Competent Person Report (CPR) - Rhein Petroleum GmbH

Compiled in accordance with AIM Note for Mining, Oil and Gas Companies, June 2009

6th of December 2022

DISCLAIMER

This competent person report (CPR) has been prepared for, and is addressed to, Beacon Energy plc and Strand Hanson Limited, for inclusion in an Admission Document to be published by Beacon Energy in relation to the acquisition of Rhein Petroleum GmBH and associated capital raising.

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Standard geological and engineering techniques accepted by the petroleum industry were used in estimating recoverable hydrocarbons. These techniques rely on engineering and geo-scientific interpretation and judgment; hence the resources included in this evaluation are estimates only and should not be construed to be exact quantities. It should be recognized that such estimates of hydrocarbon resources may increase or decrease in future if there are changes to the technical interpretation, economic criteria or regulatory requirements. Property descriptions, details of interests held, and well data, as obtained from Beacon Energy plc and Strand Hanson Limited, or public sources, were accepted as represented. No further investigation was made into either the legal titles held or any operating agreements in place relating to the subject properties.

Signed:

Niek Dousi
Competent Person

Date: 6th of December 2022

Richard Keen
Business Manager

Date: 6th of December 2022

PROFESSIONAL QUALIFICATIONS, VALUATION BASIS AND CONDITIONS OF USE

SGS Nederland B.V., subsurface consultancy (SGS) has used the working interest percentages that Rhein Petroleum (RP) has in the assets, as communicated by Beacon Energy plc (the company). SGS has not verified, nor does SGS make any warrant as to Rhein Petroleum's interest in the assets. Beacon Energy plc has instructed SGS to provide an independent Competent Person's Report (CPR) documenting Reserves, Contingent Resources and Prospective Resources in relation to Company's planned acquisition of Rhein Petroleum.

This CPR was prepared in compliance with the "AIM Note for Mining, Oil and Gas Companies, June 2009", published by the London Stock Exchange.

Professional Qualifications

SGS is a petroleum geosciences and engineering consultancy that provides specialist services in the assessment and valuation of upstream petroleum assets.

SGS has provided consultancy services to the oil and gas industry for over 20 years. The work for this report was carried out by SGS specialists having between 15 and 40 years of experience in the estimation, assessment and evaluation of hydrocarbon reserves.

Except for the provision of professional services provided on a fee basis, SGS, has no commercial arrangement or interest with Beacon Energy plc, or with the asset that is the subject of the report, or with any other person or company involved in the interests.

Data and Valuation Basis

In estimating petroleum in place and recoverable volumes, standard industry petroleum engineering techniques have been applied. There is uncertainty inherent in the measurement and interpretation of basic geological and petroleum data. There is no guarantee that the ultimate volumes of petroleum in place or recovered from the field will fall within the ranges quoted in this report. This uncertainty has been taken into account in estimating the range of petroleum initially in place and recoverable quantities, using the industry standard system as set out in the documents entitled "Petroleum Resource Management System", 2018, (PRMS) and "Guidelines for Application of the Petroleum Resources Management System", November 2011, PRMS is a recognized oil and gas industry standard approved by the Society of Petroleum Engineers (SPE), World Petroleum Council (WPC), Society of Exploration Geophysicists (SEG), American Association of Petroleum Geologists (AAPG), European Association of Geoscientists and Engineers (EAGE), Society of Professional Well Log Analysts (SPWLA) and the Society of Petroleum Evaluation Engineers (SPEE) in 2018. SGS has used this as the "internationally recognised standard" required by the AIM Note.

SGS has independently assessed the future performance of the German assets as part of the transaction and only validated estimates of capital and operating costs at a very high level, modifying these where it is judged appropriate. Economic modelling has been carried out based on the generated forecasts of costs and production. The capital and operating costs have been combined with production forecasts based on the reserves at the 1P (Proved), 2P (Proved + Probable) and 3P (Proved + Probable + Possible) levels of confidence and the other commercial assumptions outlined in this report, in order to develop an economic assessment for this petroleum interest and properly classify the recoverable quantities. The valuations do not take into account any outstanding debt or accounting liabilities.

SGS has evaluated the petroleum assets according to PRMS requirements and the economic determination of a project is tested using an undiscounted rate. If the project/asset has a positive undiscounted cumulative cash flow for the 2P case then the project/asset is considered economic. If other commercial requirements are met then the project/asset has reserves (at least in the 2P) if the 1P case undiscounted cash flow is also economic then the project has 1P reserves. In estimating the future cash flows of the assets SGS has used extrapolated economic parameters based upon recent and current market trends. Estimates of these economic parameters, notably the future price of crude oil, is uncertain and a range of values has been considered. There is no guarantee that the actual economic parameters, in the forecast period, will be within the ranges considered.

The assessment is based on information provided by Rhein Petroleum, SGS has relied on Rhein Petroleum and Beacon Energy plc for validation of the accuracy and completeness of the data set

provided. The supplied data has been supplemented by public domain regional information where necessary.

Within this report, SGS makes no representation or warranty as to: (i) the amounts, quality or deliverability of Reserves of oil, natural gas or other petroleum; (ii) any geological, geophysical, engineering, economic or other interpretations, forecasts or valuations; (iii) any forecast of expenditures, budgets or financial projections; (iv) any geological formation, drilling prospect or hydrocarbon reserve; (v) the state, condition or fitness for purpose of any of the physical assets, including but not limited to well, operations and facilities related to any oil and gas interests or (vi) any financial debt, liabilities or contingencies pertaining to the organisation, Rhein Petroleum and Beacon Energy plc.

We affirm that from the cut-off date for delivery of this report, the 1st of November 2022, to the date of issue of this report, 6th of December 2022, that 1) there are no matters known to SGS that would require a change to this report, and 2) SGS is not aware of any matter in relation to this report that it believes should and may not yet have been brought to the attention of Beacon Energy plc.

This report has been compiled in accordance with the guidelines on the scope and content of a Competent Persons' Report as set out in the AIM Note "Guidance for Mining and Oil and Gas Companies, June 2009" for the purpose of inclusion within an AIM Admission document.

Conditions of Usage

The report was compiled during September to November 2022, with the effective cut-off date for inclusion of data being the 1st of November 2022. Should substantive new data or facts become available then the report should be updated to incorporate all recent data. The reference date for the economic evaluation is the 1st of January 2023.

The copyright of this CPR document remains the property of SGS. It has been provided to Beacon Energy plc for inclusion in an Admission Document to be published by Beacon Energy in relation to the acquisition of Rhein Petroleum GmBH and associated capital raising. Notwithstanding these general conditions, SGS agrees to the publication of the CPR document, in full, in accordance with AIM Rules for Companies.

The accuracy of this report, data, interpretations, opinions and conclusions contained within, represents the best judgement of SGS, subject to the limitations of the supplied data and time constraints of the project. In order to fully understand the nature of the information and conclusions contained within the report it is strongly recommended that it should be read in its entirety.

EXECUTIVE SUMMARY

At the request of Beacon Energy plc and Strand Hanson Limited, SGS has prepared this Competent Persons Report (CPR) relating to the acquisition of Rhein Petroleum GmbH (RP).The CPR has been prepared for inclusion in an Admission Document to be sent to shareholders of Beacon Energy plc and to be available on the company's website. It has been prepared in accordance with the AIM Note for Mining, Oil and Gas Companies, which forms part of the AIM Rules for Companies, as published by the London Stock Exchange. The resource volume assessments are reported in compliance with the definition and guidelines set out in the 2018 Petroleum Resource Management System (PRMS).

There are no material changes to resources or values evaluated as at 1st November 2022 or to the analysis and opinions expressed in this CPR.

Licences

Rhein Petroleum has interest in a number of assets onshore Germany and the following is a list of their licenses:

SUMMARY TABLE OF ASSETS

Asset				*Operator*	*Interest*	*Status*	*Licence Expiry Date*	*Licence area*	*Comments*
Country	*State*	*Licence*	*Field/Discovery/Prospect*		*%*			*km²*	
Germany	Bayern	Lauben	Lauben Field	ONEO	50%	Production	31-Dec-41	6.67	Lauben-7 well producing
		Rieden	-	ONEO	50%	Exploration	30-Nov-22	35.99	Licence to expire
	Hessen	Schwarzbach	Schwarzbach Field	Rhein Petroleum	100%	Production	31-Dec-45	8.84	Schwarbach-1a well producing
		Nördlicher Oberrhein	Hamm Prospect	Rhein Petroleum	100%	Exploration	16-Nov-25	587.22	
			Dungau Prospect						
			Gross Rohrheim Prospect						
		Nördlicher Oberrhein II	-	Rhein Petroleum	100%	Exploration	16-Nov-25	27.70	
	Baden-Württemberg	Weschnitz	Weinheim Prospect	Rhein Petroleum	100%	Exploration	30-Jun-27	91.89	
		Graben-Neudorf	Steig Discovery	Rhein Petroleum	100%	Exploration	31-May-24	326.51	Steig-1 well suspended as a potential producer
			Feldslag Prospect						
		Karlsruhe-Leopoldshafen	Graben Discovery	Rhein Petroleum	60%	Exploration	31-Dec-22	182.35	Extension application submitted 30-Aug-22

Figure 1-1 Overview of licenses (source: Beacon Energy plc)

An application for the extension of the Karlsruhe-Leopoldshafen exploration licenses has been submitted and SGS has assumed that there is a reasonable expectation of success given the track record of extending licenses in Germany. RDG GmbH is a privately held company based in Germany. It engages in the development and production optimisation of existing oil and gas fields. RDG Gmbh rebranded as ONEO in 2021 and they are the Operator of Lauben.

The producing assets

The producing assets on the Lauben and Schwarzbach licences are governed under a tax royalty system. The royalty rate for Erfelden field on the Schwarzbach licence is 10% and for Lauben 0% according to Beacon Energy plc. More information on the tax-royalty regime can be found under section 11.1.

Erfelden (Producing/Development)

Rhein Petroleum holds a 100% interest in the Schwarzbach licence. In the recent past 3D seismic was shot over Erfelden greatly enhancing the image of the structure. The Erfelden field is currently under production from one well SCHB-1a, which produced at a peak rate of 225 stb/d and is currently producing 15 stb/d. The operator is envisaging developing the so-called Stockstadt-Mitte (STK-M) block on the licence , which holds a substantial amount of STOIIP and has been discovered by the STKM-1 well. This development targets the Meletta-Schichten (ME) and Pechelbronner-Schichten (PBS) formations. First oil is envisaged from March-2023.

Planned activity

Based on client information, the operator Rhein Petroleum, to be acquired by Beacon Energy plc, intends to undertake the following principal operations:

1. Drill 2 oil producers in the Stockstadt Mitte block, targeting the Meletta, Upper- and Lower PBS
2. Drill one water injector in the Stockstadt Mitte block, targeting the Meletta, Upper- and Lower PBS
3. Convert the SCHB-1a well into a water supply well when the water injector has been drilled

The planned wells will be connected to the existing Schwarzbach processing facility.

The capital being raised in conjunction with the acquisition of Rhein Petroleum is expected, inter alia, to directly fund the drilling of the first production well on the Stockstadt Mitte block, namely SCHB-2, in Q1 2023, with further planned activities set out above expected to be fully funded from free cash flow generated from future production.

Lauben (Producing)

Rhein Petroleum holds a 50% non-operated interest in the Lauben licence which is operated by ONEO. The Lauben field is currently under production from one well, Lauben-7, which is currently producing at about 40 stb/d (100%WI) and shows an exponential decline. Current water rate is stable at about 10 stb/d. No additional development activity is planned for Lauben.

Steig (Development/Appraisal/Exploration)

Rhein Petroleum holds a 100% interest in the Graben Neudorf licence, which includes the Steig discovery. Steig is covered by 3D seismic. It consists of several reservoirs both proven and potential, the Meletta-Schichten (ME), Pechelbronner-Schichten (PBS) and deeper Buntsandstein. The Meletta and PBS were discovered to be oil bearing and were successfully tested by the Steig-1 well. An oil rate of about 60 stb/d was measured from the Meletta-A reservoir. The Steig PBS was tested at rates of about 160stb/d of oil, albeit at high drawdowns. Beacon Energy plc is studying a combined Steig-ME and Steig-PBS development, leading to technical and commercial synergies. In addition, further data acquisition will be carried out to further de-risk the subsurface uncertainties. Therefore, the Steig-ME development has been subclassified as "Development Unclarified," and contingent resources have been ascribed to the development. The Steig PBS contains substantial amounts of oil volumes (P50 STOIIP equals some 78MMstb), but it is a complicated structure and relatively modest oil rates were tested by the Steig-1 well, due to the viscous nature of the oil. SGS has ascribed contingent resources to Steig ME and Steig PBS and the development has been sub-classified as "Development Unclarified."

Graben East (Development/Appraisal/Exploration)

Rhein Petroleum holds a 60% interest in the Karlsruhe-Leopoldshafen licence and is the operator. The Graben asset has historically had production from the Graben-1 and Graben-2 wells. It is a complex faulted structure now covered by 3D seismic which shows it to be bounded to the south by an E-W fault and to the east and west by normal faults splaying northwards and dividing the field into two N-S fault blocks dip-closed to the north. The oil-bearing reservoirs are the Oligocene Cyrenen-Mergel (CM) and the Meletta (ME) sands. However, modern petrophysical analysis of the legacy wells has revealed bypassed pay in the upper CM sands. The 3D seismic also suggests that the wells drilled downdip of the structure and that unproduced volumes exist updip. The focus of the Graben project therefore is to target the bypassed and updip pay suggested by the recent studies.

Preliminary development plans exist to target these reservoirs with an oil producer and water injector. Contingent Resources are carried by SGS, sub-classifying the development as "Development Pending."

Exploration portfolio

Rhein Petroleum has identified more than 10 prospects across the portfolio, including the Steig Buntsandstein structure. SGS has validated Rhein Petroleum's process in quantifying the potential STOIIP ranges by reviewing relevant material such as maps, seismic data, offset well logs and PVT data. The Steig Buntsandstein and the Weinheim structure appear to be the most attractive targets, containing substantial amounts of potential STOIIP with P50's of 56 MMstb and 554 MMstb respectively (aggregate across 5 potential reservoirs).

Methodology

Standard industry methods were applied to generate the production forecasts: For the Erfelden development a material balance model was applied. For Lauben decline curve analysis was applied. Reservoir simulation was adopted to estimate recoverable volumes for the Steig ME. For Steig PBS and Graben East a simple volumetric evaluation was carried out.

Cost and Economic model

A cost model was built by Rhein Petroleum which was shared with SGS and was validated. It is a mixed portfolio with cost sharing between Erfelden and Lauben developments. SGS has reviewed and validated pertinent cost assumptions, in terms of OPEX, CAPEX and ABEX on a high level and has adopted these costs in the portfolio economic model. The following scenarios have been assessed, among others not shown here:

1. Lauben Low – Erfelden Low
2. Lauben Best – Erfelden Best
3. Lauben High – Erfelden High

Economics of Lauben is dependent on the development of Erfelden. Erfelden Best and High (case 2 and 3) are economic with an NPV10 as of 1-Jan-2023 of 52.8 mln and 105.3 mln Euro respectively. For more details see section 11. The low case evaluated is sub-commercial at this stage, but reductions in OPEX may be realized, which could make the low case NPV0 positive.

