

Nexen's Buzzard to Fly with Fourth Platform

John Sheehan, Contributing Editor

Canada's Nexen is pushing ahead with the next phase in the development of its Buzzard field in the UK sector of the North Sea, with a plan to install a new hydrogen sulfide (H₂S) treatment platform due to get into full swing this year. The new "crude-sweetening" platform will be installed as part of the Buzzard Enhancement Project on the 600 million bbl field, which straddles two licenses—P.986 (Blocks 19/10 and 20/6) and P.928(S) (Blocks 19/5a and 20/1S).

Buzzard is the largest discovery on the UK Continental Shelf (UKCS) in more than a decade and has been developed with three bridge-linked platforms, soon to become four when

the new platform is fully installed in 2010. The field is operated by Nexen with 43.2% interest, and partners include Petro-Canada 29.9%, BG Group 21.7%, Dyas UK 2.6%, and Oranje-Nassau 2.6%.

The field was discovered in the Outer Moray Firth in May 2001 with the 20/6-3 exploration well, which hit a 400 ft oil column and was flow tested at 6,547 BOPD of 32°API crude oil. Construction work on the development was completed in 2006 and first oil flowed in January 2007.

Peter Addy, Nexen's Project Director for Buzzard, said that production is currently running at 210,000–215,000 BOPD and 30 MMcf/D of gas through

14 production wells with a further 12 producers planned. Reservoir pressure is currently sustained by water injection. The John Shaw semisubmersible and the Transocean Galaxy III jackup rigs have carried out the development drilling program on the wells that feed into the Buzzard processing complex.

The production platform receives multiphase reservoir fluids through the bridge-linked wellhead platform and processes them to separate crude oil, gas, and water.

Oil is then exported through an 18-in., 30-km pipeline, tying-in subsea to the Forties Pipeline System. From there it is sent on through the onshore section of the pipeline system to Kinneil, crude oil stabilization terminal on the Firth of Forth in Scotland, for further processing and export by tanker. Gas is exported by a 10-in., 29-km line to the Captain T point on the UK Frigg gas pipeline.

Enhancement Project

The importance of Buzzard to total output levels from the UKCS cannot be overstated, accounting as it did for approximately 16% of total production last year. Estimates suggest that it is expected to represent between 13.7% and 17.5% of total forecast oil production from the UK sector in 2010. Keeping the flow rate up is therefore seen as paramount, and, when production drilling presented the problem of high levels of H₂S in the oil, Nexen acted quickly to identify a solution.

An extensive reservoir sampling program was carried out, which revealed that the concentration of H₂S in the oil varied across the reservoir from virtually 0 to approximate-



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ly 600 parts per million by weight (ppm wt).

Because the existing Buzzard facilities are not designed to process the fluids at the higher levels of H₂S content to achieve the specification of 11.7 ppm wt required for export through the Forties Pipeline System, Nexen was forced to conclude that additional oil-treatment facilities were required. And so the Buzzard Enhancement Project was born, with the aim of installing a fourth bridge-linked platform on the field to cope with the increased level of H₂S and enable continued export of the oil through the pipeline.

New Contracts

Chicago Bridge & Iron, which had worked on the engineering design for the first three platforms, was called back in to plan the detailed design engineering and procurement services for the fourth platform in the complex. With the engineering studies completed, Heerema was awarded a contract for construction of the 6,000 tonne crude-sweetening topsides and a 3,500 tonne jacket as well as an 80 m-long bridge to link the development's new platform to the existing three installations.

The new facilities will include crude-sweetening process equipment and utilities located on a steel-piled jacket and bridge-linked to the existing Buzzard complex.

Work on installing the jacket is expected to get under way in the late summer of this year. "We plan to install the jacket in the third quarter of 2009," Addy says. "The topsides will be installed and bridge-linking the Buzzard Enhancement Project platform to the existing facility will be carried out in the second quarter 2010. The new Buzzard Enhancement Project facility will be ready for production by the fourth quarter 2010."

Sour Gas Stripper

Once the new production-sweetening platform has been installed along with new equipment modules on the existing Buzzard platforms, the new process plan will crank into action. "The H₂S in the oil will be removed using a stream of sweet stripping gas, which will flow counter to the oil

stream in a large vertical stripping column," Addy said. "The resulting sour gas will be reconditioned through an amine gas reabsorber unit and then recycled with the resulting sweet oil exported through the Forties Pipeline System."

The process works with the sour crude oil from the existing second-stage separator being pumped by the existing booster pumps to the new crude oil stripper. The sour crude is contacted counter-currently with stripping gas to remove H₂S and the resultant sweet crude oil will be transferred to a new holdup vessel to analytically check the H₂S content in the crude.

Nexen anticipates that following stripping, the crude oil will contain just 2 ppm wt of H₂S, bringing it well within the parameters for shipment through the pipeline system. A booster compression system will recompress low-pressure gas from the crude oil stripper and send the gas to the acid gas absorber. The holdup vessel will be designed to provide sufficient holding time to allow online analysis of the crude oil. Oil will then be pumped under level control using new transfer pumps to the existing main offloading pumps.

Nexen said a number of options were studied for housing the additional processing equipment required, including on the existing platforms, but structural and layout studies showed this was not feasible. The additional steel platform and jacket bridge-linked to the production platform was selected by Nexen because it also offers increased versatility for the future development of the Buzzard facilities.

And although Addy does not anticipate the planned lifespan of the Buzzard field to be extended by the USD 450 million enhancement project, he says that far more oil will be produced than would have been possible. "The field life will remain about the same, however, we will be able to produce significantly more oil from the higher H₂S areas of the reservoir," he said.

Nexen, which expects to invest USD 2.6 billion in capital oil and gas projects around the world this year, said its net production will increase dur-

ing the year by 10% to approximately 235,000 BOE/D, driven by strong flows from Buzzard. The company is not planning to rest on its laurels with Buzzard, however, and an exploration drilling program is planned from the platform over the coming years. The platform probes will form part of Nexen's exploration schedule in the North Sea.

Well Plans

Nexen's Chief Executive Officer Charlie Fischer said in December that the company is planning eight exploration and appraisal wells in North Sea UK sector during 2009 and that five previous discoveries will be drilled prior to development. Two exploration wells and one appraisal are planned on the Golden Eagle and Pink discoveries, while near the Buzzard field, Nexen will appraise Blackbird, Bugle, and Polecat.

Addy said: "Over the next 5 years, we plan to continue to maximize production from existing assets, to continue an exciting exploration program at an average rate of 5-6 exploration wells per year in the UK sector of the North Sea and to bring forward to development the results of successful exploration. We are also drilling our first exploration well in Norway, which is a natural extension to our work in the UK North Sea."

Meanwhile, development work is continuing on the company's Etrick field, although startup was delayed because delivery of the floating production, storage, and offloading vessel (FPSO) on lease for the field was postponed following commissioning delays in Singapore.

The Etrick field is now expected to come onstream early this year. It is being developed by three subsea production wells and one water injector tied back to a leased FPSO. The FPSO is designed to handle 30,000 BOPD, 35 MMcf/D of gas, and to reinject 55,000 B/D of water. Nexen originally considered developing Etrick with the nearby Buzzard facilities, but in effect became the victim of its own success with capacity constraints on Buzzard meaning an alternative development option had to be found. **JPT**