BRENT E-NEWS

SHELL BRENT FIELD DECOMMISSIONING PROJECT

ISSUE #15 DECEMBER 2015

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A WORD FROM DUNCAN

Welcome to the latest edition of Brent e-news.

As we approach the end of the year, I am encouraged by the progress we are making both with our decommissioning work offshore and our efforts to engage with stakeholders onshore.

It was a huge boost to receive regulatory approval for the Brent Delta topside lift this summer. During the consultation period, people were generally very supportive of the next steps, and also in awe of the Single Lift Vessel and its capability.

Another personal highlight was our trip offshore to the Delta platform with some of the UK's leading energy journalists. It was invaluable to show them first-hand the size and complexity of the decommissioning task we face and to discuss some of the challenges. It was interesting too to witness their surprise at the hive of activity they encountered on the platform – which was at near capacity rather than the 'Mary Celeste' they were expecting.

A great deal of my time this year has been spent engaging with stakeholders – in other words discussing the project with a wide range of interested parties. In fact this year I have travelled the length and breadth of the country - from Aberdeen to Exeter - in my efforts to explain our approach to decommissioning and to listen to stakeholders' views.

"... PEOPLE WERE GENERALLY VERY SUPPORTIVE OF THE NEXT STEPS, AND ALSO IN AWE OF THE SINGLE LIFT VESSEL AND ITS CAPABILITY."

Most recently the focus of these discussions has been the GBS and the cell sediment. In this issue you can read more about our efforts to obtain samples from the Brent Delta storage cells (see page 6) and our work to share and seek feedback on the sample results. In November, we held a plenary event for the Cell Management Stakeholder Task Group (CMSTG) in Aberdeen so participants could hear from each other their reactions to the cell sampling process and results (see page 8). We really appreciate the investment of time and effort the CMSTG members are making in the project and value their views and opinions.

I have also taken the opportunity in the past few months to speak more widely about the challenges and opportunities that decommissioning in the North Sea presents – at industry workshops and public conferences. There's no doubt that interest in this topic is gathering pace – as evidenced by the fact that the recent Offshore Decommissioning Conference in St Andrews was heavily oversubscribed. Decommissioning is a challenge for the whole oil and gas industry, and if we're going to do it as safely, efficiently and responsibly as possible, we need to use every opportunity to exchange lessons learned, to discuss dilemmas and stimulate ideas.

I look forward to talking to more of you in person in 2016 and to hearing your views on this complex, exciting topic.

Duncan
Business Opportunity Manager

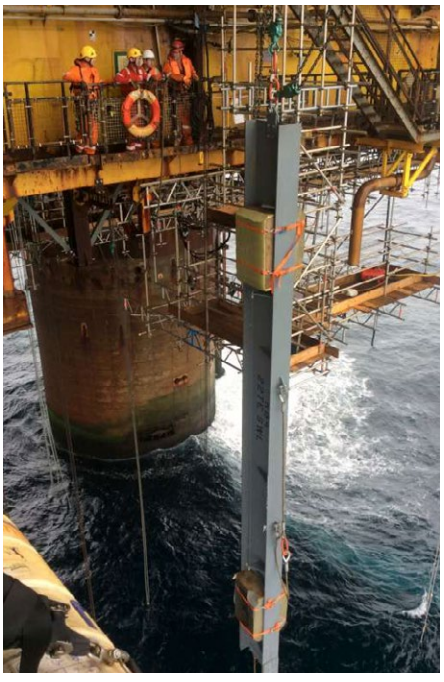
ONE-TO-ONE ENGAGEMENT

If you would like to be briefed one-to-one on any aspect of the Brent Decommissioning Project's developments, or would like to raise any particular queries or issues with the Project team, please contact us at www.shell.co.uk/brentdecomm or, you can also get in touch with the team via the 'Contact us' link on the website.