Site visit

SGS did not perform a site visit as this was outside of the scope of the evaluation. However, on the 20th and 21st September 2022, a representative of Xodus performed a site survey of the Schwarzbach and Lauben surface production facilities as part of the ongoing evaluation of the intended take-over of Rhein Petroleum by Beacon Energy plc. The report stated the Schwarzbach separator has sufficient capacity to handle the additional flow from the 3 new wells. The described facilities are unmanned and very simple in design, with a sufficient level of automation for the intended operation. Xodus concluded both sites to be in very good condition and in good state of maintenance. On the basis of the site survey, Xodus concluded the facilities present a relatively low risk to Beacon Energy plc with regards to their current condition. For more information reference is made to section 18.

Use of flared gas

According to Rhein Petroleum all gas produced is consumed in operations, thereby reducing operating costs if this fuel had to be bought from external parties.

Table 1-1 Overview of reserves, Contingent Resources and Prospective resources assigned to Rhein Petroleum's assets. *Source: SGS 2022*

License	Reserves	Gross			Net attributable			Operator	
	All figures in 1000bbls	1P	2P	3P	1P	2P	3P		
Lauben	Lauben	-	126	144	-	63	72	ONEO	
Schwarchbach	Erfelden STK-Mitte and SWB-Mai	-	3,784	5,754	-	3,784	5,754	Rhein Petroleum	
	Total reserves	-	3,910	5,898	-	3,847	5,826		
License	Contingent resources	Gross			Net attributable			chance of	
	All figures in 1000bbls	1C	2C	3C	1C	2C	3C	development	Operator
Schwarchbach	Schwarzbach South	1,669	2,417	3,315	1,669	2,417	3,315	50%	Rhein Petroleum
Karlsruhe-Leopoldhaven	Graben - East Block CM+CMD	2,000	3,200	4,800	1,200	1,920	2,880	70%	Rhein Petroleum
Graben-Neudorf	Steig ME	499	1,627	2,213	499	1,627	2,213	50%	Rhein Petroleum
	Steig PBS	13,000	17,000	22,000	13,000	17,000	22,000	50%	Rhein Petroleum
	Total CR	17,168	24,244	32,328	16,368	22,964	30,408		
License	Prospective Resources	Gross			Net attributable			Probability of geological discovery	Operator
	All figures in 1000bbls	1U	2U	3U	1U	2U	3U		
Karlsruhe-Leopoldhaven	Graben - West Block CM+CMD	2,600	4,100	5,900	1,560	2,460	3,540	50%	Rhein Petroleum
	Graben - West Block - ME C	730	1,100	1,600	438	660	960	40%	Rhein Petroleum
	Graben - West Block - ME B	150	500	1,100	90	300	660	40%	Rhein Petroleum
	Graben Total	3,480	5,700	8,600	2,088	3,420	5,160		
Graben-Neudorf	Steig Deep - Buntsandstein	9,000	16,000	24,000	9,000	16,000	24,000	30%	Rhein Petroleum
Weschnitz	Weinheim - CM+BNS+ME+PBS	92,000	150,000	234,000	92,000	150,000	234,000	42%	Rhein Petroleum
	Weinheim - Buntsandstein	18,000	30,000	45,000	18,000	30,000	45,000	15%	Rhein Petroleum
	Weinheim - Total	110,000	180,000	279,000	110,000	180,000	279,000		
Nordlicher Oberrhein	Hamm - PBS	918	1,435	2,081	918	1,435	2,081	45%	Rhein Petroleum
	Hamm - Buntsandstein	1,480	2,367	3,484	1,480	2,367	3,484	15%	Rhein Petroleum
	Hamm - Total	2,398	3,802	5,565	2,398	3,802	5,565		
	Feldschlag - BNS	996	1,585	2,417	996	1,585	2,417	40%	Rhein Petroleum
	Feldschlag - CM	568	888	1,433	568	888	1,433	40%	Rhein Petroleum
	Feldschlag - ME	675	1,094	1,690	675	1,094	1,690	20%	Rhein Petroleum
	Feldschlag-Total	2,239	3,567	5,540	2,239	3,567	5,540		
	Dungau	344	552	848	344	552	848	50%	Rhein Petroleum
	Gross Rohrheim - Rotliegend	294	490	811	294	490	811	40%	Rhein Petroleum
	Total PR	127,755	210,111	324,364	126,363	207,831	320,924		

All contingent- and prospective resources figures are unrisked.

SGS believes the Erfelden Stockstadt-Mitte project to be technically and commercially mature with 2P and 3P reserves assigned to it. Reserves amount to some developed reserves (SCHB-1a) but mainly undeveloped reserves. Since capital, with a reasonable expectation of being raised, is in progress, the reserves are sub-classified as "Justified For Development." The Lauben asset is limited by the End of License. Reserves, Contingent and Prospective resources are defined in section 14

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1 INTRODUCTION

SGS has been requested by Beacon Energy to prepare a CPR to be included in their AIM Admission document in accordance with the AIM Rules for Companies and specifically in compliance with the Note for Mining and Oil and Gas Companies (June 2009). An independent evaluation of licences held by Rhein Petroleum and in particular the main producing assets at the Erfelden project and Lauben, the Erfelden development, Graben and Steig potential developments and several exploration prospects has been performed, indicating expected NPV and Net Reserves. Beacon Energy plc and Strand Hanson Limited have asked SGS to determine Reserves and Resources according to PRMS guidelines (see section 4.1.2). SGS relied on the provision of data from existing licence holder Rhein Petroleum. This included seismic data, geological, petrophysical, engineering and cost data and information, as well as future Tax-royalty framework which may apply after the acquisition.

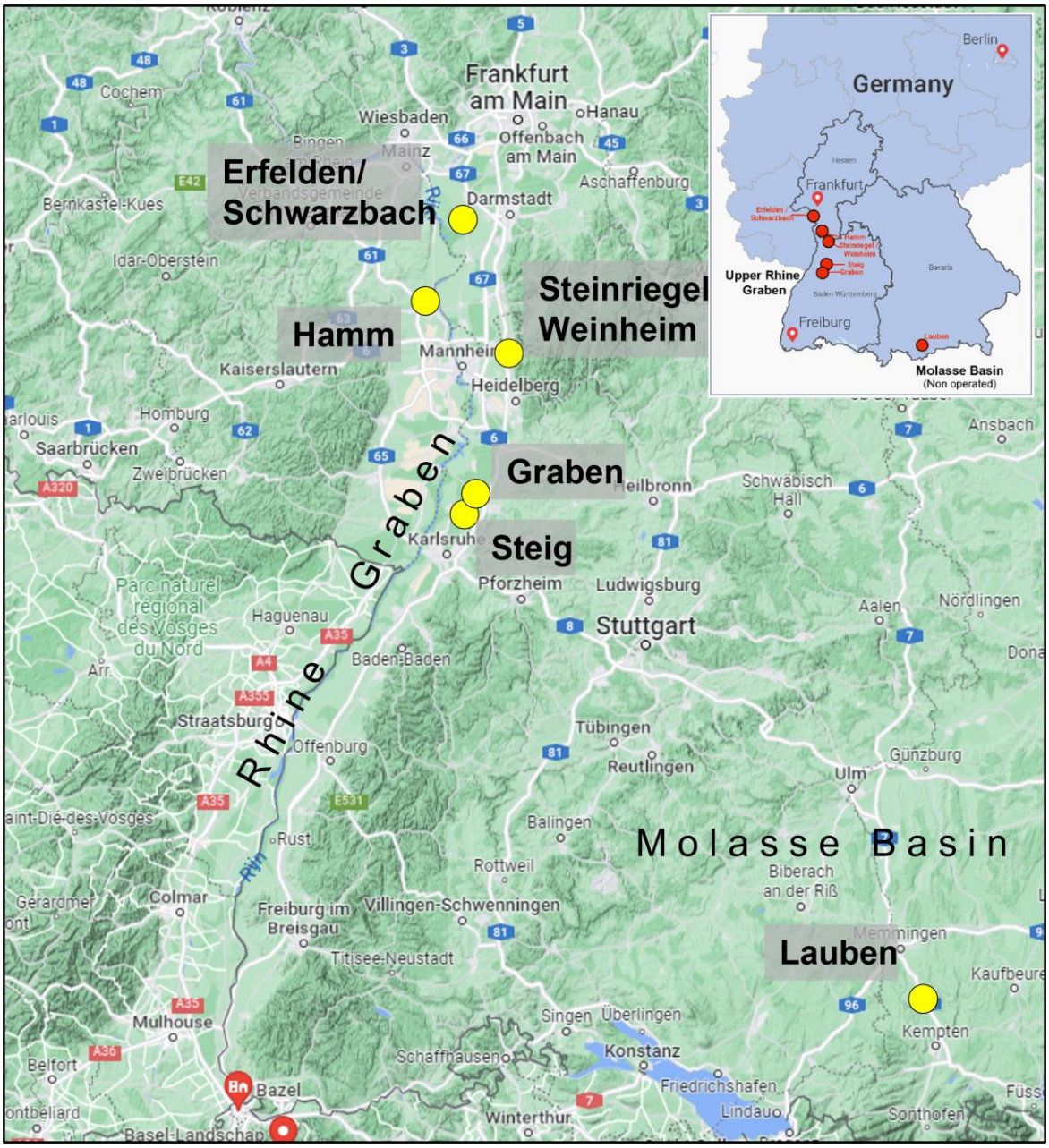


Figure 1-1 Location of the main assets. (Google Maps and Rhein Petroleum)

The Erfelden oil field is located in Federal State of Hessen close to the abandoned Stockstadt Main and Eich oilfields. The field is covered by 3D seismic. The field is split up into several blocks, Keuhkopf, Stockstadt Mitte, Schwarzbach Main and Schwarzbach South. Note that Keuhkopf and Schwarzbach South are not part of the Erfelden reserves assessment, as these blocks do not form part of the initial development plan of Rhein Petroleum. The key development target is Stockstadt Mitte. The Tertiary Pechelbronner-Schichten (PBS) formation is confirmed to be oil bearing in Stockstadt Main, Eich, Keuhkopf, Stockstadt Mitte and Schwarzbach Main. The overlying undeveloped Tertiary Meletta-Schichten (ME) was discovered by the STKM-1 well, which also confirmed oil presence within the PBS within the Stockstadt Mitte block. In addition, reservoir engineering analysis indicates that Stockstadt Mitte is partly in communication with Kuehkopf, sharing a common OWC. Peak oil rates of two previously drilled oil producing wells amount to ~68 and ~225 BOPD for the Kuehkopf-38 (stopped in 1985) and SCHB-1a wells (started in 2015) respectively.

A Rhein Petroleum management approved field development plan exists to develop the ME and PBS within the Stockstadt Mitte block by means of 2 deviated oil producers and 1 water injector. The wells will be tied-back to the existing Schwarzbach surface facilities. The SCHB-1a well will be converted into a water supply well. All oil wells will be ESP lifted. First oil is envisaged in March/April 2023, assuming drilling of the first well commences Q1 2023. The STOIIP in the combined ME and PBS in the best estimate case equals some 12 MMstb in the Stockstadt Mitte block. Expected peak oil rates reach ~800 BOPD in the best estimate case with an estimated recovery factor of some 32%. The recovery factors are in line with the analogue fields which reached recovery factors of some ~26 and ~40% for Eich and Stockstadt Main respectively.

The Lauben field is located in the Free State of Bavaria and presently consists of one well with no further development envisaged for this field.

In addition to existing Lauben and Schwarzbach production, SGS also evaluated the Erfelden, Graben and Steig development plans and a number of prospects that lie within the Rhein Petroleum licence areas.

The regulatory and fiscal regime is currently advantageous in Germany with stable and predictable permitting processes. The regulatory framework is likely to remain advantageous given the challenges associated with compromised gas supplies from Russia and the increasing importance for indigenous sources of energy and the environmental benefits of local supply of hydrocarbons over imported products. German oil production dates to 1858. In 2021 domestic oil and gas production amounts to some 120kboe/d. The Upper Rhine Graben is a historic oil and gas province, as over 400 exploration and appraisal wells have been drilled, discovering 57 oil and gas fields. The basin -opening Stockstadt Main oil field was discovered in the early 1950’s and is adjacent to the Rhein Petroleum operated Erfelden development. Recent oil discoveries have been made by Rhein Petroleum i.e., Schwarchbach Main in 2015 and the shallow Steig formations in 2019. In 2003, a deep well to test geothermal potential serendipitously discovered the Römerberg field which doubled the total recoverable reserves in the German sector of the URG in a new play in Triassic reservoirs.

2 REGIONAL GEOLOGICAL OVERVIEW OF THE UPPER RHEIN GRABEN

The Upper Rhein Graben (URG) is one of several important hydrocarbon basins in Germany, including the Permian North German and Triassic Thuringian Basins to the north and the Tertiary Molasse Basin (that contains the Lauben asset) to the south (See Figure 2-1).

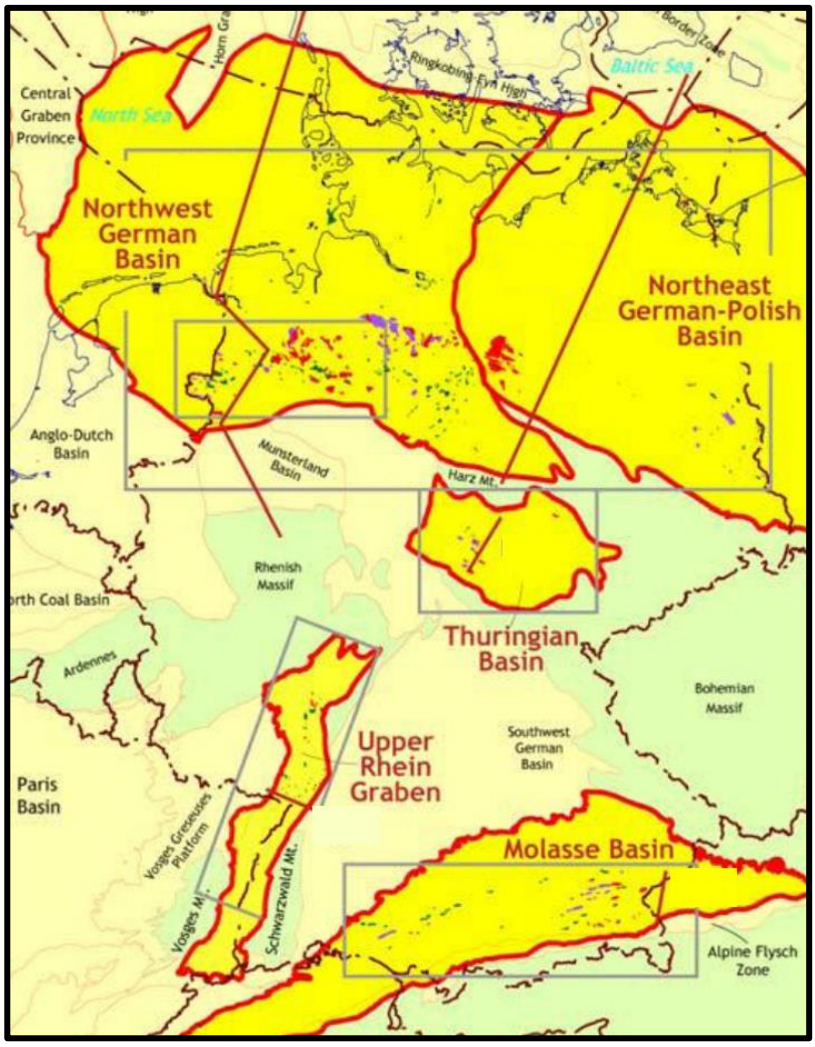


Figure 2-1 The main sedimentary basins of Germany. *Source: Beacon Energy plc*

The URG forms the central section of the European Cenozoic Rift System and is a mature hydrocarbon province and is in fact one of the oldest oil provinces in the world, with historical small-scale exploitation of surface oil seeps for medicinal and lubricant purposes. The main exploration phase took place after World War I.

