

ENSCO enhances its ENSCO 72 jackup to work in environmentally sensitive areas

Julian Hall, ENSCO International

WHEN TOTAL EPNL was awarded a license in 2004 to drill well ZDW-A10-T1 from the Zuidwaal platform in the Waddenzee, certain requirements had to be achieved. As a condition of the license, the Dutch authorities imposed strict environmental limits. In setting these limits, the authorities took into consideration the demands of local and Dutch society.

It was made clear that the possibility of pollution in the Wadden Sea, however

- Noise limitation set at 50 db(A) at 300m;
- Minimum visual disturbance;
- Minimum light pollution;
- Minimal disturbances.

The Wadden Sea is a sheltered shallow sea bounded by the Big Dam and the coastline of the Netherlands. To the East the area is bounded by the West Frisian Islands. These provide a natural barrier and protection of the low lying coastline from the extremes of the open North Sea.

West Frisian islands of Tessel, Vlieland and Terschelling and Ameland from the mainland. The large sailing vessels not only provide pleasure but also educational trips for children and adults.

ENVIRONMENTAL CHALLENGE

The challenge for **ENSCO International** and Total was to prepare a drilling rig to meet the prescribed environmental limits, while retaining full operational functionality of a jackup drilling rig. The ENSCO 72 was chosen to carry out this work. The rig had previously drilled on the verges of the Wadden Sea and much enhancement and modification work had already been done to the rig in making it suitable for working in an environmentally sensitive area. However, additional work would be required to achieve 2004 standards.

The oil and gas industry has various goals and standards set throughout the world by either local legislation, operator or contractor standards with regard to reducing the environmental impact in drilling. Our aim must be to achieve these goals, but also to be able to maintain a cost effective operation. The challenge was to identify areas for improvements, independently survey those areas, assess this with all concerned, then action and address the issues. It does not stop there. We must re-assess and measure our modifications.

Environmental, nature and preservation are all words that generate an emotive response when there is potential for a detrimental impact. When an area of environmental sensitivity is exposed to any industry an open and honest approach is required. Our independent surveys were commissioned by local and independent impartial industry experts. When this was not possible due to the nature of our industry, a more specialized survey was required. The survey encapsulated primary areas such as noise, spill and visual pollution.

The controls for the noise requirements were clearly set out in the drilling permit, however, the surveying, consultation, manufacturing and re-testing of the upgrades were performed by local com-



ENSCO International's ENSCO 72 jackup went through upgrades and enhancements to enable the rig to work in the environmentally sensitive Waddenzee off The Netherlands.

remote, was totally unacceptable. This had been shown in the past by demonstrations by private persons and various non-governmental organizations (NGO's). The Dutch authorities had to balance society's environmental concerns in one hand and the national strategic and economic oil and gas interests in the other.

The goal in terms of the drilling license and environmental factors were:

- Absolute zero discharge;

The Wadden Sea is an area of great environmental importance. Many protected species living there depend on its delicate local ecology, including many species of fish, permanent seals and migrating birds. There is a thriving sustainable local fishing industry that provides employment and the area is well renowned for its seafood.

The area is hugely popular recreationally, with activities including tall ship sailing which travel constantly between the

panies as far as possible. Our aim was not only to achieve the guidelines laid out in the drilling permit but also to satisfy more local concerns.

The existing environmental protection features of the rig included:

- Hydraulic top drive and iron roughneck, providing low noise;
- Derrick fully clad between wind walls with screen designed to contain any splash or spill;
- Dedicated drain collection covering nearly the entire rig for containment of splashes and spills and prevention of potential pollutants from entering the sea;
- Acoustic cladding around selected major noise sources including the drilling equipment (top drive and iron roughneck), hydraulic power unit, deck cranes, cement unit and engine house;
- Single point, non-visible discharge.

PROTECTION FEATURES

The environmental operational criteria had been tightened since the rig last operated in this area in 1999. The crite-

ria was set by the Ministry of Economic Affairs in a document that set particular environmental goals to be achieved. The guiding principle was that there should be no direct pollution to the environment, and visual, noise and light pollution should be reduced below accepted operation norms to a much lower level.

In summary ENSCO had to comply with:

- Complete zero discharge, meaning no drill fluid, no drill cuttings, no oil spills, no discharge of gray water and sewage;
- The maximum allowable noise limit was reduced from 62dBA to a 50dBA at 300m. As noise is measured exponentially this represented a massive reduction of noise emissions from the rig;
- All possible efforts were to be made to limit visible impact.

RIG ENHANCEMENTS

Prior to the ENSCO 72 entering the Wad-denzee, it was enhanced further to meet the environmental criteria that had been set. The rig enhancement project was completed by a team consisting of rig operational personnel and staff engi-neers.

They identified specific areas for improvement, provided design solutions and executed rig enhancement modifica-tions as required.

The rig's gale breaker was replaced with material that could provide a noise reduction as well as preventing spills and reducing external light pollution. A mid gray color was requested in the drilling permit to blend in with the sur-rounding environment.