A WORD FROM ALISTAIR

As we approach the year end, there's no let up in the pace of offshore work on Brent. I am amazed at the sheer number of fronts we are working on simultaneously: plugging and making safe wells on Brent Alpha and Bravo, the rig upgrade and asset integrity project on Brent Charlie, attic oil recovery, conductor removal, debris removal, engineering down on Brent Delta - all with an overarching focus on safe offshore execution and efficient delivery.

At the same time we are working hard to put together our second, wider Decommissioning Plan and to engage with DECC and the new Oil and Gas Authority.



"AROUND 70% OF THE PILES ARE INSTALLED AND WORK IS EXPECTED TO BE COMPLETED IN 2016. THE END RESULT WILL BE, ARGUABLY, THE STRONGEST QUAY IN EUROPE. ."

Perhaps most time-consuming of all is the work required to prepare for the Brent Delta topside lift, but we are making headway in all four key areas. The first of these is making sure that the necessary permits and consents are in place, so DECC's approval of our topside Decommissioning Plan in July was a major milestone.

Secondly, the Brent Delta platform itself needs to be modified in preparation for the lift. We have had a very busy summer installing eight lift points weighing around 15 tonnes each under the platform (see page 5). This was a hugely challenging task requiring a heroic effort by all offshore to complete it safely in the summer weather window.

Thirdly, the owners Allseas need to be ready with their Single Lift Vessel, the Pioneering Spirit. Earlier in 2015, I was lucky enough to attend the vessel's naming ceremony in Rotterdam. It was fantastic to see it first hand and to understand better the challenge of completing this industrial giant. Since then, Allseas have made significant progress with the Pioneering Spirit and have conducted numerous tank test trials. Next will be a test lift in Dutch waters using a specially constructed 5,000 tonne platform.

Finally, Able need to be equipped to take the giant Brent Delta topside at their receiving yard in Teesside. Work is now well advanced on the super-strong quay specially constructed to take the weight of the topside. Around 70% of the piles are installed and work is expected to be completed in 2016. The end result will be, arguably, the strongest quay in Europe.

Only when all four of these key elements are ready can the lift take place. And then, of course, there's the weather… I look forward to calm seas and an equally productive year in 2016.

Alistair
Project Director

CONTACT US

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TOPSIDE LIFT

PREPARING FOR THE TOPSIDE LIFT
In 2016, the first Brent topside is due to be removed and taken to shore for dismantling and recycling. It will be a significant milestone in the massive engineering project to decommission the Brent field infrastructure.

The 24,200 tonne 'topside' of the Brent Delta platform is to be removed in one piece by a single-lift vessel. Using this single lift technique marks a major departure from traditional decommissioning methods where the topside is usually taken apart piece by piece in situ offshore.

After detailed technical and engineering studies, this technique was chosen by the Brent owners for three compelling reasons: it will substantially reduce the safety risk, cost and environmental impact of the operation compared with other methods.

Alistair Hope, Project Director for Brent Decommissioning, said: "Removing the topside in a single lift requires much less work offshore than traditional modular dismantling. There's less cutting and lifting offshore, which in turn means a reduced chance of accidents.

"But while the lift itself will take seconds, there are months of preparation work ahead to make sure everything goes to plan. Scheduled for 2016, it will be the heaviest lift for the oil and gas industry that the North Sea has ever seen."

SUMMER WORK UNDERDECK
One of the major activities during summer 2015 has been the installation of eight specially designed cruciforms at the exact locations under the platform where the vessel's lifting arms will make contact with the main deck. These cruciforms will allow the vessel's lifting arms to be positioned accurately on pre-strengthened lift points.

Eric McWilliam is project engineer for the underdeck work: "This type of lift has never been attempted before which means we can't just take equipment off the shelf and follow established procedures. Each stage needs to be meticulously planned and often requires bespoke equipment such as the eight cruciforms. And as always with offshore work – particularly if you are working underdeck - you can only work when the weather allows."

The eight steel cruciforms were manufactured at a specialist fabrication yard in Dundee before being sailed out to the Brent Delta platform. Each 15 tonne cruciform was then lifted by crane onto the deck ready for installation. Offshore workers used a runway system, wires and chains to manoeuvre each cruciform into position before checking its precise positioning with 3D laser survey equipment.