The URG is a NNE-SSW trending 'failed rift' graben system. Some 25-35km wide, it extends for around 300km between Basel in the south to Frankfurt in the north. The URG formed over a pre-existing Hercynian shear zone during a period of extension during the middle/late Eocene to early Miocene.

Sedimentation reflects episodic interplay between marine and terrestrial processes as subsidence waxed and waned, with open marine-brackish lacustrine conditions giving way to lacustrine-fluviatile environments as uplift progressed. The syn-rift sediments are composed mainly of shales, silts and marls with minor intercalations of sands (see Figure 2-2). Along the rift margins course clastics are occasionally developed.

Broadly, the Tertiary reservoirs consist of the following:

Pechelbronner-Schichten (PBS) sandstone (Upper Eocene-Lower Oligocene). These sands were deposited in active half-grabens and form distinct wedges (see Figure 2-3). The PBS can be further sub-divided into Lower, Middle and Upper that reflects the fluvial dominated (Lower), marine dominated (Middle) and deltaic settings (Upper) of each. Provenance of the reservoir rocks are mainly the western shoulder of the URG, with some minor influx from the eastern margin.

Meletta-Schichten (ME). These Rupelian sandstones are mostly marine in origin, becoming more brackish in the upper section.

Cyrenen-Mergel (CM) sands were deposited in the quieter, brackish lacustrine environment of the Late Rupelian.

Bunte Niederroederner Schichten (BNS). These sandstones were deposited as thin stringers within the predominantly lacustrine setting of the late Rupelian-Early Chattian in a system of tectonically controlled graben lakes and braided rivers.

Below the Base Tertiary Unconformity (BTU), there are pre-rift, predominantly terrestrial, Mesozoic reservoirs of historically relatively minor importance, but with considerable future potential following the discovery the Römerberg field in 2003. These reservoirs include the Schilfsandstein and Malschenburg Sandstein of Middle and Upper Triassic age and the Buntsandstein of the Lower Triassic.

Source Rocks

The Fish Shale ‘Fischscheifer’ is the most important source rock for the URG and was deposited during a marine incursion during the early Oligocene (mid-Rupelian). 10-15m thick, it is composed of argillaceous limestones, marlstones and oil shales deposited in an low energy (restricted) anoxic marine environment. As a type-II kerogen, it is oil-prone and has excellent hydrocarbon generation potential. According to the literature, the Lias (Earliest Jurassic) is an important source rock throughout the basin, but as the Lias is absent through erosion here, long range migration from the central and southern parts of the Graben are required, Other minor Tertiary source rocks also exist, but their productivity and contribution to the URG petroleum system is probably minor.

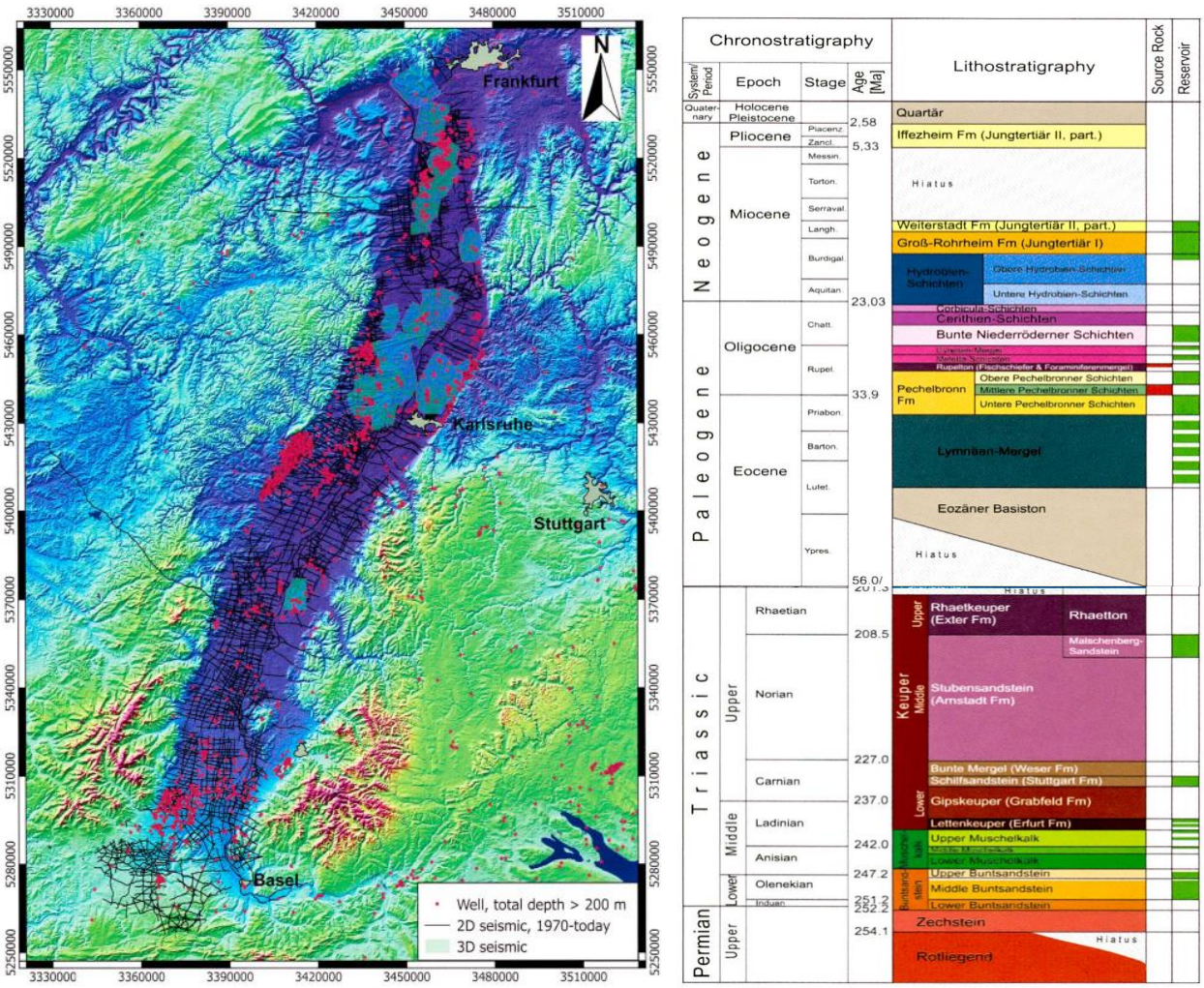


Figure 2-2 Digital elevation model of the URG (left) and the chronostratigraphy of the northern area

Timing of oil charge post-dates trap formation and is believed to be ongoing. Migration into the reservoirs is both vertical (into the PBS below and ME, CM and BNS above) and via lateral migration across faults.

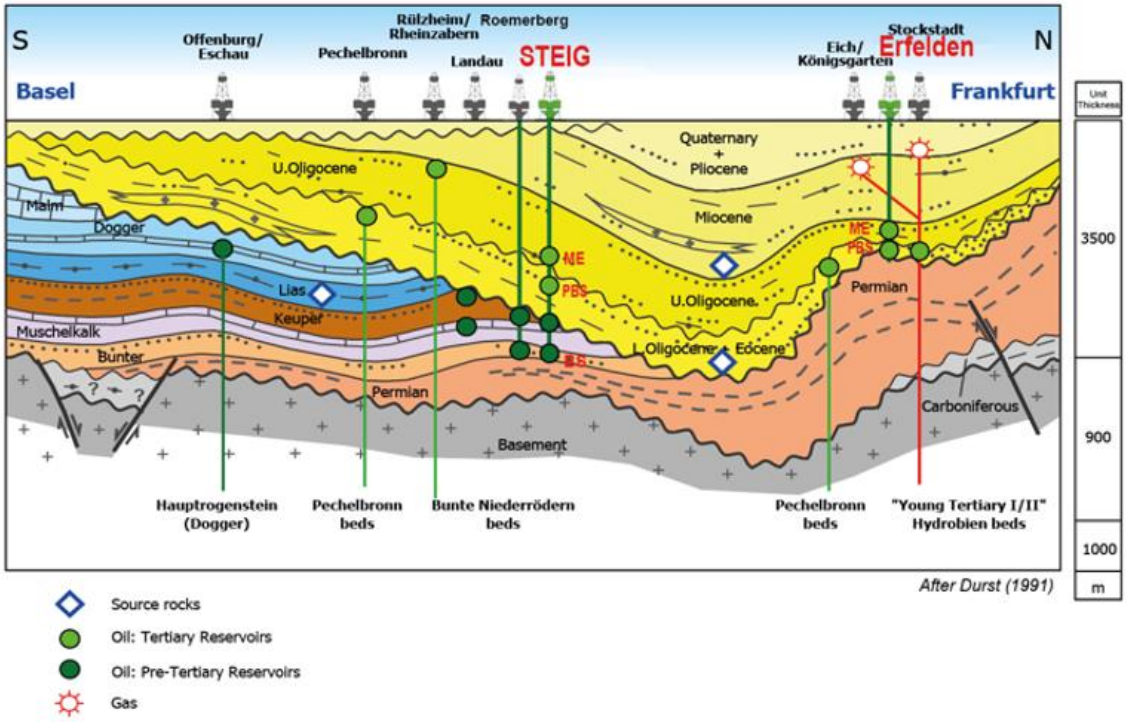


Figure 2-3 N-S geological cross section of the URG. Source: Beacon Energy plc

3 ERFELDEN STOCKSTADT-MITTE ME/PBS DEVELOPMENT

3.1 GEOLOGICAL OVERVIEW

The Erfelden oilfield is situated on the west side of the Upper Rhein Graben (URG). It was discovered by Rhein Petroleum (RP) in 2015 when the Schwarzbach-1 well (SWB-1) discovered oil in the Oligocene Pechelbronner-Schichten (PBS) sandstones in a N-S trending structural high at around 1700m depth. There are several abandoned and active oilfields nearby, including the Stockstadt Main field (see Figure 3-1)

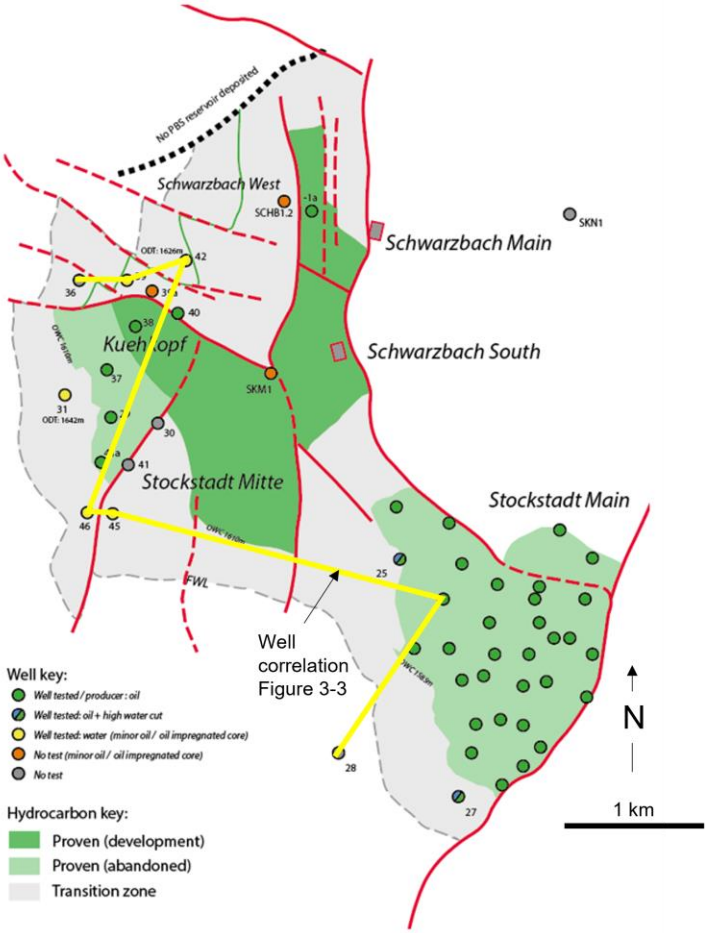


Figure 3-1 The Erfelden Field complex. *Source: Rhein Petroleum*

In addition to the PBS, potential for oil-bearing reservoir exists in the shallower Meletta-Schichten sands (ME) as suggested by the presence of oil in the Stockstadt Mitte-1 well (STKM-1) drilled in 1985 by Exxon.

Since these well were drilled, 3D seismic data has been acquired over the licence area (2012) greatly improving the imaging of the field.

Erfelden field is a complex of four juxtaposed fault blocks: Kuehkopf (K), Stockstadt Mitte (SKM), Schwarzbach Main (SBM) and Schwarzbach South (SBS) (Figure 3-1).

The alluvial-fluvial deposits of the PBS are confined within the URG as a syn-rift wedge, deposited in half-grabens within the developing rift. They are some of the most commercially important reservoirs in Germany.

The PBS is subdivided into three intervals. The Lower PBS is a sequence of massively bedded, conglomeratic sandstones with frequent shale intercalations deposited in a high-energy fluvial environment. Towards the upper part of this lower unit, there is an increase in marine influence and a general fining upward trend (Derer et al 2003).

The shale dominated Middle PBS represents a marine flooding event and a marine-brackish depositional environment. A sea level fall led to coarser clastics sourced from both sides of the URG, deposited in fluvial-lacustrine settings (Upper PBS). Tectonic-induced subsidence and a eustatic sea level rise then led to the deposition of the Rupel Clay which is the ultimate seal for the PBS reservoir.

