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Consents given under the Petroleum Act 1998 and Reviews under the Assessment of Environmental Effects Regulations 1999

Buzzard Enhancement Project W/3776/2007

Development Type:

Provision of additional oil treatment facilities at Buzzard Field to process the increased H₂S levels identified in the oil phase, to enable export to continue through the Forties Pipeline system (FPS). The new facility will comprise a new crude sweetening process equipment and utilities located on a steel piled jacket, bridge linked to the existing Buzzard complex.

Summary

The Buzzard Development comprising of three steel platforms is located in blocks 19/5, 19/10, 20/01 and 20/06, in the outer Moray Firth approximately 57Km north east of St Fergus. Following an extensive reservoir sampling programme as part of the drilling and production of wells on the Buzzard Field, it has been determined that the concentration of **H₂S in the oil** varies across the field from zero to 600 parts per million by weight (ppm wt). Additional oil treatment facilities are required to continue to export the oil via the Forties Pipeline system, which specifies a limit of 11.7 ppm wt sulphur.

A number of options have been considered by Nexen to enable H₂S removal, each with a design capability of 200,000 barrels per day and 500 parts per million by weight in the hydrocarbon wellstream and these were presented in the ES. Options considered included:-

1. provision of additional offshore processing facilities located at the Buzzard location with export via the existing Forties pipeline system (FPS)
2. provision of an alternate export route either by
 - a) a bridge linked platform with twin submerged turret unloading systems (STL) and tanker export or
 - b) a bridge link platform with floating storage installation and offloading facilities (FSO).

Other options considered were providing a new pipeline with

onshore treatment at Cruden Bay, offshore treatment at the Buzzard P Platform, New pipeline to an alternative pipeline system, new pipeline to an existing offshore treatment facility. However these latter options were discounted during the selection process.

Following consideration of each of the options, it is proposed to install a new production sweetening platform (PS platform) bridge-linked to the production platform and continue to use the FPS export route. A new amine contactor is proposed for the PS platform, which will be used to treat the H₂S rich stripping gas leaving the stripping column on the PS Platform. The H₂S rich amine from both the new & existing amine contactors will be treated in the existing amine regeneration plant on P platform and the waste stream from this will be placed to the acid gas flare.

The original ES in 2003 (D/1767/2003) predicted a peak of 9 tonnes of S₀₂ / day would be emitted from Buzzard commencing towards the end of the first year of production, with typical level of 5 tonnes/day. Nexen have confirmed in additional information provided to the Department that at peak production the predicted S₀₂ levels will be 7.24 tonnes/day as a result of the disposal of the total H₂S content from the Buzzard wellstream fluids i.e. both oil & gas.

The production profile has changed from those presented in the original Buzzard Field Development ES in that the shape of the profile has changed but Nexen have confirmed that the peak values remain unchanged. The current FDP application shows a reduction in the annual average production figures for the first four years but then from 2013 there is an increase in the predicted profiles.

When the 2003 ES was consented the S₀₂ levels emitted by the project accounted for approximately 28% of the UKCS emissions of this pollutant. In the 2007 ES Nexen were requested to use current data for comparison purposes. Based on the 2006 data the emission of 7.24 tonnes/day of S₀₂ equates to 75% of the UKCS production emissions. Whilst in real terms the level of S₀₂ has not risen above peak levels assessed within the 2003 ES, there has been a significant reduction in the UKCS emission of this pollutant. The 2006 OSPAR return reported 3,000 tonnes of S₀₂ emitted from all production sources during 2005, with 3,300 tonnes reported as emitted during 2006. Nexen commented in the additional information that the S₀₂ production profile is such that the levels increase and drop off rapidly and over the life of the field, the contribution averages out to approximately 25%, based on the 2006 data.

The original ES design considered a number of options to handle the acid gas disposal including production of elemental sulphur, using either the Claus or Redox Processes, Catalytic

Oxidation and production of sulphuric acid, subsurface re-injection, incineration followed by seawater scrubbing and finally, flaring. Based on this assessment the selected and installed solution on Buzzard is disposal via the flare. Due to the increase in H₂S in the waste stream, each of these options has been re-considered by Nexen. This re-evaluation reached the same conclusion as the original assessment and it is proposed to continue to dispose of the acid gas by flare.