The following key areas were identified and addressed:

Noise. Reducing noise to the operating limit of 50dBA at 300m was the single largest challenge in preparing the ENSCO 72 for this work. This stringent limit was met by adding additional sound reduction measures to the rig. Key upgrades included the main engine exhausts; replacing the derrick with acoustically damping panels; adding enhanced silencers to deck penetrating ventilators; adding acoustic damping around various exposed equipment such as mud circulating pumps and reducing the noise from the deck cranes.

This was achieved by providing acoustic engine and winch enclosures and by



cladding the crane pedestal to dampen harmonics.

Zero Discharge. The existing single point discharge was enhanced to provide total zero discharge draining system, including collection and holding of all gray and black water waste. The rig can now collect all potential discharges, hold them in dedicated tanks for storage and eventual pumping to vessels for shipping onshore for correct processing and disposal.

Mud pump cooling. The existing mud pump liner cooling is a system with heat exchangers and water and air cooled radiators. To provide an additional safeguard and contingency against equipment failure, additional backup cooling supply was provided for the heat exchangers so they can be lined up to the drill water tanks for closed loop cooling.

Raw Water/Preload pumps. Raw water and preload pumps for shallow water application were installed and fitted with automatic cut off switches. The rig is equipped with a raw water surge tank rather than a conventional ring main with an overboard discharge relief to allow for a flexible sea water supply for rig operations. This system allows the rig to maintain a sustainable seawater buffer for the demands of the drilling operation as well as providing fire cover without the continual overboard discharge.

Cuttings Collection. For cuttings and collection, an auger and flexible dump chute is in place but existing "skip and ship" system is retained as a back up.

Visual Impact. To blend with the environment, all parts of the rig were required to be painted single color gray as far as possible. This included all handrails and ancillary equipment. The new derrick acoustic panels were also color coded to gray, with the only exception being safety systems.

Light emission. The goal was set to minimize the light pollution as far as reasonably possible. Lighting for work areas was modified to prevent light "spillage" over other areas. Extensive low glare lighting and light diffusers were installed.

ZERO DISCHARGE

During the modifications, the rig's operating and environmental procedures were reviewed and modified by the crews. We developed a rig specific to the

ENSCO 72 Zero Discharge Package. A manual of procedures, drawings and checklists developed by the crews demonstrates ENSCO's commitment to the zero discharge philosophy. During the development of the manual an informal form of risk assessment was completed. By completing the manual we considered the "what ifs", as the potentials. Checklists, chemical data sheets, work instructions and engineering modifications were included.

The rig's environmental work instructions were modified to incorporate a thorough step by step instruction. These were then reviewed and discussed with the crews. We attached to each work instruction a basic pipework layout clearly explaining the fluid path on all transfers to and from the rig as well as around the rig.

The standard zero discharge checklist that would normally be used prior to handling oil-base muds, for example, was again reworked with the input of the crew to capture all potential situations. Acknowledging where there was a potential for a spill, a solution would put in place, be it containing the spill or controlling the spill, by engineering spill protection to deflect or direct a potential spill to a safe area where it can be safely contained without potential for an environmental incident.

When the checklist was agreed and approved by the crew, it was broken down once more to capture the deck crew and the drill crew. These were completed by each responsible supervisor on an hourly basis. Completed lists were then handed into the Barge Engineer and logged in the Zero Discharge Manual.

ENSCO's procedures and checklists had to be prepared and approved by the crew to be of any value because they are the people performing the tasks.

The zero discharge specific policies and procedures in the Zero Discharge Manual included:

- ENSCO 72 zero discharge philosophy;
- Thorough inter-department checklists;
- Transfer line drawings;
- Drain line drawings;
- Mud pit layout drawings;
- Shale shaker layout drawings;

- Zero discharge project action and close out;
- Q Tec survey close out;
- Bulk transfer manifold valve identification;
- Mud pit individual valve identification;
- Shale shaker individual valve identification;
- Double spill protection for all potential overboard lines;
- Bulk hose register;
- Chemical data sheets;
- Specific fluid handling work instructions.

PERSONNEL

It is important that a professional attitude among the crew is developed from the start. Total prepared an HSE awareness training course to develop and promote HSE performance in the Dutch Wadden Sea. The course was held on location in the area of environmental sensitivity. All crews were invited to attend including service and local support and logistics, and it was strongly supported by senior Total and ENSCO management. This was not just a team building get together, but an event that had a definite theme to prevent harm to the environment and to teach the Zuid-wall drilling team about the sensitivity of the local area and the consequences of an environmental incident. Senior Total and ENSCO management also attended the environmental awareness training. The result was a team effort and ownership of the project from the very start.

The ENSCO 72 has developed into one of the most environmentally friendly rigs in the North Sea, possibly the world. The rig met the stringent demands placed by the Dutch authorities in allowing drilling in one of our most environmentally sensitive areas. Total EPNL were able to complete this challenge with minimum environmental disturbance.

During the 134 days on location there were zero environmental incidents, zero recordable incidents, and all stakeholder audits and visits successfully completed.

There is of course a commercial impact in upgrading a drilling rig to ENSCO 72 standards. However by doing so it has been demonstrated that we can drill and look after our environment at the same time. ■