A relative sea level fall then gave rise to fine grained sandstones of the Meletta-Schichten, deposited largely in a delta front setting (Perkenseer et al 2013)

3.1.1.1 Well data

The majority of the wells in the Erfelden area were drilled before the 1970s. The latest wells, Schwarzbach-1 (2015) and STKM-1 (1985) have acquired a limited suite of petrophysical logs, namely SP, resistivity and in STKM-1, GR and sonic logs. Therefore, the majority of the wells in the area do not have the basic suite of logs necessary to carry out a standard petrophysical interpretation. The only consistent set of electrical logs available are SP and resistivity logs, which can be used for correlation purposes as well as to extract some basic reservoir information. In addition, core data provides some information on the petrophysical properties.

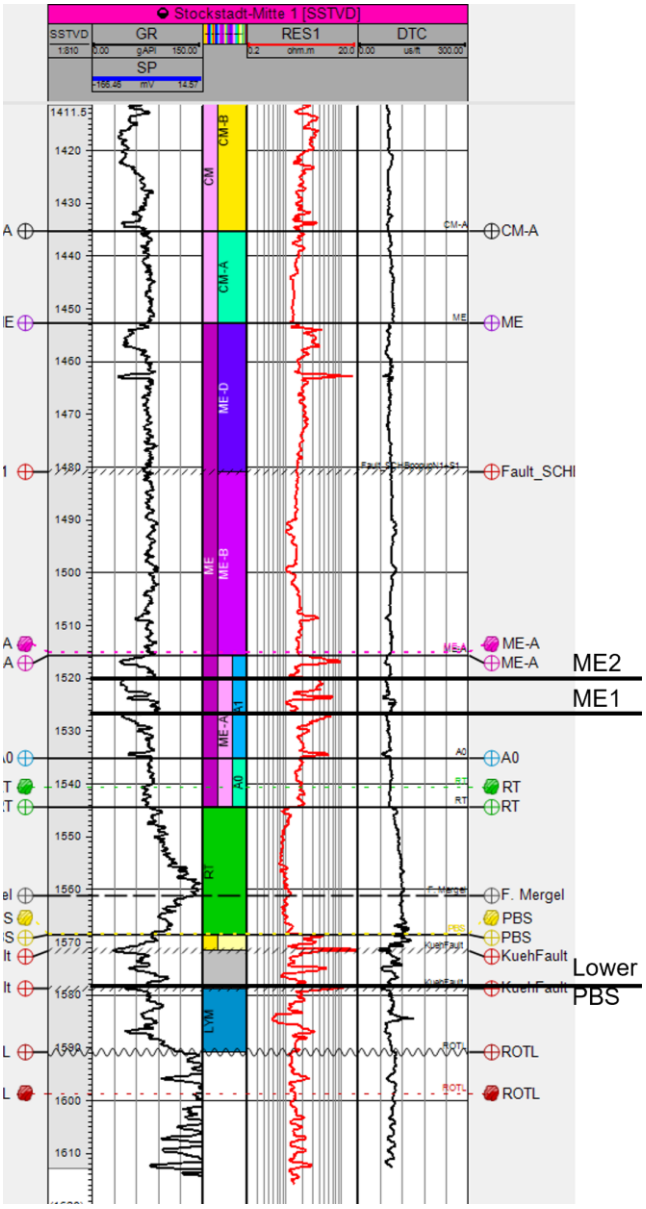


Figure 3-2 Type log of STKM-1 well. Source: SGS

3.1.1.2 Reservoirs

The PBS beds have a distinctive log signature that make their recognition easy:

- The fluvial sandstones of the Lower PBS often show a blocky pattern at the base, suggesting channel amalgamation; the upper part is characterized by a positive SP and higher GR, due to transition to lacustrine/interfluvial mudstones and swamp deposits
- Offshore mudstones and minor fine-grained delta/shoreface sandstones of the Middle PBS formed under brackish-marine conditions and are showing a typical “shale” signature. It is a good correlation marker.
- The Upper PBS is more complex and consists of coarse-grained sandstones and conglomerates of fluvial origin alternate with interfluvial/lacustrine mudstones and siltstones. In general, the porous and permeable fluvial sandstones and conglomerates of the Upper PBS Beds appear as relatively isolated negative SP and low GR - single-story fluvial channels embedded in overbank fines.

Owing to their unknown hydrocarbon potential here, the sands of the Meletta beds have been neglected in the Erfelden area. However, petrophysical interpretation of STKM-1 wireline logs as well as hydrocarbon shows at surface while drilling suggest that these sands do have hydrocarbon potential. From analogues, it is likely that this formation is producible with moderate permeabilities in Erfelden.

Because the wireline logs are insufficient for conventional petrophysical interpretations, reservoir properties are derived either from the core dataset acquired from previous Operators, or from the literature. Core data are available from 15 wells, as described in the petrophysical section. Almost all data concern the Upper PBS that is acknowledged to be considerably poorer quality than the Lower PBS. The better reservoir quality of the Lower PBS is extrapolated from production data from other fields (including Stockstadt Main) as well as from published papers. The Lower PBS is largely unknown in the wells drilled in the Erfelden area, either because it is absent, or it has been neglected because it is in the water/transition zone.

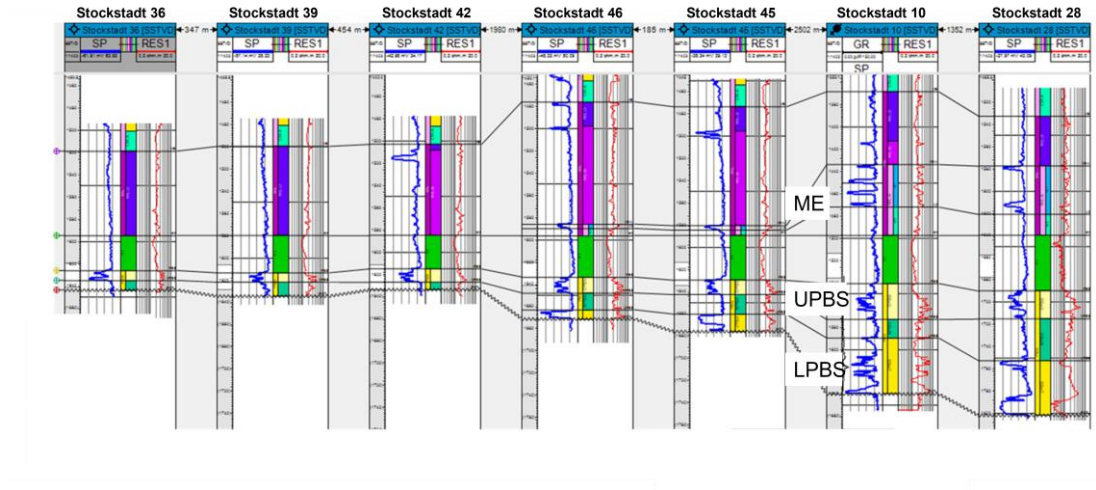


Figure 3-3 Well correlation across the Kuehkopf and Stockstadt Main field showing the progressive appearance of the Lower PBS moving southeast in agreement with the current depositional model. Note also the eastward gradual appearance of sand layers of the Meletta Fm (see fig 3-1 for location of correlation line). *Source: SGS*

The well panel in above figure shows the conformance of the geology seen in the Erfelden wells, **Figure** 3-3. In particular, the correlation panel show geometries that are in line with the geometries of the deposits expected to fill the accommodation space created following the development of a half-graben (see figure 3-4). In this type of setting little or reduced deposition occurs at the shoulders of the graben, eventually dislocated in several fault blocks, to the west. The basin depocentre (around Stockstadt Main location) is the site of the greatest sediment accumulation, whilst eastwards towards the far end of the graben the sediments are tapering out. It is also worth noting the gradual appearance of Meletta sands at the graben's depocenter.

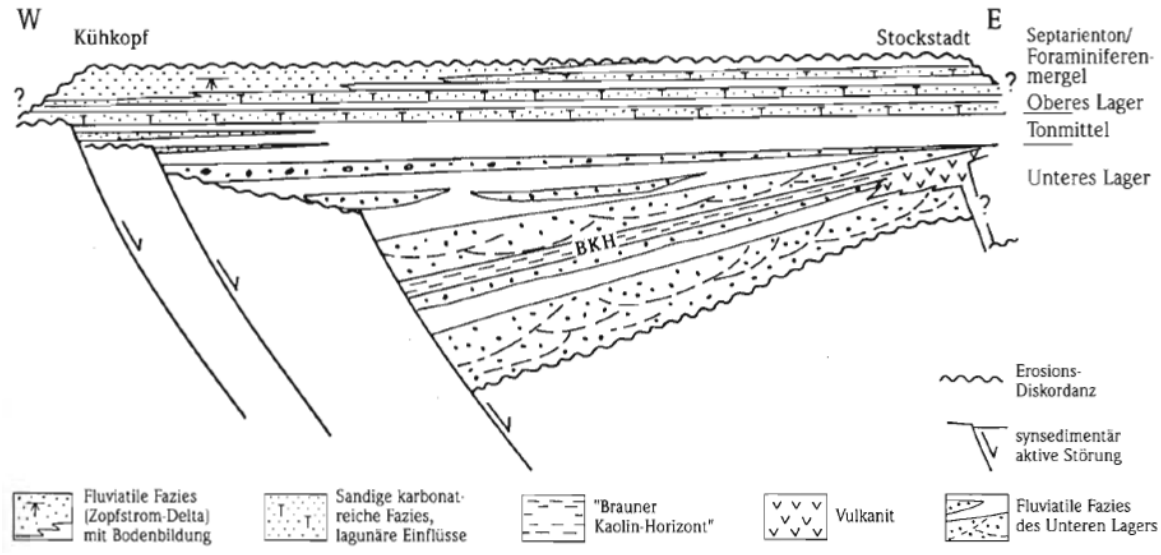


Figure 3-4 Depositional model of the PBS in the Erfelden oilfield area. *Source: Gaupp and Nickel, 2001*

It is important to highlight the significant faulting that is affecting the area. This is obviously linked to the complex tectonic evolution of the area that was affected by an extensional event in late Eocene and Oligocene which lead to the development of the Rhein Graben, subsequently replaced by a strike slip regime in the early Miocene. This change of tectonic regime has caused the re-orientation of the fault pattern from NNE-SSW oriented normal faults to a set of NNW-SSE oriented *en-echelon* faults. The complexity of the faulting can be considered one of the main

reasons for the failure of some drilling projects (e.g. STKM-1) but can also be a key factor in isolating compartments within a field, such as Schwarzbach Main in the Erfelden field that sees a different, shallower oil-water contact (perched water) than in the neighbouring fault blocks.

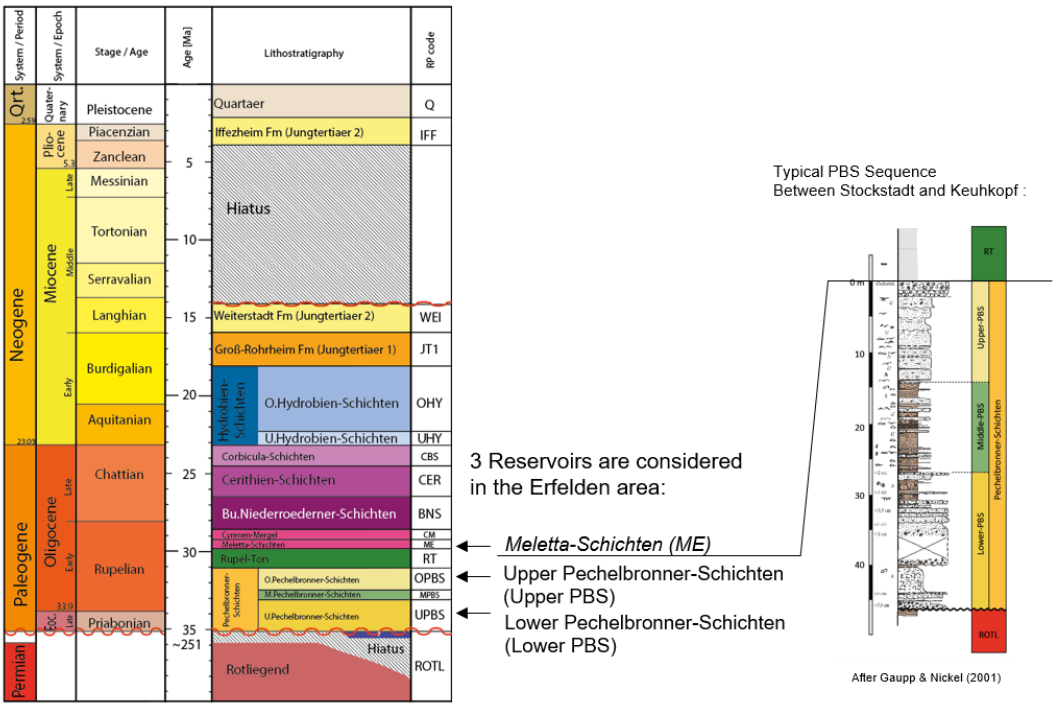


Figure 3-5 Stratigraphy of the URG and standard profile and gross thickness of the PBS in the Erfelden area. *Source: Beacon Energy plc*

These structural and stratigraphic complexities have been mitigated and partially resolved by the acquisition and interpretation of 3D seismic data.

3.1.2 EVALUATION METHODOLOGY

3.1.2.1 Data used

Several Petrel projects containing the main 3D TWT seismic volumes were made available for evaluation. The projects included all the available wells, logs, checkshot information as well as time and depth interpretations. Some of the volumes are available in depth.

3.1.2.2 Seismic data quality

The 3D data used for this evaluation is a pre-stack time-migrated volume which has had Q-compensation applied to reduce the effects of energy attenuation and wavelet distortion due to velocity dispersion. The entire field area is covered by these data. Overall, the seismic imaging at the target Oligocene levels is fair to good for interpretation, with good amplitude and reflector continuity observed. However, part of the Schwarzbach South block lies in the fault shadow of a major antithetic fault complex. It has been suggested that the amplitude 'chaos' observed here might be due to intense faulting, but it is perhaps more likely that the reflector continuity here has been reduced due to the complex ray paths and attenuation caused by the overlying fault (Figure 5-1). Given this block's proximity to the major fault, it is possible that the reservoir is highly fractured here, although it is uncertain how this will affect the continuity or dynamic properties of the reservoir.

3.1.2.3 Seismic interpretation and mapping

To get a seismic well tie, the synthetic generated for the STKM-1 well used a 25Hz Ricker wavelet and required a 16ms upwards shift after which the tie was good at the target levels.

The following time interpretations were provided (note that the seismic data appear to have a reverse SEG polarity convention and a peak represents a negative acoustic impedance contrast):

ME2 &ME1

These are interpreted for the Meletta-Schichten reservoir(s). They are both picked on a trough ('hard') event but the ME1 is the better defined of the two, and is imaged as bright, fairly continuous reflector. The ME2 sand is very thin and its corresponding reflector weak and quite unstable. The STKM-1 well tie is fair at ME1 and poor at ME2.

