

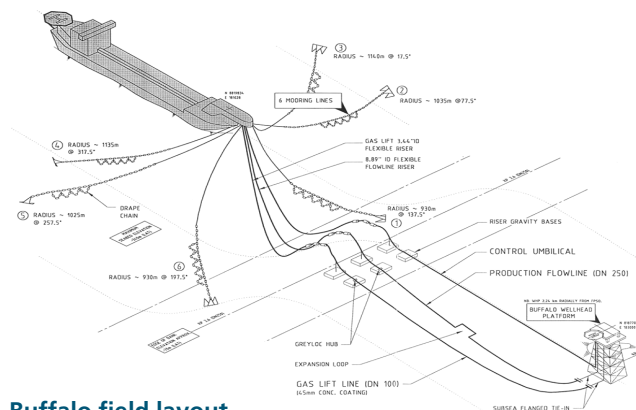
NEXEN PETROLEUM - BUFFALO FIELD ABANDONMENT

Engineering and Contracting Strategy

ICON Engineering has been involved with the Buffalo field since the initial feasibility studies with BHP in 1997. ICON installed the Wellhead Platform (WHP) for BHP in 1999 using a jackup rig to lift the structure and install the piles.

Since the field was taken over by Nexen Petroleum in 2001, ICON has provided ongoing facilities engineering support for the field. In 2002, ICON was engaged by Nexen to assist in developing an abandonment strategy for the field.

The field consists of a 380 tonne Wellhead Platform (WHP) in 30m water linked to a 70,000 DWT FPSO anchored approximately 2km away in 300m water depth. The field is characterised by the fact that the WHP is on the steep edge of a shallow bank.



Buffalo field layout

The platform and FPSO are linked via a 10" Production Line, 4" Gas lift line and an umbilical.



Installation of the Buffalo WHP by ICON using a jackup rig



Buffalo Venture FPSO 6 point mooring, riser and control umbilical

The Buffalo field is expected to become uneconomic at the end of November 2004.

ICON's work scope included:

- Extensive literature research of worldwide abandonment practices to assist in preparing government submission for abandonment
- Participation in meetings with regulators
- Assistance in development of abandonment contracting strategy. This resulted in a decision to separate removal of the WHP and plugging and abandonment of the wells and to defer them until mobilisation costs for the spreads could be shared with other operators and projects.
- Supervision of ROV surveys of the facilities
- Detailed stability assessment of pipelines and preparation of submission to justify leaving the pipelines in situ.
- Review of rigless abandonment option for the production wells
- Review of abandonment of the platform using jackup rig, heavy lift ship and derrick barge
- Detailed costing of abandonment options.

ICON also investigated the following subsea cutting techniques for cutting rigid and flexible flowlines, jacket legs and piles (below the mud line):

- Abrasive water jet cutting
- Diamond wire cutting
- Band Saw cutting
- Explosive (shaped charge) cutting
- Thermal cutting using divers