

Subsea pipeline leak detection

By Chris Teal, director, Neptune Oceanographics Ltd

Neptune Oceanographics Ltd., as a leader in the field of detecting leaks from subsea pipeline systems, has made significant advances in leak detection techniques resulting in a revolution in detection efficiency.

Fluorescent dyes have been in use for many years as a tool for subsea leak detection and originally, detection was achieved by using a 'black light' (unfiltered UV light) and visually observing fluorescence. But this method has many drawbacks such as the requirement for high concentrations of tracer dye, masking of the leak location due to the 'fog' effect of clouds of dye, no on-board data display and reliance on a camera or diver's visual observation.

More recently, submersible fluorometers have been used to much greater effect. The main advantages of fluorometers are:- lower dye concentrations required, the sensor is 'tuned' to the characteristics of the dye thus reducing the 'fog' effect and data are transmitted to the surface for display and logging. The main drawback is that the sensors have to pass through the tracer to detect it thus making detection time consuming.

All this has changed by the recent introduction of Neptune's 'Long Range' remote detecting fluorometric sensors. These sensors use 'tuned' light beams that are directed like a torch towards the pipeline system. Any leaked dye or oil is then detected as fluoresced light back at the sensor.

The major advantages are:- remote detection, large spatial coverage, detection of leaks in confined spaces where ROV access is not safe or possible, detection of leaks from flexible risers at safe working distances, fast and simple mobilisation on ROVs, and no need to consider tidal flow direction as no contact with dye or oil is required.

Long Range sensors are available for Fluorescein, Roemex red dye, Rhodamine; UV clear dyes, Castrol SPF dye, crude oil, lubricating oil, hydrocarbon based control fluids and water based control fluids containing fluorescent dye.

Neptune Oceanographics has also made further advances in both acoustic and differential temperature measurement techniques. Acoustic methods use directional hydrophones to 'listen' for leak generated ultrasounds, whereas the differential temperature



sensors are used to detect leaks of fluids that are not at ambient sea temperature such as from water injection flow lines.

Neptune Oceanographics have recently launched a new MEG (mono ethylene glycol) version of the 'Dissolved Gas in Water' Sniffit system that enables real time detection of MEG without the need to add a tracer dye. ■

For further information visit:-
www.neptune.gb.com

Partnership makes subsea industry history

Operator Hess Limited, working with flexible pipe specialist flexlife and partners AGR Field Operations, have made industry history by the successful scanning of flexible risers in situ for the first time.

Hess Limited commissioned the inspection of flexible risers on the Triton FPSO, which produces oil and gas from the Bittern and Guillemot West Area fields, using breakthrough technology, as part of campaign to investigate and assess riser integrity on its North Sea assets.

The work was successfully carried out in February and involved three companies combining forces and utilised flexlife's patented ultrasonic scanning technology delivered by AGR Field Operations' Neptune device, carried by Film-ocean's inspection class ROV.

flexlife, recent winners of the Subsea UK Best Newcomer award 2009, launched the scanning technology in partnership with AGR Field Operations last year. The AGR Neptune is the only subsea operated technology able to scan for a flooded annulus and flexible pipe armour wire corrosion, factors that significantly affect the service life of flexible risers.

John Marsden, flexlife director who oversaw the work offshore, said: "This is the first time in the 40 years since flexibles were brought into service that it has been possible to inspect risers for a flooded annulus and be absolutely certain of the results. Hess Limited were the first operator to commission work from us using the AGR Neptune and, in a matter of days, we gathered the 100% accurate data on flooding for them. Our pioneering, safety-conscious solution has attracted a huge amount of interest from the industry and we are scheduled to carry out similar scanning work for more clients shortly.

"The AGR Neptune can be used down to 6,000 metres meaning it can go anywhere in any environment required by the oil and gas industry. By using this technology, operators can detect if they have a breached outer sheath and flooded annulus on a flexible riser or flowline. We can now see the armour wires through the outer sheath and measure levels of corrosion or damage, greatly reducing the risk of major leakage of hydrocarbons and associated environmental, personnel and production impact. There is the potential for the technology to help extend the lifespan of flexible pipes – an attractive option, especially during the current period of reduced oil prices."