PBS

The Upper and Lower PBS both lie within a prominent trough below the bright peak of the Rupel shales.

The seismic data quality allows for an unambiguous interpretation of the faults and the reflectors are correctly interpreted and correlate well across the faults. The seismic interpretations provided appear to form a sound basis for the calculation of gross rock volume. Area-depth data was obtained from the depth structure maps provided.

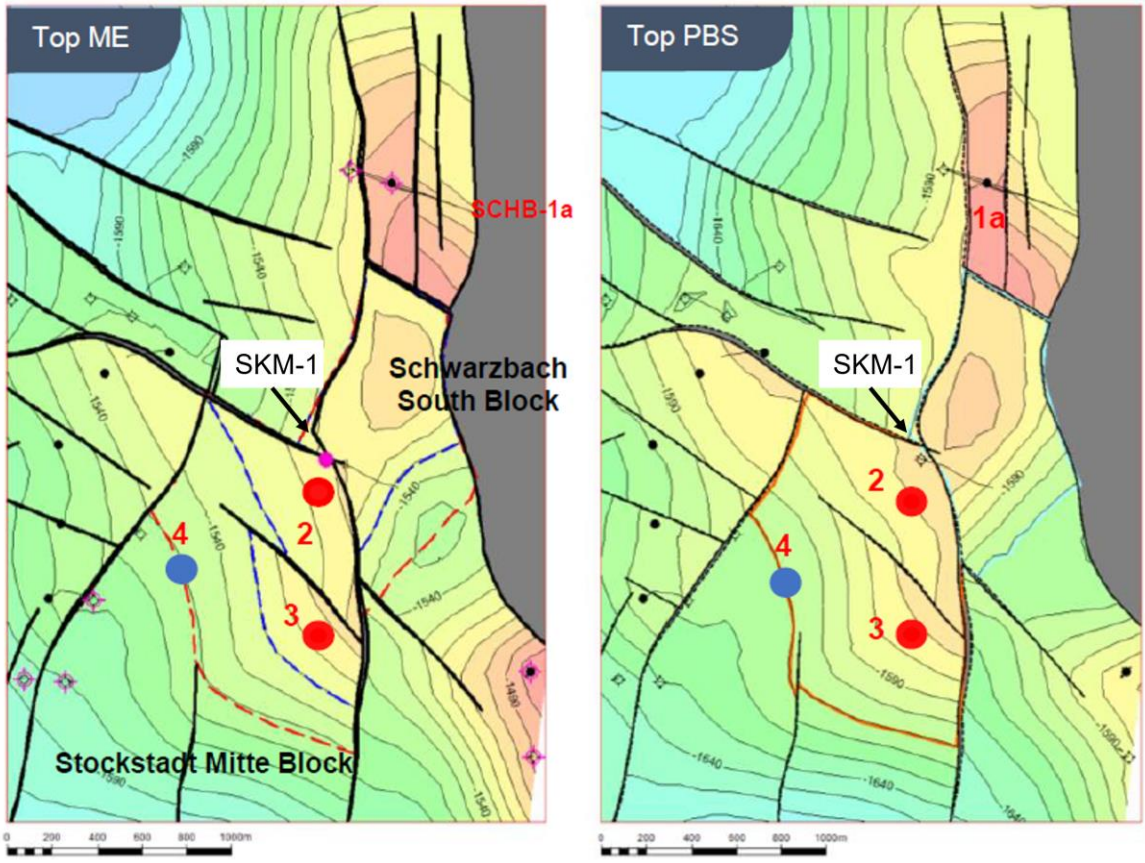


Figure 3-6 Well targets for the Development Plan. *Source: Beacon Energy plc*

3.2 FIELD DEVELOPMENT PLAN

3.2.1 OVERVIEW FIELD DEVELOPMENT PLAN

The operator (Rhein Petroleum) plans to drill 3 wells targeting the Stockstadt-Mitte block, comprised of 2 oil producers and one water injector. In addition, an old oil producer (SCHB-1a) will be converted into a water supply well. First oil is envisaged for the March 2023 assuming drilling of the first well commencing Q1 2023. Well onstream dates assumed are as follows:

1. 1-Mar-2023 (OP)
2. 1-Jan-2024 (OP)
3. 1-Jan-2025 (WI)

Fluids will be treated in the existing Schwarzbach facilities. More information on the facilities aspects is presented in section 10.1.

3.2.2 ENGINEERING ASSESSMENT

3.2.2.1 PVT data

No downhole fluid sample from the Stockstadt Mitte (SKM-1) well was acquired. A surface crude sample was obtained from well Schwarzbach-1 and sent to 3 different vendors to be analysed, but none of the reports are considered as standard PVT reports. Only the composition is available for the oil, and the GOR was taken from the analogue neighbouring field, Eich. It was concluded that recombination or proper reconstruction of the hydrocarbon was not possible. Standard industry correlations were applied to generate key PVT properties. One of the reports, stated the presence of some paraffin, wax and asphaltenes, however, flow assurance issues are not expected, based on production from Kuefkopf-38 and SCHB-1a.

PVT data used in MBAL model:

- Oil API = 38
- Rsi=15 Sm3/Sm3
- No CO_2 and no H_2S in produced gas

A simple PVT 'black oil' was modelled by matching the Rsi value at initial pressure of 172 Bar and a temperature of 124 C.

3.2.2.2 Relative Permeability

There were no special core data to provide the shape or values of a relative permeability model. Relative permeability parameter ranges were taken from the nearby Eich field.

- There is no capillary pressure and transition zone.
- Sor= 0.3 – 0.35
- Nw + No = 7
- Swc = 0.35
- Kro@Somax = 0.8
- Krw@Sorw = 0.2 – 0.3
- Sweep efficiency = 60% - 70%

3.2.2.3 Material balance model

Three MBAL models representing low-, best- and high cases were generated by Rhein Petroleum and adapted by SGS where required. The inputs for these cases have been shaped based on a deterministic realization table as detailed in section 3.2.2.4.

The best case was modelled with a multi-tank system where each reservoir was split into near and far tanks in order to replicate transient effects present in low permeability reservoirs. The STOIIP ratio is similarly assigned to near and far tanks at 40% and 60% respectively. The 3 formations of Meletta, Lower PBS and Upper PBS were targeted in this case. The aquifer was applied using a Hurst-van Everdingen-Modified radial model for the far tanks while near tanks contained no aquifer. The productivity indices (PI) of the wells were calculated as per subsurface realization. Transmissibility between tanks were adjusted to reach oil recovery based on the analogue fields, Eich (~26%) and Stockstadt Main (~40%), i.e. some 32%.

For the low case, the approach was simplified by modelling single tank systems and targeting the Meletta and Upper PBS only. Meletta is restricted at Lowest Known Oil depth and has STOIIP of ~1 MMstb. The Upper PBS P50 STOIIP calculated by Rhein Petroleum and endorsed by SGS was also used for this case. The P50 STOIIP in the low case was adopted to avoid modelling a case closer to a P99 rather than a P90 case. Aquifer and well PI was modelled in a similar fashion to the best case.

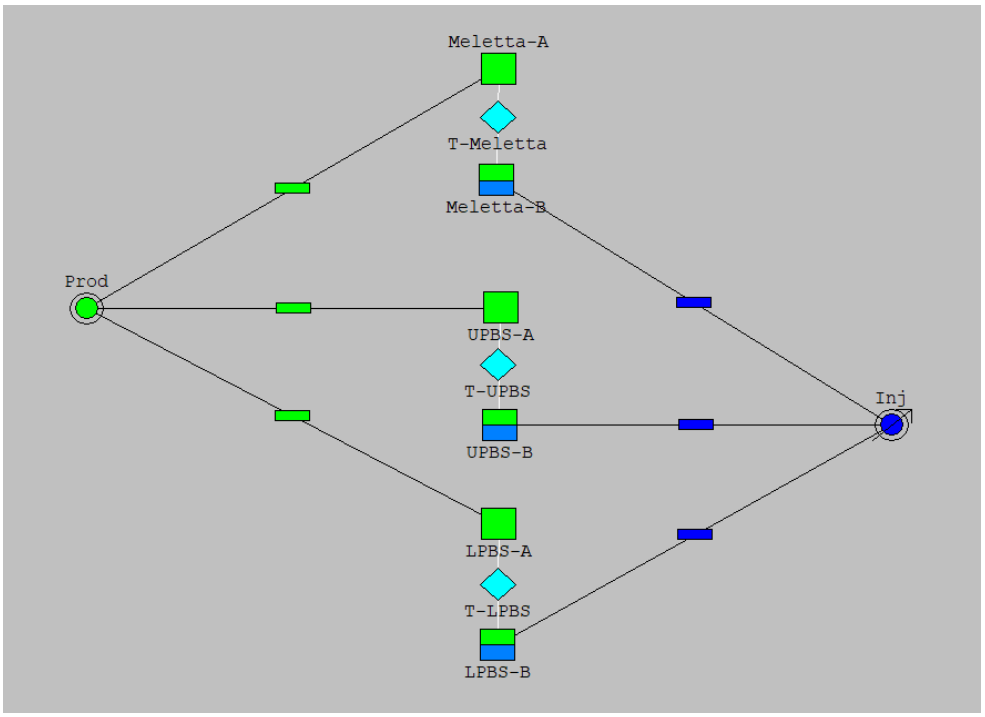


Figure 3-7 Best case MBAL model system. *Source: SGS*

3.2.2.4 Uncertainties

3.2.2.4.1 Key subsurface uncertainties

SGS defined deterministic low, best and high technical case subsurface realizations for the assessment of the low, best and high estimate production forecasts, with uncertainties carried forward marked by the red, green and orange dots respectively in table below.

The key static- and dynamic uncertainties have been captured in a realization table below. It must be noted that the Lower PBS in Stockstadt-Mitte has not been penetrated by any oil-bearing wells. However, the Lower PBS is present as confirmed by the downdip STOK-45 and STOK-46, below the contact. However, considering that the Lower-PBS was the main oil producing reservoir in Eich and Stockstadt-Main, based on analogues and the depositional regional model, as well as the Lower PBS and Upper-PBS likelihood of sharing a common contact (viz-a-viz Stockstadt Main), it has been assumed that the Lower-PBS is oil bearing in the best technical case estimate. Conservatively, the Lower-PBS was excluded in the low estimate.

Table 3-1 Erfelden realization table

Meletta-Schichten Reservoir

Case	Volumetrics	Drive mechanism					PVT	Permeability and KxH	Skin
	STOIIP [MMbbls]	Rel. Permeability	Sweep	Sor	Injection PI	Aquifer size	Muo	K*H [mD*m]	
Low	1.0 (LKO)	Nore oilwet	STK-Mitte 60%	0.35	2x Production PI	Weak aquifer	+5%	5	4
Best technical	2.5	Mixed wet	STK-Mitte 70%	0.30	3x Production PI	Midsized aquifer	Best	45	2
High	3.5	More waterwet	STK-Mitte 80%	0.25	4x Production PI	Strong aquifer	-5%	298	0

Upper Pechelbronner-Schichten Reservoir:

Case	Volumetrics	Drive mechanism					PVT	Permeability and KxH	Skin
	STOIIP [MMbbls]	Rel. Permeability	Sweep	Sor	Injection PI	Aquifer size	Muo	K*H [mD*m]	
Low	4.9	Nore oilwet	STK-Mitte 60%	0.35	2x Production PI	Weak aquifer	+5%	18	2
Best technical	5.8	Mixed wet	STK-Mitte 70%	0.30	3x Production PI	Midsized aquifer	Best	65	1
High	6.9	More waterwet	STK-Mitte 90%	0.25	4x Production PI	Strong aquifer	-5%	260	0

Lower Pechelbronner-Schichten Reservoir:

Case	Volumetrics	Drive mechanism					PVT	Permeability and KxH	Skin
	STOIIP [MMbbls]	Rel. Permeability	Sweep	Sor	Injection PI	Aquifer size	Muo	K*H [mD*m]	
Low	2.5	Nore oilwet	STK-Mitte 60%	0.35	2x Production PI	Weak aquifer	+5%	35	2
Best technical	3.4	Mixed wet	STK-Mitte 70%	0.30	3x Production PI	Midsized aquifer	Best	130	1
High	4.5	More waterwet	STK-Mitte 90%	0.25	4x Production PI	Strong aquifer	-5%	1875	0

Low Case
Best Case
High Case

3.2.2.5 Production forecasting

3.2.2.5.1 Methodology

The approved development concept by Rhein Petroleum was adopted as the basis for the low, best and high technical case estimates, where 2 producing wells and 1 injecting well will target the respective formations. No well location optimization was performed by SGS. The deterministic scenarios from the FDP and subsurface realizations have been applied in the production forecasting process.

3.2.2.5.2 Production constraints

The following constraints were applied:

- Maximum well liquid rate = 1,000stb/d
- ESP $FBHP_{min}$=30bar
- WI $FBHP_{max}$=175 bar (Initial pressure~173bar)
- Uptime=0.95
- Production timeframe 2022-2045=23 years

3.2.2.5.3 Overview of technical recovery and recovery factors

A table showing the technical recoveries based on the development concept presented for the Low, Best and High estimates up to End of License are shown in Table 3-2.

