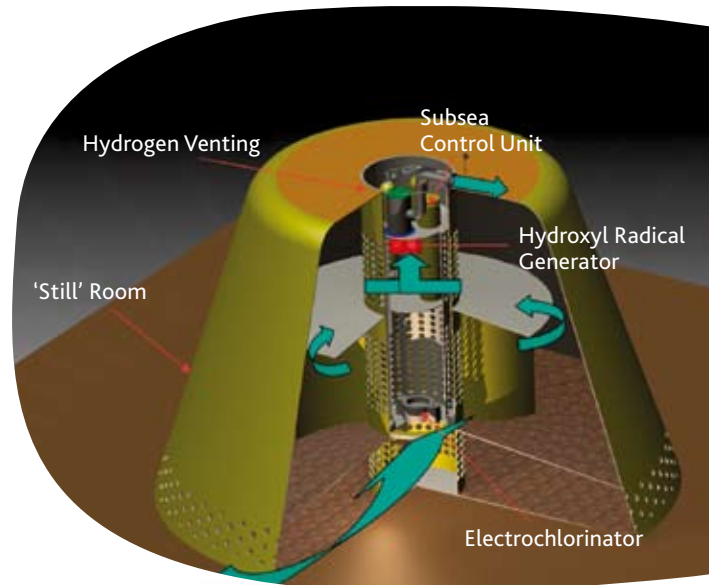




Case Study:

Subsea water injection treatment (SWIT)

Well Processing's innovative subsea water injection treatment (SWIT) system is undergoing full-scale pilot plant trials thanks to support from ITF and Norway's DEMO 2000 initiative. SWIT provides an alternative to topsides seawater treatment by doing everything on the seabed. The system offers a subsea seawater treatment solution to add to existing subsea pumping and christmas tree technology.



The Requirement:

Injecting seawater into reservoirs for maintenance of reservoir pressure and increased oil recovery (IOR) is a long established and common practice. Treatment of the water before injection is however essential to avoid plugging and souring of the reservoir. The treated seawater is injected into the main field reservoir through platform-based injection wells, or can be transported out to subsea injection wells through long flowlines. While this approach has served the industry for many years, it does impose some challenges, mainly implications associated with being able to effectively drain a field.

As an alternative solution to enhance IOR and maximise production, SWIT has been under development and testing since 2003. Since then it has been awarded four patents and won an innovation award at ONS in 2006.

As part of its continued development, full scale subsea pilot plant trials were required and ITF worked in collaboration with Well Processing to secure industry funding from several international oil companies for field trialling. This also brought about the opportunity to secure further funds from DEMO 2000 and marked the first time that the two bodies have worked in conjunction to secure support for a Joint Industry Project (JIP).

The Solution:

The 18 month long SWIT JIP was launched in December 2008 with support from four major oil and gas operators and DEMO 2000. The technology allows for significant reduction in solids content, provides two independent methods for 'on line' sterilisation of seawater – electro-chlorination and a new method for sterilisation via hydroxyl radical generation - and also includes system sterilisation.

The Method:

Well Processing developed the SWIT technology to allow reservoir engineers the freedom to think outside the box. Because a topsides water treatment and injection plant is reliant on the data gathered from initial appraisal well information, it may be inadequate for the fields needs over its entire lifetime.

SWIT gives freedom of choice with respect to the number and location of injection wells – it allows for injection of as much treated seawater as required, where required – without typical host platform restrictions. This technology essentially allows the decision on water injection needs to be delayed until the reservoir is up and running because operators can see how a reservoir reacts then provide water injection as required rather than having to estimate future requirements and design them into the platform at the outset.

Implementation:

The first phase of the SWIT project, engineering design and fabrication, is now nearing completion and the pilot plant is due to be transported to NIVA's marine research centre in Oslofjord for subsea testing. Once proven, the subsea water treatment system will be combined with existing subsea water injection pumping equipment.

The Outcomes:

SWIT expands the choices available to operators and allows for injection of as much treated seawater as required, where required – without the restrictions and limitations associated with using a host platform. The technology is being continually developed and other applications for SWIT include boosting pressure in older reservoirs and the development of satellite fields that would otherwise be uneconomical.

