

NON – TECHNICAL SUMMARY

BROCKHAM OIL FIELD

AUGUST 2020



1.0 Introduction

Angus Energy are applying to vary Permit EPR/BL9763IN/V004 to allow the injection of produced water at Brockham Oilfield, Betchworth, Surrey, RH3 7AU for the purpose of aiding the production of oil from the oil reservoir. The National Grid Reference for the centre of the site is TQ 18840 48672. The site is operated by Angus Energy Weald Basin No3 (AE).

An Environment Agency (EA) initiated application to vary the permit was made on 20th July 2017 (Application reference number EPR/BL9763IN/V004) under the Environmental Permitting (England and Wales) Regulations 2016 (EP Regulations), regulation 34(1), which requires the EA to periodically review permits.

The application included a groundwater activity to inject produced water resulting from the extraction of hydrocarbons from both the Portland Sand Formation and the Kimmeridge Clay Formation back into the Portland Sand Formation.

The discharge of produced water into groundwater within the oil-bearing formation is considered as a direct discharge to groundwater and a permit can only be granted provided it does not compromise the achievement of any of the environmental objectives relating to groundwater in Article 4 of the Water Framework Directive (WFD).

The EA concluded that based on the information supplied they still had concerns regarding the proposal to continue re-injecting at this location using the existing well and therefore they decided to remove the groundwater activity from the application. A copy of the permit and the reasoning behind removing the groundwater activity

1.1 Proposal

Angus Energy Weald Basin No.3 Limited (Angus Energy) has commissioned SLR Consulting to prepare a supplementary Hydrogeological Risk Assessment (HRA) to strengthen its application and justification for the injection of produced water and hope that it satisfies the requirements of the EA.

The objective of this supplementary HRA is to present the additional information requested by the EA and should be read in conjunction with the original HRA report.

Angus Energy have also produced robust procedures so that all activities are carried out safely and protect the environment.

The Waste Management Plan and associated reports and risk assessments submitted in the July 2017 application include all relevant information relating to the groundwater activity and are part of this application submission.

1.2 Content of the Application

This non-technical summary should be read in conjunction with the documents submitted in support of the application.

The contents of the application include:

- Application Forms and Supporting Documents
- Non-Technical Summary
- Site Plan
- Waste Management Plan
- Supplementary Hydrogeological Risk Assessment in Support of Permit Variation Application for a Groundwater Activity for the Injection of Process Waters

2.0 Summary of the Regulated Facility

2.1 Site Location and History

The on shore producing oil well (the Site) is located approximately 1.6km north-east from Brockham in Weald Basin, just off Old School Lane, 2km west of Dorking in Surrey. The site is centred on National Grid Reference (NGR) TQ 18840 48672, the nearest postcode is RH5 4DZ. The location of the site is shown on Drawing HRA1 and the site layout on Drawing HRA2. The site is currently mothballed and there are no site activities.

The drilling history at the site is complex with a number of wells, sidetracks to those wells and well renaming. A summary of the history is given in Table 1.

The first well at the site BRX1 was drilled in 1987 and has since been plugged but contains a sidetrack which is used as a water injection well; this well is now referred to as BRX3. A second production well BRX2 was drilled in 1998, this has now been plugged but contains a sidetrack well BRX2-Y which is a production well. It also contained a second sidetrack BRX2-Z which has been plugged. A third production well at the site BRX4 was drilled in 2007, this has now been plugged but contains a sidetrack well BRX4-Z drilled in 2017.

Table 1
Summary of Wells on Site

Well	Date	Total Depth	Approx. range of Inclination (degrees from vertical)	Approx. Direction	Status and Description	Formation at Base
BRX1	15/08/87	2123.8 m bgl TVD	0 – 21.5 variable	South	Original production well plugged but includes sidetrack BRX3 used to reinject produced waters	Devonian/ Carboniferous
BRX2	26/04/98	761 m bgl TVD	0 – 56 variable 52 at TD	WSW	Second production well now plugged but includes sidetrack BRX2-Y which was a failed production well	Kimmeridge Clay
BRX2-Z	12/05/98	626m bgl TVD	0 – 95 variable 95 at TD	SW	Sidetrack from BRX2. Kicked off at 629 m rkb, failed production well, now plugged	Lower Purbeck Anhydrite
BRX2-Y	16/11/03	631 m bgl TVD	0 - 86.6 variable	SW	Sidetrack from BRX2Z. Kicked off at 629 m rkb operational production well	Portland Sandstone
BRX3	July 2007	736 m bgl TVD	Unknown	SW	Water injection well sidetracked from BRX1. Kicked off at 618.9 m bgl drilled to 750.2 m bgl TVD. BRX1 sealed by a 22.3m long cement plug.	Portland Beds (Unit 1)
BRX4	24/07/07	689 m bgl TVD	0 – 96 variable 89 at TD	SW	Third production well was intermittent producer now plugged but includes sidetrack BRX4-Z used as a production well	Portland Sandstone
BRX4Z	January 2017	1197m m bgl TVD	75 at kick-off 0 at TD	SW	Future operational production well	Oxford Clay

Notes: m bgl TVD metres below ground level true vertical depth

m rkb m below rotary kelly bushing measured depth

2.2 Overview of Existing & Historical Operations

The site is currently moth-balled and there are no on site activities. Crude oil was extracted from well BR2-Y and BRX4 from the Portland Beds using 'nodding donkey' beam oil abstraction pumps (see Table 2 for well production depths). BRX4 has now been plugged but contains a side track into the Kimmeridge Clay that is proposed to be used for production in the future. The crude oil, a mixture of oil, gas and water was conveyed, when the site was in production, through the cellar wellheads into production tubing at the surface.

Table 2
Well Details

Well ID	Operation	Approximate Production Intervals (m bgl)	Reservoir
BRX2-Y	Production Well	529.5 – 691.2	Portland Beds
BRX3	Injection Well	700.1 - 750.2	Portland Beds (Unit 1)
BRX4-Z	Production Well	*1838.2 – 973.2 or 1,317* ²	Kimmeridge Clay

Notes: *1 depth is measured depth.

*2 total depth and end of screened interval unclear

3.0 Proposed Permit Variation Application

This environmental permit variation application seeks to include the following additions to environmental permit reference EPR/BL9763IN:

- Addition of a groundwater activity comprising the re-injection of produced waters generated from Brockham, Angus Energy's Lidsey Wellsite and potentially from other oil producing sites via BRX3.

The supplementary HRA includes detailed information to support the application on:

- Water Injection Proposals and Justification
- Protection of Overlying Aquifers and Well Integrity
- Re-Interpretation of Seismic Data
- Formation Pressure and Barriers
- Well Integrity
- Probabilistic Analysis of Fluid Mitigation
- Operational Procedures
- Groundwater Monitoring
- Chemicals Usage

The Waste Management Plan and Environmental Risk Assessment submitted as part of the application in July 2017 and relevant to this application.