Table 3-2 Overview of technical cases evaluated

Case	STOIIP	Np	RF
	MMstb	MMstb	%
Low	6.8	1.0	15%
Best	11.7	3.8	32%
High	14.9	5.7	38%

STOIIP ranges defined by SGS for the individual cases. Rhein Petroleum has assessed the STOIIP ranges and these values have been endorsed by SGS. The recovery factor has been obtained using material balance modelling complemented by an analogue review. (Figure 3-10)

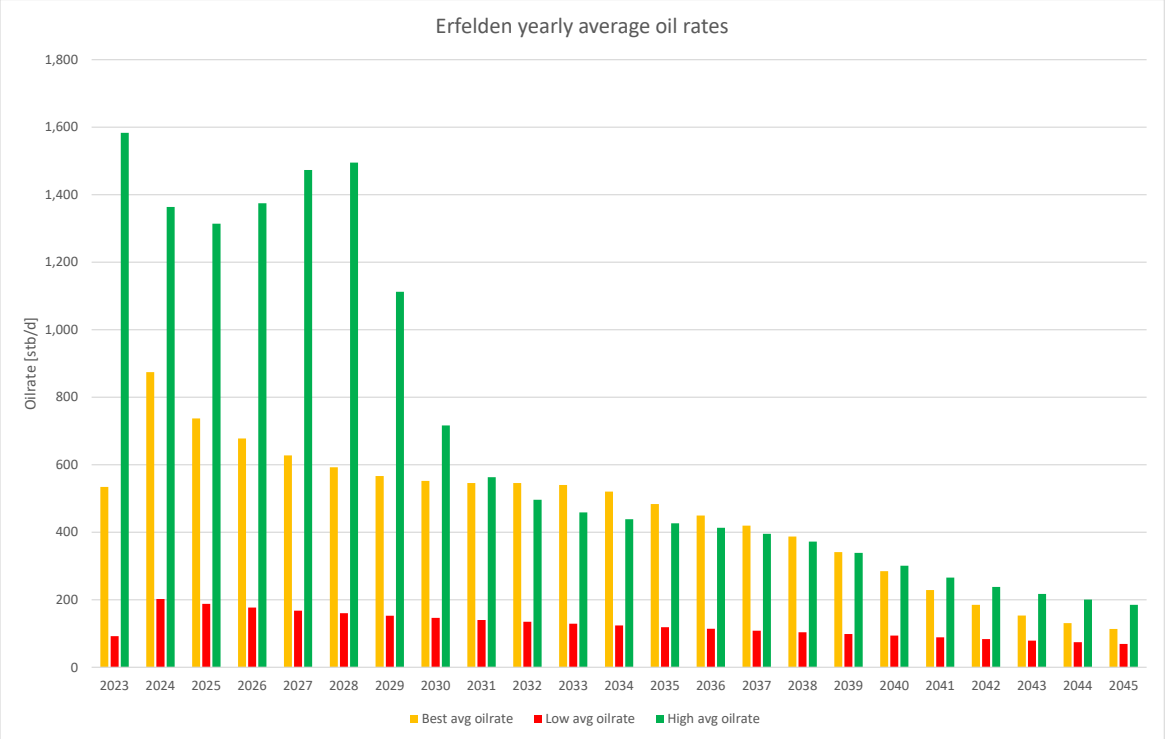


Figure 3-8 Erfelden Stockstadt Mitte yearly average oil rates

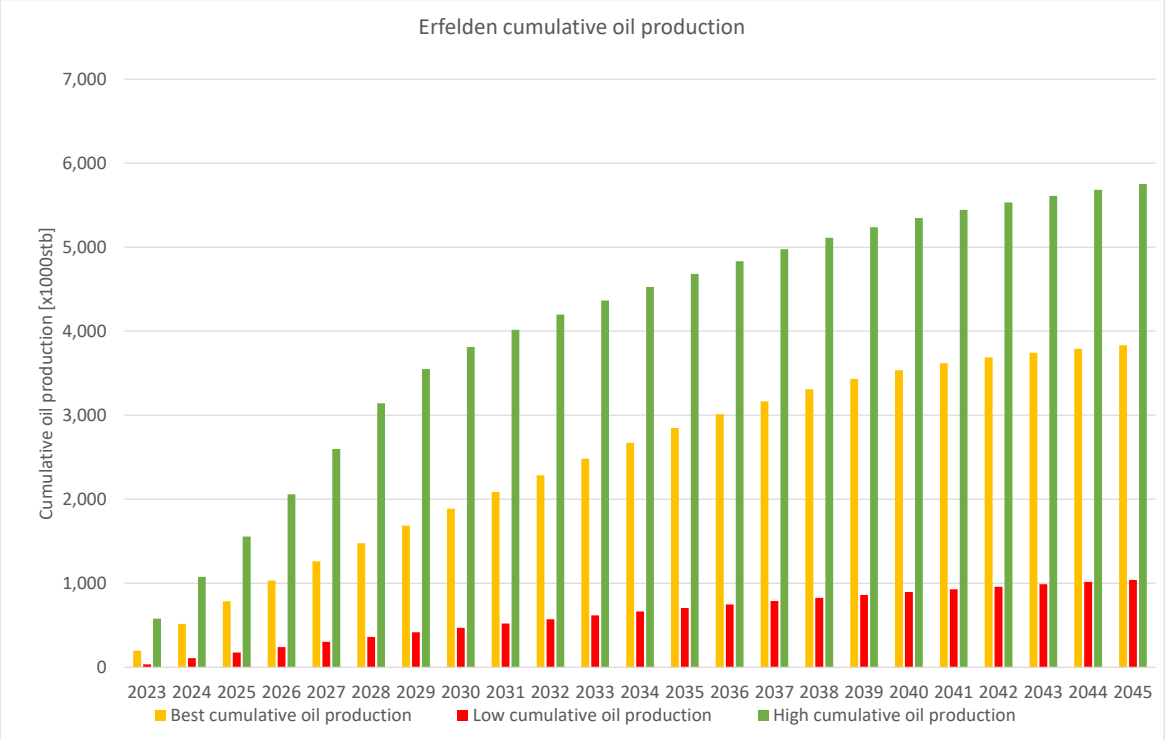


Figure 3-9 Erfelden Stockstadt Mitte cumulative oil production

3.2.2.5.4 Comparison with analogues

The chart below shows ultimate oil recovery per well from various fields. However, all analogue fields are old, were completed sub-optimally and have a high skin factor. The Stockstadt Mitte best case was calibrated to match a typical Eich well oil recovery, which is considered to be the most suitable analogue field.

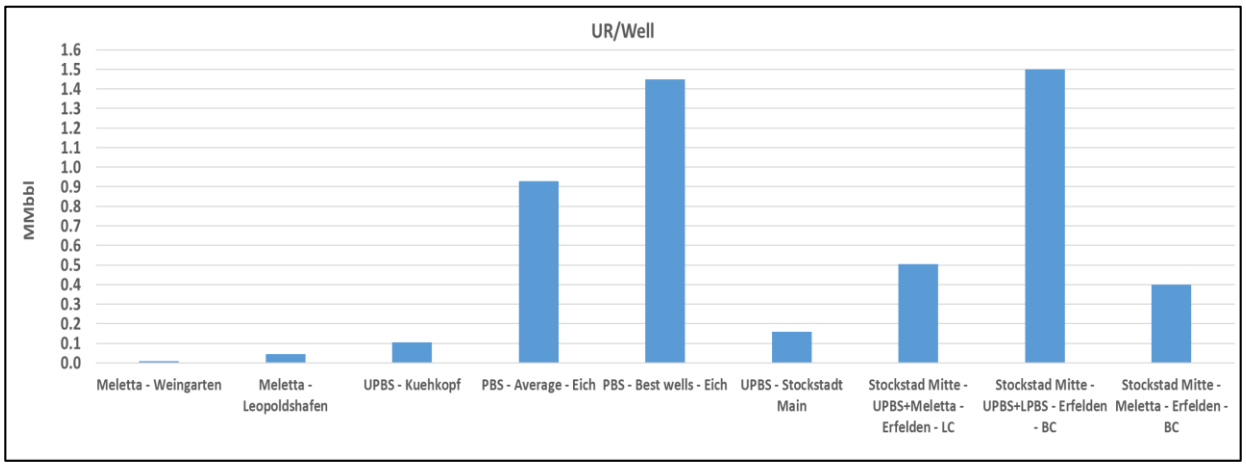


Figure 3-10 Ultimate recovery per well of Erfelden cases and analogue fields from Meletta and Lower and Upper PBS formation

3.2.3 RESERVES

The reserves associated with the SCHB-1a well (section 4.1) is included in the Stockstadt Mitte reserves overview provided in the following table.

Table 3-3 Erfelden Stockstadt Mitte development reserves (100% WI)

IN X1000STB	1P	2P	3P
RESERVES	0	3,784	5,754
COP (ECONOMIC LIMIT)	N/A	Sep-2044	Dec-2045

4 ERFELDEN SCHWARZBACH-MAIN PRODUCING ASSET

4.1 TECHNICAL ASSESSMENT

4.1.1 OVERVIEW

See also section 2.1

The SCHB-1a well is currently producing oil from the Schwarzbach Main block. Oil rates are low, having declined from a peak of 225 bopd. Once the water injector development comes on stream this well will be converted into a water supply well, assumed to be in January 2025. Decline curve analysis has been adopted to estimate remaining recoveries from this well. Simple exponential declines have been applied, based on the historical trend. The remaining recoveries up to 1st January 2025, when the well is scheduled to turned into a water production source, are presented in Table 4-1.

Table 4-1 SCHB-1a remaining recovery up to 1st January 2025 (technical cases)

Case	Remaining recovery
	Mstb
Low	8.4
Best	9.1
High	9.6

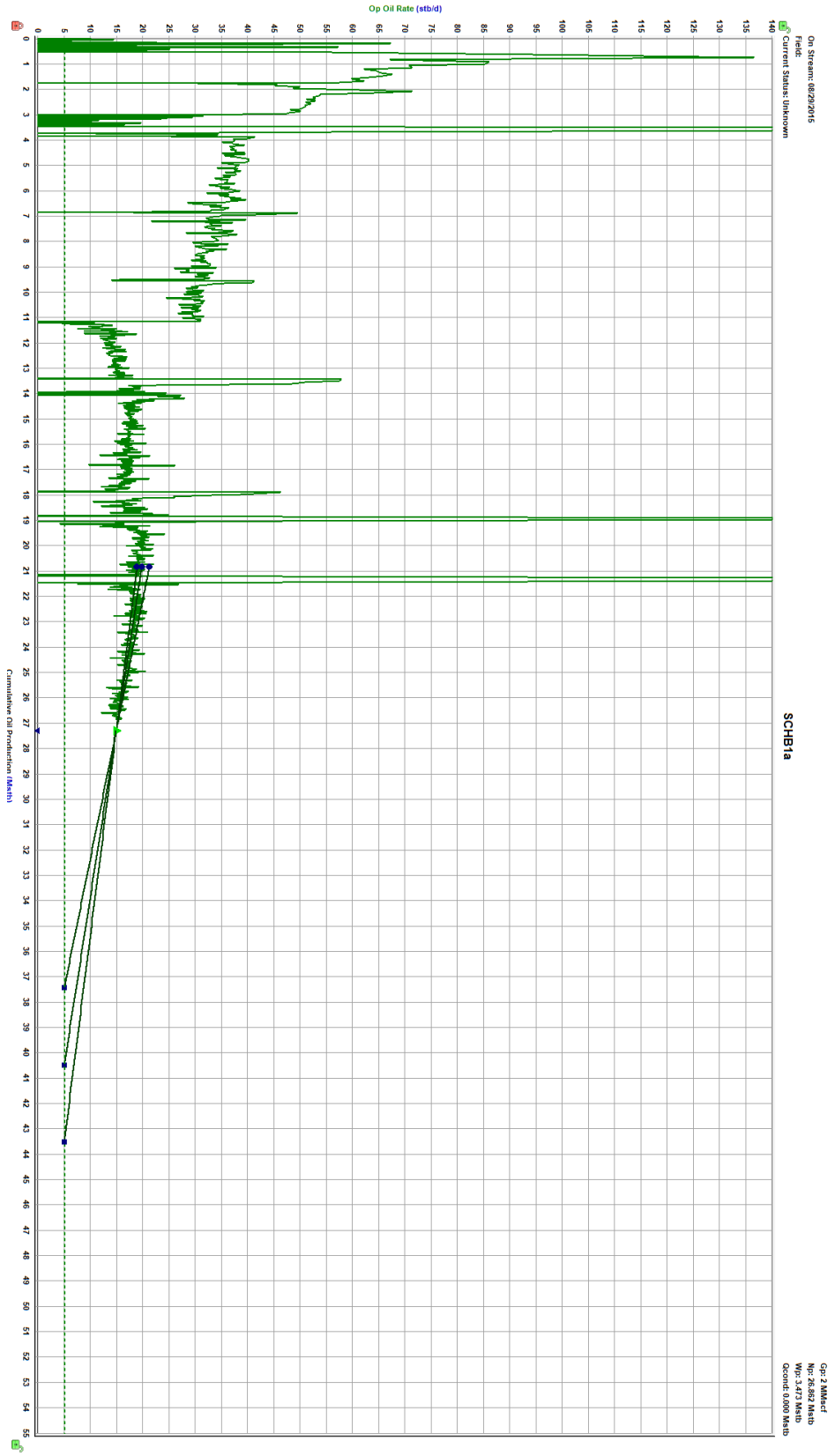


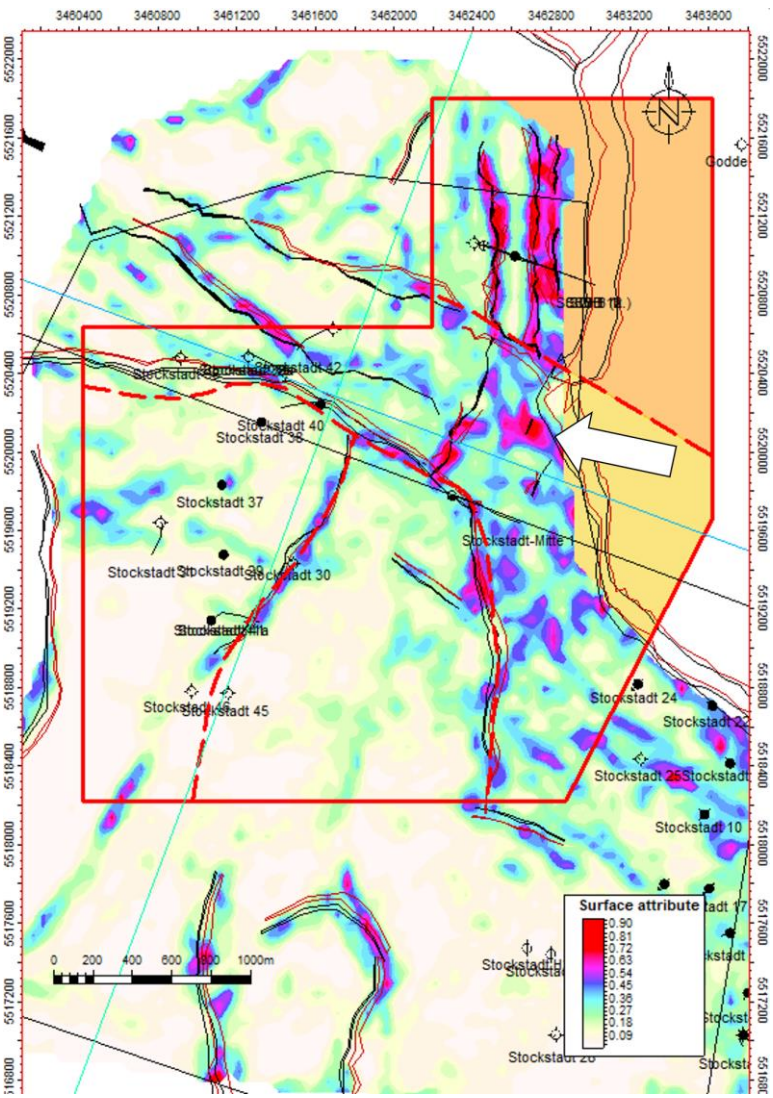
Figure 4-1 Decline Curve Analysis plot SCHB-1a well

4.1.2 RESERVES

The reserves associated with the SCHB-1a well is within the Stockstadt Mitte reserves overview, see section 3.2.3.

5 ERFELDEN SCHWARZBACH-SOUTH ME/PBS DEVELOPMENT OPPORTUNITY

5.1 GEOLOGICAL OVERVIEW



For the geological overview and evaluation methodology, see Section 2.1. In previous seismic amplitude studies by SGS, it has been noted that this fault-block has the potential to be severely faulted due to its proximity to the Graben Bounding Fault (GBF) (Figure 5-1). However, as mentioned in Section 2.1, this could also be due to the fault block lying underneath a major fault that has caused disruption to the seismic signal.