Over a period of five months, a highly skilled team including scaffolders, abseilers and welders worked to fix the cruciforms in place. The team of 36 welders operated in shifts throughout the day and night in order to maintain continuity of the heating and welding operations. In total the team hand-welded more than 10 km of steel.

Eric said: "One of the most time-consuming aspects of the project has been getting the access scaffold in place to allow us to work under the platform. Essentially we have had to build a network of scaffolding underneath the entire deck. End to end the beams and boards would stretch more than 40 km.

"And as each cruciform is fixed into place, the access scaffolding then needs adjusting and rejigging to accommodate the next piece of work. It's like an endless jigsaw puzzle.

TOPSIDE LIFT

"Our aim is to install all the cruciforms by the end of 2015, but we have been hampered by bad weather this summer. The safety standby vessel has to be able to see what's going on underdeck at all times, but on numerous days the fog has simply been too thick or the waves have been too high. It's very frustrating.
"But we are learning a huge amount as we go. All told, the first lift point took 53 full working days to install. The latest one took just 35 days. We are starting to review lessons learned and can already see ways to do this better for Brent Bravo and, in turn, Alpha and Charlie."

"... EACH STAGE NEEDS TO BE METICULOUSLY PLANNED AND OFTEN REQUIRES BESPOKE EQUIPMENT SUCH AS THE EIGHT CRUCIFORMS."

BACKGROUND FACTS

- The Brent field, located north east of Shetland was discovered in 1971. It has provided oil and gas to the UK for almost 40 years but is now reaching the end of its life and, in compliance with legal requirements, is to be decommissioned.
- The field has produced around 10% of all UK North Sea oil and gas and generated more than £20bn of tax revenue for the UK since production began in 1976.
- Brent Delta ceased production on 31 Dec, 2011. All 40 of its wells have been plugged and made safe.
- Plans to decommission the field infrastructure are being submitted in two parts. The first decommissioning programme, approved in July 2015, addressed the Brent Delta topside only. The second decommissioning programme for the remaining Brent field infrastructure is currently being developed but has not yet been submitted.

DID YOU KNOW?

- The Brent Delta topside measures 72m long by 47m wide and weighs more than 24,000 tonnes, equivalent to 2,500 London buses.
- Between March and October 2015, up to 100 construction workers were working offshore at any one time.
- End to end the scaffolding beams and boards for the underdeck work would stretch more than 40 km.
- A team of up to 36 welders was required to provide a continuous service, 24 hours per day (18 offshore and 18 on leave onshore at its peak). In total the length of the weld run exceeded 10 km.

CELL SAMPLING UPDATE

SAMPLING SUCCESS

One of the most challenging aspects of the Brent field decommissioning project to date has been obtaining sediment samples from the storage tanks – or 'cells' - clustered around the base of the Brent Delta platform.

For nearly 40 years, these massive concrete cells were used to store oil before it was exported to shore. When the platform ceased production, some oily sediment remained trapped at the base of the cells. The exact volume and composition of that sediment had not, however, been substantiated.

Duncan Manning is Business Opportunity Manager for Brent Decommissioning: "We had a good idea of what was left in the Brent Delta storage cells, thanks to our historical records and data modelling. But in order to check our assumptions about the quantity and composition, we wanted to obtain real samples.

"This desire was shared by our stakeholders who, during engagement sessions, told us they would have more confidence in our decommissioning recommendations if they were based on real samples."

Accessing the cells and obtaining these samples however, presented a huge technical challenge. Duncan said: "This was not a simple matter of taking off the lids and sucking out some sediment. For a start the cells are located 180 kilometres offshore and the cell tops are 80 metres below the surface of the sea. Their original internal access points are old and complex and their concrete walls are almost a metre thick. And there are only a few weeks in the year when the weather is stable enough to attempt this kind of operation."