Glenn Wilson, Hess's North Sea Facilities engineering manager, said: "Having seen the results achieved in onshore trials, Hess was sufficiently confident to commission the flexlife-AGR partnership to undertake the first commercial scanning operation using this innovative technology. The operation provided valuable new information about the condition of our risers, contributing to our ongoing integrity management programme and the long term safety of our facilities."

High-resolution images were obtained by scanning through the riser outer sheath showing the armour wires underneath. Deployment, attachment, detachment and recovery were performed to meet strict safety and integrity conditions. The ROV was deployed from the FPSO and testing was carried out in depths of 20-30metres and currents approaching one knot.

The results were recorded using AGR's proprietary Technology Design™ software and delivered to the client in real time.

"We are now looking forward to assisting other flexible operators obtain a clearer picture of their flexible integrity," said Matthew Kennedy, manager of AGR Integrity UK.

FPSOs are the main users of flexible pipe - with some 300 FPSOs in operation now and approximately 200 more expected to come on stream within the next four years, nearly all using flexible risers, potential worldwide demand for the application is enormous. ■



▶ ADAPT ▶ DELIVER ▶ MAINTAIN

flexlife

the life cycle solution for flexibles


flexible pipe solutions to meet your project needs


Experts in flexible pipe. Designing your flexible pipe system from concept through to detailed design. Delivering your system to meet project budget and reduce risk. Managing your system integrity.

Whatever your flexible pipe requirement, we will provide you with a practical and realistic solution within your timescale.

www.flexlife.co.uk

T: +44 (0) 1224 443300 | E: info@flexlife.co.uk



**Leaks in your subsea pipeline installations?
Neptune Oceanographics and DPS can find them for you.**

Leak detection techniques include:

- Long range fluorescence for tracer dyes
- Long range UV fluorescence for crude oil etc.
- Direct detection of gaseous hydrocarbons
- Differential temperature
- Acoustics

NOL continuously strive to improve and develop new techniques in subsea leak detection and along with their associate company, DPS, provide leak detection systems, offshore engineers and operational training.

Neptune Oceanographics Ltd is an ISO 9001 : 2000 certified company
First Point registration number 20436

Neptune Oceanographic Limited

Tel: +44 (0) 8453 707 177
Fax: +44 (0) 08704 581 979
Email: info@neptune.gb.com
Web: www.neptune.gb.com

Dynamic Positioning Services Limited

Tel : +44 (0) 1224 226850
Fax: +44 (0) 1224 226851
Email: info@dynamic-positioning.co.uk
Web: www.dynamic-positioning.co.uk

Qserv - topside leak detection. Seeking out the best solutions

By Keith Drummond, process manager, Qserv

Qserv leak testing services prove the integrity of bolted and threaded connections prior to introducing process fluids. Leaks found with process fluids are undesirable and can be time consuming and costly ultimately leading to lost production, but more importantly can be catastrophic to plant and personnel.

Since first being developed and used during the Manhattan project by Alfred Nier, Helium Mass Spectrometer Leak Detection (MSLD) as applied by Qserv has become the leak detection method of choice for global oil, gas and petrochemical industries.

The technique has the advantage of being able to provide an accurate, quantifiable and certifiable record of leakage for each and every 'joint' tested at conditions close to maximum allowable operating pressure. It is a relatively quick and cost effective means by which to test joint integrity prior to introducing process fluids.

Qserv's highly experienced staff now apply the latest generation of equipment to provide clients with the opportunity to reduce the time taken to

carry out these tests and hence offer the opportunity for increased production. To great effect Qserv use the 3 key elements below to reduce test duration:

Technology; Qserv use the latest generation static and mobile leak detection techniques to tailor a solution which can drastically reduce testing time over traditional offerings. N2 converters used to pressurise process systems are all high output 180,000scf/hour units capable of applying finesse or pumping power as and when needed.