Figure 5-1 Attribute extraction of seismic chaos shows the potential for intensive faulting (arrowed).
Source: SGS

5.2 TECHNICAL ASSESSMENT

5.2.1 ENGINEERING ASSESSMENT

The block is as yet unpenetrated but is assumed to be oil-bearing since all surrounding blocks are oil bearing and there is a strong likelihood of sand-sand juxtaposition between the blocks. Thus it is highly likely that the area was in pressure communication after/during charging. Key uncertainties are fluid distribution (producibility), connectivity and internal faulting. Further data acquisition is required to assess whether the block contains movable hydrocarbons. Notional recovery factors

have been assigned to the block, broadly in line with recovery factors obtained from the Stockstadt-Mitte modelling work. The recoverable volumes in this block are considered to be Contingent Resources.

Table 5-1 Schwarzbach-South STOIIP, recovery factor (RF) and recoverable oil volumes overview (100% WI)

		STOIIP (MMstb)			RF	Recoverable volumes		
Segment	Reservoir	P90	P50	P10	%	P90	P50	P10
Schwazrbach South	Melleta	1.4	1.99	2.7	15	0.43	0.62	0.88
Schwarzbach South	Upper PBS	3.3	3.8	4.5	30	0.83	1.20	1.64
Schwarzbach South	Lower PBS	1.5	1.9	2.3	50	0.41	0.59	0.80

5.2.2 CONTINGENT RESOURCES

Contingent resources are presented below. Since more data acquisition is required to determine the more accurate STOIIP ranges, compartmentalization and well productivity, SGS ascribes a chance of development (COD) risk factor of 50%. SGS subclassifies the potential development as "Development Unclarified."

Table 5-2 Schwarzbach South contingent resources (100% WI unrisked)

IN X1000STB	1C	2C	3C
ALL RESERVOIRS	1,669	2,417	3,315

6 LAUBEN PRODUCING ASSET

6.1 TECHNICAL ASSESSMENT

6.1.1 OVERVIEW

The Lauben oil field is located in the German sector of the Molasse Basin which is a Cenozoic foredeep formed as a flexural response to load induced by advancing Alpine thrust units. The thickness of the molasse deposits is close to 5000 m. The principal oil source rocks are thought to be a Permian shaly series and Middle Jurassic shales, and lower Oligocene series of the lower Marine Molasse. Oil generation from lower Oligocene shales started in the Miocene and may still be continuing. Reservoirs of the Tertiary basin fill include Eocene and Oligocene sandstones.

The Lauben oil field produced from 1958 until 1985 and delivered in the region of 140,000 barrels of oil. In 2016 Rhein Petroleum and Wintershall undertook a testing program and to evaluate the feasibility of further exploitation from the field and the group successfully reactivated the Lauben 7 well as an oil producer. Wintershall subsequently sold their 50% operated interest to RDG Gmbh in 2020 who rebranded as ONEO in 2021.

Currently 1 well, Lauben-7, is producing oil. Production forecasts were generated using decline curve analysis. The results of the evaluation are presented in Figure 6-1. Simple exponential declines have been applied, based on historical trend. It is assumed that the water rate remains constant at about 10stb/d based on historical information.

Remaining oil recoveries up to the end of license 31-Dec-2041 are presented below:

Table 6-1 Lauben remaining technical case recovery up to end of license (Gross)

Case	Remaining recovery
	X1000stb
Low	104
Best	126
High	144

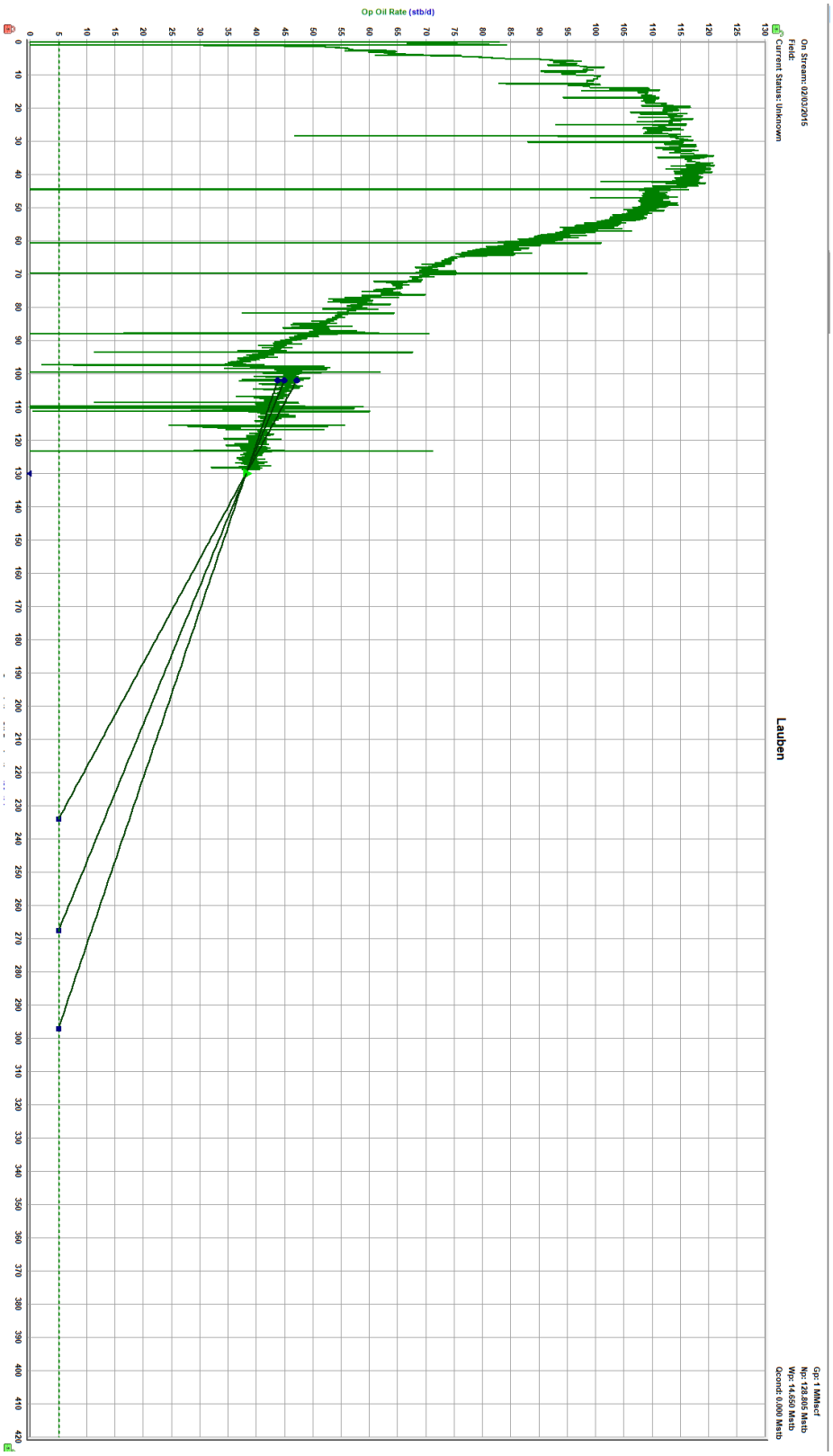


Figure 6-1 Decline Curve Analysis results Lauben-7

6.1.2 RESERVES

The table below shows the reserves calculated for the Lauben asset.

Table 6-2 Overview Lauben reserves up to End of License 50% Rhein Petroleum share

IN X1000STB	1P	2P	3P
RESERVES	0	63	72
COP	N/A	Dec-2041	Dec-2041

7 GRABEN DEVELOPMENT OPPORTUNITY

7.1 GEOLOGICAL OVERVIEW

7.1.1 OVERVIEW

The Graben asset is a complex faulted structure, bounded to the south by an E-W fault and to the east and west by normal faults splaying northwards from this fault that divide the field into two N-S fault blocks dip-closed to the north. The structure was originally mapped and drilled in the 1950s on poor quality 2D seismic where the structure was poorly defined. It is now covered with a modern 3D data set and is much better imaged.

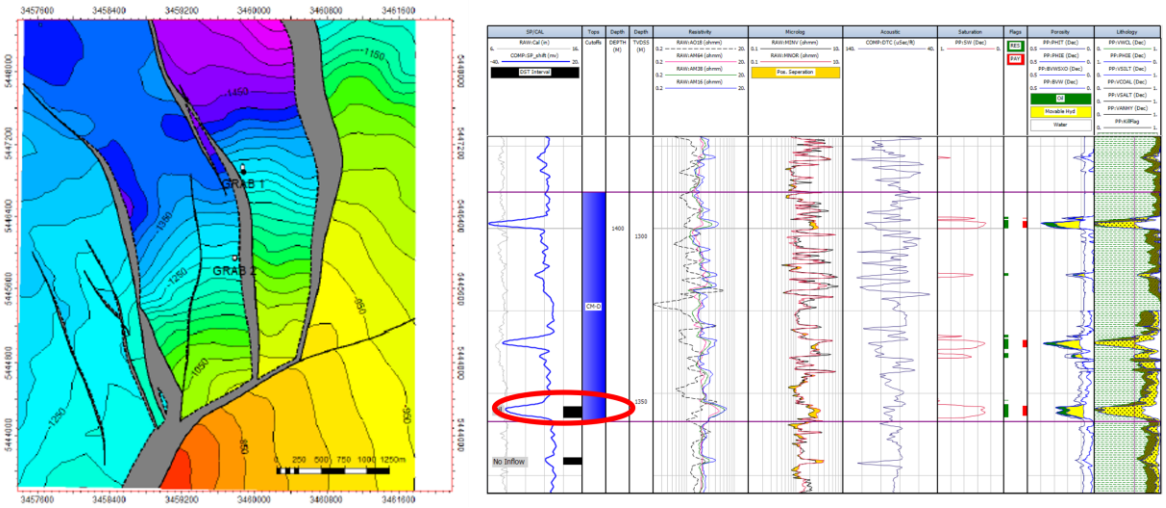


Figure 7-1 Graben Field Top CM-D structure map and petrophysical analysis of the Graben-1 well. *Source: SGS (map), Advance (well log)*

The oil-bearing reservoirs are the Oligocene CM-D and ME sands. It was discovered in 1959 by the Graben-1 (GRAB 1) well that drilled the eastern fault block. The downdip G1 well found oil in the lower of three thin CM-D sands. Production from this sand started in 1960 and 4822 m3 was produced before the well was shut in. Recent petrophysical analysis suggest that the upper two sands are also oil-bearing (Figure 7-1).

The well also found oil in the middle of three underlying ME sands and tested oil with 50% water. The upper ME sand was tested but proved inconclusive. Again, recent petrophysical analysis suggests that this sand is also potentially oil-bearing. There has been no production from the ME sands in the eastern block.

The Graben-2 (GRAB 2) well drilled further up-dip into to one of the N-S splay faults that separate the eastern from the central block. As a result, the well penetrated only the upper two CM sands in the central block, the third being faulted out. After passing through the fault, the well penetrated all three ME sands in the eastern block and found the upper sand to be oil-bearing. Oil was produced from this sand until the well was shut in in 1963 after which 2230 m3 had been produced.

7.1.2 EVALUATION METHODOLOGY

A Petrel project containing wells, 3D seismic and interpretations and surfaces was provided to SGS so that the basis for GRV calculation could be verified.

7.1.3 STOIIP RANGES

Table 7-1 Volumetric range for Graben East Block – CM reservoir. (Rhein Petroleum estimate)

IN X1000STB	P90	P50	P10
GRABEN – EAST BLOCK, CM-CMD	7,700	10,700	14,000

7.2 TECHNICAL ASSESSMENT

7.2.1 ENGINEERING ASSESSMENT

A notional RF range was applied considering the field is waterflooded with a Low of 15% (no benefit of Water injection), Best of 30% and a high of 50%, resulting in the recoverable volumes in Table 7-2. (Probabilistic multiplication of STOIIP and RF).

7.2.2 CONTINGENT RESOURCES

Contingent resources are presented below. Since more data acquisition is required to determine the more accurate STOIIP ranges, compartmentalization and well productivity, SGS ascribes a chance of development (COD) risk factor of 70%. SGS subclassifies the potential development as “Development Pending.”

Table 7-2 Graben-East contingent resources (100%WI – unrisked)

IN X1000STB	1C	2C	3C
GRABEN-EAST	2,000	3,200	4,800

8 STEIG DEVELOPMENT OPPORTUNITY

8.1 OVERVIEW

The Steig asset is an oil accumulation that was discovered by Rhein Petroleum in 2019 by well Steig-1. The well drilled through the entire Tertiary section and found oil at both Meletta and PBS stratigraphic levels. Both the Meletta and PBS, although they were tested and proved moveable hydrocarbons, require additional technical and commercial work, including among other things, further appraisal. However, together the Steig ME and Steig PBS can be envisaged as a low-risk future development programme, sub-classified by SGS as 'Development Unclarified.'

8.2 GEOLOGICAL OVERVIEW

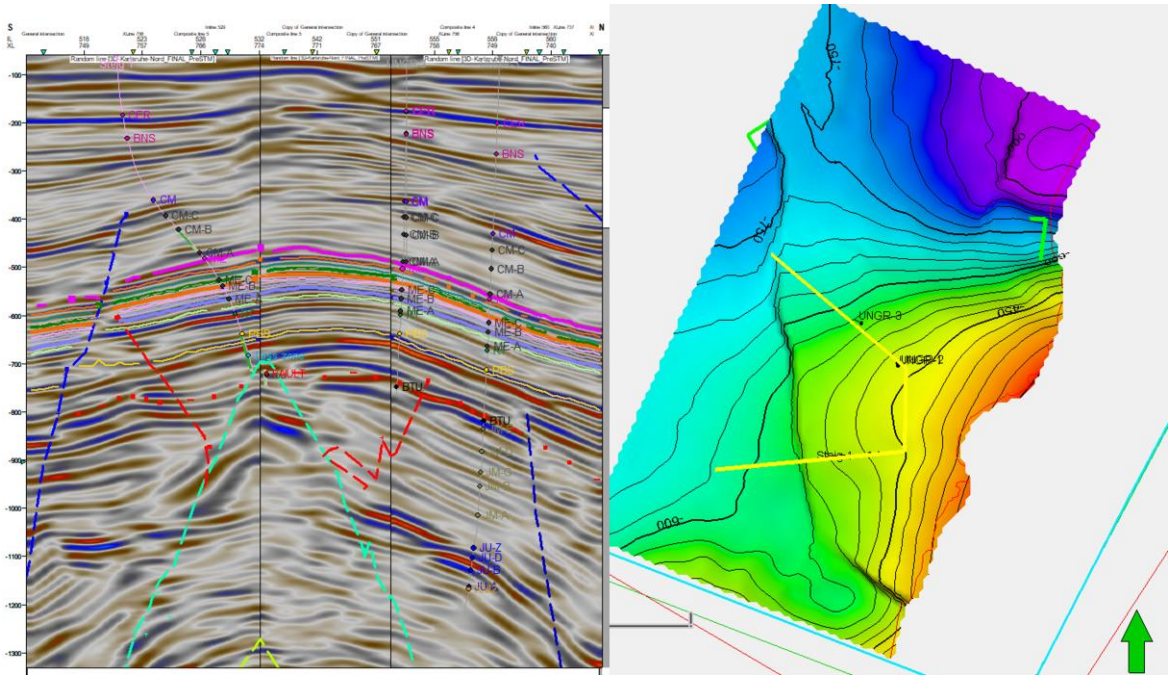


Figure 8-1 Seismic line through the Steig wells and ME-C depth structure map *(Source: SGS)*

Structurally, Steig is a triangular shaped hanging wall fault block, dip-closed to the north and fault bounded to the south and east (Figure 8-4). In general, Meletta beds are considered to be predominantly deep-water deposits. In Steig, they are about 100 m thick and consist of weakly stratified marls with positive SP response and relative high GR values. They show variable resistivity signal, but in clear contrast with underlying Rupelian Clay. Subordinate siltstones and fine-grained sandstones in coarsening-upward trends are present (funnel-shaped SP and GR pattern 10 to 30 meters thick.