"... ONE OF THE COMPANIES WE WORKED WITH WAS THE SPACE AGENCY NASA WHO HELPED US WITH A SONAR MAPPING PROJECT TO MEASURE THE VOLUME OF SEDIMENT."

PERSEVERANCE AND METICULOUS PLANNING

Work started on the sampling project in 2008. After numerous engagements with industry suppliers, it became clear that sampling operations of the kind we would need to deliver had never been successfully conducted before.

Over the next few years, thousands of man hours were devoted to the sampling task and multiple concepts examined and tested. Two ideas progressed beyond the drawing board to become offshore projects in 2008 and 2012, but eventually both had to be abandoned due to feasibility challenges.

Thoughts also turned to companies outside the oil and gas sector. John Gillies, Brent Decommissioning Execution Manager, was in charge of the sampling project: "One of the companies we worked with was the space agency NASA who helped us with a sonar mapping project to measure the volume of sediment. Their expertise in miniaturisation and navigation enabled the first successful access into one of the storage cells. But in the end, the waxy material near the top of the cell prevented the sonar from generating the image necessary for measurement."

In 2014 a fourth attempt to obtain samples was made offshore. Crucially this concept was based on creating a new subsea access point in the top of the cell, and on integrating five different technologies which had been tested extensively on shore.

CELL SAMPLING UPDATE

Three storage cells were chosen for sampling that could be accessed using the topside crane.

Working at 80 metres below the surface of the sea, divers first installed base plates on each of the three cells and bolted them onto the concrete surface. Phase two was carried out from the Brent Delta topside using the platform cranes, supported by a platform-based, remotely-operated underwater vehicle (ROV). A drilling tool was attached to the base plate so it could core into the 0.9m thick concrete tank tops and extract the samples.

Finally in August 2014, during a period of calm weather, we were able to collect between one and three kilogrammes of sediment from each cell – as well as water samples. A 3D sonar device was also successfully launched in each to measure the sediment volume and its surface topography.

John said: "In the end perseverance, good engineering and meticulous planning paid off, but it was a long, costly and technically difficult journey. Integrating multiple technologies and managing teams from multiple contractors was a real challenge. The use of the platform-based ROV was a game-changer in terms of cost, saving us hundreds of thousands of pounds a day because we didn't need a diving operations vessel. I'm proud to say the whole job was completed safely as well."

INDEPENDENT ANALYSIS

In order to give assurance that the samples were genuine and collected in controlled conditions, the offshore operation was witnessed throughout by independent observers. Each sampling canister was temperature controlled, sealed and signed to ensure it could not be tampered with or compromised before onshore analysis.

"...BUT THE RESULTS FROM THE SAMPLE ANALYSIS, TOGETHER WITH DATA FROM THE MODELLING, WILL BE INVALUABLE IN HELPING US MOVE FORWARD."

Once back onshore in Aberdeen, a specialist independent laboratory carried out detailed chemical and physical analyses of the samples. The results are now being used in the various studies needed to compare different decommissioning options, such as the Environmental Impact Assessment.

Duncan Manning said: "Obtaining samples from the Brent Delta storage cells has been a monumental challenge. It's taken years of work, millions of pounds and a variety of specially adapted and bespoke technologies. But the results from the sample analysis, together with data from the modelling, will be invaluable in helping us move forward. They will give us – and our stakeholders – a new degree of confidence that we know exactly what we are dealing with."

TASK GROUP COMES TOGETHER TO EXCHANGE VIEWS ON CELL SAMPLE RESULTS

CMSTG: CELL MANAGEMENT STAKEHOLDER TASK GROUP

The Cell Management Stakeholder Task Group, or CMSTG, met in Aberdeen at the end of November 2015 to discuss the analysis of the cell sediment samples, obtained from three of the Brent Delta oil storage cells. The meeting was an opportunity for members to put their own views forward and discuss each other's perspectives on the results, as well as to hear an update from Shell on its assessment of the cell management options.

