

"In 1,000 feet, you can get in three, maybe squeeze in four vessels," he says. "But here, in the same 1,000 feet you can

> *"The area of the port that we thought would take 30 years to develop was completely developed between 1995 and 2000. So, really in the past 20 years, we have more than doubled the size of the port, becoming the premier oil and gas service base for the US."*
>
> **Chett Chiasson**

Harbour view: above, looking out from the wheelhouse of an offshore supply vessel, while docked at Port Fourchon; above right, cargo handlers giving hand signals for load operations; right, cargo handlers directing overhead crane-loading operations; and far right, offshore supply vessel bridge crew in conversation at Port Fourchon.

bring in nine vessels in the same amount of space because they dock with the stern in."

And, at C-Port, the ships can refuel and take on any type of supplies because everything is available at the slips. "All those services – the mud, the cement – instead of being spread out all over the port, are now all available in that slip," he says.

The port was created when the offshore industry hardly existed, but over the course of a couple of decades, its location southwest of New Orleans proved an ideal spot for serving the GoM.

"Things slowly built up in the 1970s," Chiasson says. "But in the 1980s, during the oil bust, there was not much going on."

As the offshore activity began to pick up again, thanks in part to BP, numerous energy companies began looking for a spot that could support all their business activities. Then, in 1995, a law was passed opening up the deepwater GoM for exploration and production, providing a major boost for the offshore business. "The area of the port that we thought would take 30 years to develop was completely developed between 1995 and 2000," says Chiasson. "So, really in the past 20 years, we have more than doubled the size of the port, becoming the premier oil and gas service base for the US."

The Port Commission manages the property, not the facilities. "Our role is to help facilitate growth," Chiasson adds. "We do basic infrastructure, we build in roads, we put in water lines, we dredge the channels, we build bulkheads."

Chiasson says sales taxes paid by the energy companies to local government came to $12.8 million in 2013, up from $8.5 million just seven years earlier. "The port's activities create a $3.5 billion impact on our state's economy each year," he says.

The Port Commission recently completed an economic impact study that shows that about 10,800 jobs in Louisiana are directly related to Port Fourchon. The study also found that for every job created in Port Fourchon, another 5.2 are created elsewhere in the state; that the average annual wage for the port-created jobs was $53,702, around 28% higher than the average annual wage in Louisiana; that in 2013, the combination of construction spending and ongoing operations at the port generated at least $46 million in taxes for the state treasury.

BP is a major player in the area's economy, with $1 billion spent in 2013 on vendors in Louisiana – more than a year's worth of state tax generated by travel and tourism in the state, according to BP's *Economic Impact Report.*

Also, BP employs more than 650 people across the state and supports another 8,500 jobs. ■

PORT FOURCHON IN NUMBERS

270
Average number of vessels docking at the port every day

6,600
Number of meals supplied every week

11,000
Tonnes of groceries every year

22,650
Number of loaves of bread per year, enough for 249,150 sandwiches

76,000
Gallons of milk per year