Reliability; coupled with the latest technology Qserv can boast an industry leading record of reliability. Applying this reliability to a critical path activity such as leak detection is paramount to the success of each operation. Equipment failures cost clients production and can pose an increased safety risk. Qserv's modern fleet of thoroughly prepared and maintained equipment delivers industry leading reliability to mitigate against these risks.

Preparation; Qserv leak detection team are some of the most experienced specialists in the



industry and use this experience to exceed expectations. Having worked in a broad cross section of locations and for many different clients, Qserv personnel illustrate attention to detail on each operation by preparing a work schedule which optimises testing durations and safety. Challenging previous philosophies for testing and improving wherever possible. Qserv have shown that a thoroughly prepared plan and crew deliver significant reductions to planned schedule.

Qserv offer helium leak testing as part of a range of process, well and pipeline services. ■

Major Norwegian operator selects Seal-Tite International for sub-sea wellhead repair

By Jed Doubenmier, Seal-Tite International

Upon the landing of a very complicated completion in a newly completed sub-sea well it was discovered that part of the wellhead pressure containment configuration had a leak issue. Investigations were carried out to determine the source of the leak and attempts to correct the leak were attempted with no success.

Having reviewed the problem the Operator decided, in conjunction with the Red Spider Company in Aberdeen, to design a straddle tool that would be conveyed on drill pipe and be able to deliver a sealing product across the leak site.

Extensive testing was carried out by various sealing companies at the Red Spider facility in Aberdeen and ultimately Seal-Tite International was selected for the primary source for attempting a repair.

After gathering all the relevant leak information Seal-Tite International was able to engineer a sealing solution that was submitted and approved by the operator.



Liquid Sealant



Polymerized Sealant

Mobilization completed, the sealants were then bottom loaded into the Red Spider tool and the down line attached to the drill pipe.

The tool was then lowered across the leak site and an injection test was carried out to confirm the leak rate which was 0.6 liters per minute at 80 Bar.

The Seal-Tite sealants were then displaced and an original seal was established at 50 Bar. Continuing to raise the pressure in increasing steps a final pressure of 300 Bar was obtained and locked in place to cure for 6 hours.

After the 6 hour cure period the seal was then cycled from 0 to 300 Bar 10 times to confirm the integrity of the seal.

The successful repair of the leak, utilizing the Seal-Tite International sealants and procedures, not only proved the safest option of repair but also saved an estimated 15 million dollars in operational expenses.

Seal-Tite International, established in 1996, has successfully repaired hundreds of various types of leaks on a Worldwide basis utilizing a Pressure Activated Sealing Process developed by it's founder Barry Ellis. ■

To obtain additional information please visit our web site at www.seal-tite.com



Qserv the specialists in process services

Qserv, part of Aker Solutions is committed to delivering a quality service safely, ensuring you cost efficiency. The specialist provider of **well, process and pipeline services** can assist process facilities throughout their life cycle, from construction through to abandonment.

- Helium Leak Detection
- Controlled Bolting Services
- Flange Management
- In-Situ Machining
- Pipe Freezing
- N2 Services
- Refrigerant Recovery
- Hydraulic & Lubrication Oil Flushing
- Chemical Cleaning
- Video Inspection
- Hydrojetting (Retrojetting)

To discuss your requirements further please contact our Process Manager, Keith Drummond.

Qserv Limited Badentoy Crescent, Portlethen, Aberdeen AB12 4YD, UK
 T +44 (0)1224 783707 F +44(0)1224 783702 E qserv@qserv.com

Quality and Service +



www.qserv.com

Come see us demonstrate our technology at OTC '09 Booth #3120

Seal-Tite International

Engineered Sealing Solutions

The Leak Stops Here

liquid sealants

pressure-activated

solidifies only at leak site

HOCNF registered

Seal-Tite. We Engineer Solutions. And Savings.

www.seal-tite.com 44-1224-773838 info@seal-tite.com