The CMSTG was formed in 2011 to help inform Shell and ExxonMobil's decision-making on the cells and to ensure wider stakeholder confidence in the final recommendation. In the past four years a number of plenary workshops and one-to-one meetings have taken place to explore at a deeper level the issues surrounding the cell contents and management options.

At the heart of these discussions has been a desire to obtain actual samples from the storage cells. Task Group members felt this would improve understanding of the physical and chemical properties of the cell sediment and enable Shell to validate or modify the assumptions about the sediment properties that had previously been modelled.

After several attempts, samples were finally obtained in 2014 and then put through extensive, independent laboratory analysis. Duncan Manning, Business Opportunity Manager, said: "Throughout the summer we met with individual members of the CMSTG to share these lab results and discuss some of the implications for cell management options. One of the recurring themes was a desire for a plenary discussion so members could hear each other's perspectives on the cell sample results. They also told us they wanted to hear more about our comparative assessment work."

The majority of CMSTG members met in Aberdeen on Friday, 27 November. The meeting agenda provided the opportunity to discuss the cell sample results as well as to hear from representatives of BMT Cordah, DNV and Shell about the comparative assessment work. Representatives of the Independent Review Group (IRG) also spoke about their involvement in the planning and review of the cell sampling.

Duncan said: "People were genuinely appreciative that we had finally managed to obtain sediment samples. They acknowledged that the physical and chemical properties were largely in line with our modelling assumptions and welcomed the extra testing having been added to the analysis programme at the request of stakeholders. They also discussed a number of inconsistencies in the results and expressed their desire to understand them better."

While some CMSTG members expressed an appetite for further samples, there was also recognition of the considerable technical challenges involved in obtaining them. Participants acknowledged that further samples would serve primarily to provide additional comfort rather than being a prerequisite for moving towards a decision.

The discussion about the comparative assessment work allowed the group to consider the relative safety, environmental, technical feasibility, societal and cost impacts of the five options under consideration, and to understand how the sediment properties impacted the options. The group also touched on wider issues such as how cumulative effects on the marine environment are considered more broadly, not only of decommissioning but also wider industry activity.

Reflecting on the meeting Duncan said: "We continue to really appreciate the investment our CMSTG members are making in the project and their taking the time to meet with us, individually and collectively, to share their views and opinions. It is extremely helpful to hear their reflections and input as we move forward.

"I was also reminded of the challenge we have to communicate the complex technical issues of our project and the need to talk in a language people can readily understand."

NEXT STEPS

LOOKING TO 2016

2016 promises to be a momentous year for the Brent decommissioning project. After nine years of planning, we are set to move into a different gear and reach some major milestones.

With the singlelift preparations ongoing, we will be working hard to complete our platform scopes. The next step is to strengthen both the Brent Delta underdeck and the topside deck walls with around 80 tonnes of steel plate. This extra reinforcement is being installed to prevent the platform from buckling during the lift, the journey to shore or unloading onto the quay side.

As we get closer to the lift date, we will also start work to detach the topside from the concrete legs and make the platform ready to lift by sea-fastening items that could move during the operation like the crane booms. This is deep brownfield engineering full of really interesting but difficult challenges.

DECOMMISSIONING SOLUTIONS

While the way forward for the Brent Delta topside has received regulatory approval, we continue to develop our decommissioning plans for the rest of the field. For some parts of the Brent infrastructure – the decommissioning solutions are clear – and our plans are well advanced. For others, we are still working through the options and completing the Comparative Assessment (CA) work.

The outputs from this CA work will form the starting point for our decision-making process, into which we will "fold" other considerations such as stakeholder feedback.

YOUR FEEDBACK

And there will be plenty more opportunities to give your feedback. Most recently, we have had a fairly specialist stakeholder focus with the CMSTG plenary session in Aberdeen in November. In 2016 we plan to broaden our sights considerably and reach out to a much wider audience.

Stakeholders will be offered a variety of ways to engage, ranging from one-to-one meetings to roadshows. They will have the opportunity to learn more about our work to date, to understand and ask questions about our approach and to provide comments on any emerging recommendations. It promises to be a rich exchange.

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