The main environmental impacts potentially resulting from the project were identified as the following:-

- Physical presence
- Seabed disturbance
- Noise & Vibration
- Marine Discharges
- Atmospheric Emissions
- Loss of containment

These were further considered within the ES and although there will be some impact during each phase of the Buzzard Enhancement Project, it was concluded that there will be no significant long term environmental impacts.

Consultees

The appointed consultees for this ES were the Joint Nature Conservation Committee (JNCC), the Fisheries Research Services Marine Laboratory (FRS). The ES was also subject to a formal Public Notice procedure.

JNCC

JNCC requested additional information in relation to Acid gas disposal, piling operations and the NGL Export pipeline. JNCC also recommended that the appropriate assessment process (under the Offshore Marine Conservation (Natural Habitats&c) Regulations 2001 as amended) may need to be revisited due to the new activity involved (e.g. the use of heavy lift vessels and potential piling)." A screening was undertaken for the original Buzzard development to assess the potential impact of the project on the bottlenose dolphin which is one of the qualifying features of the Moray Firth cSAC. This assessment concluded that "there are not likely to be significant effects from the physical presence of vessels or from the noise produced by the activities associated with the Buzzard development on the Moray Firth bottlenose dolphin population". As this assessment considered the impact of installing three platforms installed by heavy lift vessels and piling, it is not intended to undertake any further assessment as the current activities will involve the installation of a single platform with piling. Nexen have been advised of the requirement to assess this activity in relation to wild life disturbance licensing and the need to undertake a screening

will be revisited at the individual activity permitting stage, when full details of the piling will be known.

Further to the provision of additional information by Nexen on the 5 February and 31 March 2008, JNCC provided the following comments:- JNCC have requested that Nexen's commitment to assess the need for a wildlife license for potential piling operations, in line with the Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007, are followed. In this assessment, Nexen should consider the details of the intended piling protocol, to include the type of piling (e.g. hammer or 'vibropiling'), the diameter of the structures to be piled, timing of operations, frequency and mitigation measures. JNCC are currently consulting on guidance on how to "present an assessment of the likelihood of committing a disturbance offence and to consider the need for mitigation measures; and to decide whether to apply for a wildlife licence (see Appendix I)" can be found at <http://www.jncc.gov.uk/page-4227>.

JNCC note that there are significant planned emissions of SO₂ (up to 75% of the UK Offshore Production Emissions during peak production), and express concern over this, as although local effects have been modelled and suggest that impacts are not significant, the contribution to larger scale issues such as acid rain is not clear. JNCC realise the difficulty in quantifying these impacts arising from an individual installation but highlight that as a precautionary measure these emissions should be kept to a minimum.

FRS

Sulphur dioxide discharges can lead to the formation of acid rain and the authors of the ES contend that levels of SO₂ are sufficiently low to be considered as negligible.

FRS has commented that "overall, the conclusion that, with the implementation of the proposed mitigation and risk reduction measures, the Buzzard Enhancement Project will not result in significant adverse effect on the environment, can be accepted".

Public Notice:

No comment was made during the public notice period.

Conclusion & Recommendation:-

The Buzzard field is a significant discovery. In January 2008 it represented approximately 16% of the UKCS production of oil and the field team have confirmed that it is expected to represent between 13.7% and 17.5% of forecast oil production in 2010.

Whilst the SO₂ levels from the acid gas disposal by flare

represent a significant contribution to the UKCS' emission of this pollutant and therefore to the overall global impact, there are limited options for the acid gas disposal. Modelling has been undertaken which demonstrates that there will be no significant impact on a local level but there will be a contribution to the regional and global impact.

It is recommended that consent be granted for the installation of the additional oil treatment facilities to process the increased H₂S levels and enable export to continue through the existing Forties Pipeline. However it is recommended that Nexen should be made aware of the concerns regarding the emissions and that they should continue to investigate other options for disposal of sour gas. Nexen should also be reminded of their obligations to report such emissions to the Environmental Emissions Monitoring System (EEMS).

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