Rhein Petroleum's first phase development plan is comprised of the Meletta sands. As part of this phase the PBS and deeper levels will be further appraised. The accumulation is also penetrated by three more wells; Untergrombach-1, 2, and 3, drilled in 1952. Of these, UNGR-2 was drilled to a shallower level and is therefore not relevant for this study. The old UNGR wells had only a very basic set of logs taken, including an SP log. Although well test data were carried out, no oil samples are reported in any of these wells from the Meletta sands, while oil samples were collected from the underlying PBS sands. The UNGR-1 shows some indications of oil being present in the ME-B.

The more recent Steig-1 well, on the other hand, drilled in the south of the structure, penetrating the Meletta at a similar depth and has acquired a more modern suite of wireline logs that clearly show oil saturation in the topmost Meletta C sand level. The presence of moveable oil is confirmed by a well test carried out at the same level. The Steig-1 well penetrated two other, deeper Meletta sands,

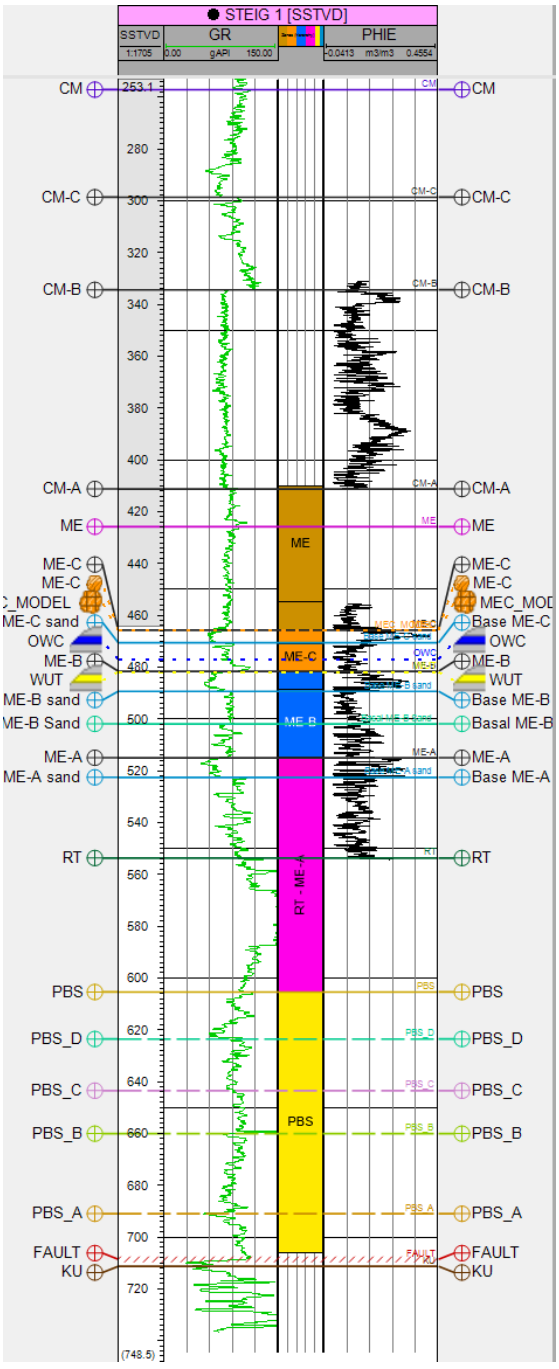


Figure 8-2 Steig-1 well section *(Source: SGS).*

ME-A and ME-B. Both petrophysical interpretation of well logs and well tests carried out at these levels confirm they are both water bearing (i.e. below the ODT in the C sand). However, it should be noted that the Steig-1 well has penetrated the base of the Meletta, with oil presence likely up dip within the ME-B and ME-A. On a geological timescale the inter reservoir sandy shales are not likely to be continuous or competent seals. In addition, all 3 ME sands are oil bearing in the Weingarten field, just 1-2 km South from the Steig field and the regional sedimentological model supports communication between the A, B and C sands. However, because fluid distribution and presence are subject to considerable uncertainty, the low case the A and the B sands have been excluded from the STOIIP and reserves calculation.

The Steig-1 well also tested the PBS and proved moveable hydrocarbons, albeit at low rates (~160stb/d at high drawdowns).

In the same license the Steig Buntsandstein "Deep" prospect is located, see section 9.3

8.2.1 EVALUATION METHODOLOGY

A Petrel project containing wells, 3D seismic and interpretations and surfaces was provided to SGS so that the basis for GRV calculation could be verified.

For the Steig PBS a fully probabilistic volumetric evaluation was carried out.

8.2.2 STOIIP RANGES

The STOIIP range is large considering that the ME-B and ME-A may not hold substantial amounts of producible oil.

Table 8-1 Overview of technical cases evaluated for Steig ME

Case	STOIIP	Np	RF
	MMstb	MMstb	%
Low	3.1	0.5	16%
Best	9.8	1.6	16%
High	13.1	2.2	17%

A deterministic approach was adopted for Steig ME in the calculation of the STOIIP range. Conservatively, in the low case the ME-C is assumed to be oil-bearing. The best case assumes the ME-A, B and C are all charged. The low and best cases in-place volumes are underpinned by static modelling. For the high case a probabilistic P10 value was calculated assuming ME-A, B and C are charged.

Table 8-2 Overview Steig PBS STOIIP range

Steig PBS	P90	P50	P10
	MMstb	MMstb	MMstb
STOIIP	55.0	77.7	104.6

8.2.3 ENGINEERING ASSESSMENT

Reservoir simulation results indicate that the recovery factor of Steig-ME , some 17%, is modest due to the relatively viscous oil tested by the Steig-1 well. The recovery factor ranges for Steig PBS are based on similar fields i.e. from Erfelden PBS in view of Petrophysical properties and from Steig PBS, with respect to the PVT properties. Taking into consideration the above, the following recovery factor ranges have been estimated.

Table 8-3 Steig PBS recovery factor ranges adopted

Steig PBS	P90	P50	P10
	%	%	%
RF	15	20	30

8.2.4 CONTINGENT RESOURCES

Contingent resources are presented below. Since more data acquisition is required to determine the more accurate STOIIP ranges, compartmentalization and well productivity, SGS ascribes a chance of development (COD) risk factor of 50%. SGS subclassifies the potential development as "Development Unclarified."

Table 8-4 Steig ME and Steig PBS contingent resources (100% WI – unrisked)

IN X1000STB	1C	2C	3C
STEIG ME	499	1,627	2,213
STEIG PBS	13,000	17,000	22,000

9 PROSPECTIVITY ASSESSMENT

9.1 OVERVIEW

A number of drill-ready prospects within the Rhein Petroleum asset areas are documented within the materials made available to SGS. Prospect summary sheets and some basic petrophysical and reservoir engineering parameters were provided. Our evaluation of these prospects is therefore limited compared with what was carried out for the other assets documented above and has been confined to three material prospects, Weinheim, Steig Deep and Feldschlag.

SGS risked these prospects based on the materials provided and a probability of geological discovery (PGD) given for each. It must be noted that analogue data is largely unavailable, and so the PGD values may seem somewhat conservative, but in the absence of dry-well data and the relatively immature nature of many of the deeper plays, SGS deem these PGD values to be appropriate.

The Weinheim, Graben, Steig Deep and Feldschlag prospects are considered material enough volumetrically to be considered here.

9.2 TECHNICAL ASSESSMENT – WEINHEIM PROSPECT

9.2.1 OVERVIEW

Weinheim is a medium-risk, high-reward, down-thrown footwall fault block on the east side of the Rhein Graben, bounded to the east by the Graben Bounding Fault (GBF) itself, and dip-closed to the north, south and west (See Figure 8-1). The main targets volumetrically are the lacustrine-fluvial clastics of the Oligocene Bunte Niederoderner Schichten (BNS) reservoir. Other important

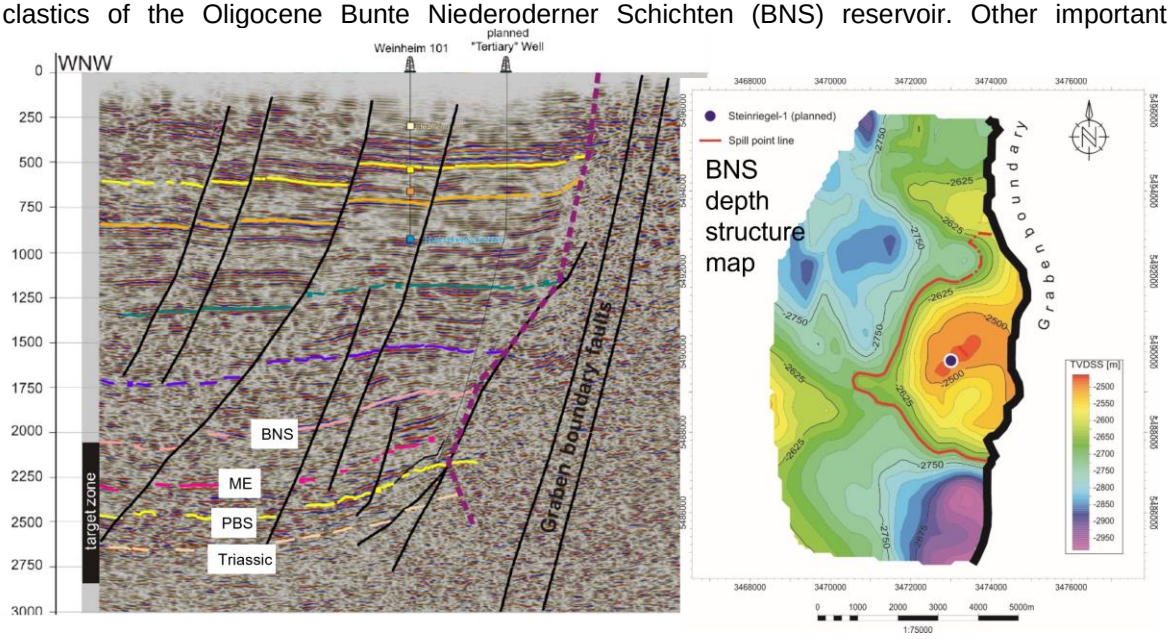


Figure 9-1 Seismic cross-section through the Weinheim Prospect and BNS depth structure map. *Source: Beacon Energy plc*

objectives are the CM, ME, PBS and Triassic Buntsandstein.

9.2.2 EVALUATION METHODOLOGY

Note that this prospect has not been evaluated to the same level as Steig Deep or Graben, since no Petrel project was made available. Accordingly, SGS reviewed and assessed presentation material and assumed the volumetric estimates of the operator are valid. SGS carried out an estimation of probability of geological discovery from the limited data provided.

9.2.3 STOIIP RANGES

Table 9-1 Volumetric ranges for Weinheim . [source: Rhein Petroleum]

IN MMSTB	P90	P50	P10
BNS	59	139	254
CM	33	77	140
ME	51	135	253
PBS	50	114	205
BUNTSANDSTEIN	41	89	164

9.2.4 RECOVERY FACTOR RANGES

A notional RF range was applied considering the field is waterflooded with a Low RF of 15% (i.e. no benefit from water injection), Best RF of 30% and a High RF of 50%

9.2.5 PROBABILITY OF GEOLOGICAL DISCOVERY (POS)

The structure as mapped, with the reservoirs, if present, filled to spill, can potentially contain large volumes for such a small structure. However, there are a number of risks and uncertainties that make this a high-risk-high-reward prospect.

Reservoir: The risk of there being no reservoir at all target levels is almost zero.

Structure: with the limited number of seismic sections available in the provided data pack, it is not possible to verify the structure as presented by Rhein Petroleum. According to the operator, the northern flank of the structure is difficult to map owing to poor seismic definition. In addition, there are a very limited number of seismic well ties available to aid identification of seismic reflectors. Therefore, with the information provided, whilst it is unlikely that no trap exists, SGS considers that a risk of 70% is appropriate.

Top Seal: the integrity of the reservoir-seal pairs is well established at the target level in the URG and so top seal can be considered a low risk. However, the fault sealing potential of the GBF is, as far as SGS is concerned, a potential risk. It is postulated that the footwall consists of crystalline basement adjacent to the reservoirs, but the nature of this lateral seal is not fully known. Therefore, the seal risk is considered to be 60%.

Charge: considering the multiple source rocks, extensive and proximal kitchen area and established migration pathways, this is considered a low risk, at least for the Tertiary reservoirs which is considered to be 100% charged. However, for the Triassic, SGS consider long distance migration from shallower source rocks across faults into the reservoirs to be potentially high risk.

The POS was estimated to be 42% for the Tertiary targets and 15% for the Triassic Buntsandstein target.

9.2.6 PROSPECTIVE RESOURCES

Table 9-2 Weinheim Prospective Resources (100% WI Unrisked)

IN MMSTBSTB	1U	2U	3U
Weinheim - CM+BNS+ME+PBS	92	150	234
Weinheim - Buntsandstein	18	30	45

9.3 TECHNICAL ASSESSMENT – STEIG DEEP

9.3.1 OVERVIEW

Steig Deep prospect lies under the Tertiary assets described in section 5 and is structurally part of the same downthrown fault block. Well UNGR-3 was drilled some time ago and apparently encountered hydrocarbons in the Triassic Malschenberg sandstone but was not tested. Prospectivity exists in the Malschenberg, Schilfsandstein, Lettenkeuper and Buntsandstein of the Triassic.

9.3.2 EVALUATION METHODOLOGY

A Petrel project was provided to SGS within which the basis for GRV estimation could be verified.

9.3.3 INTERPRETATION AND MAPPING

(See also section 8) In SGS' opinion, Rhein Petroleum's geophysical interpretation of the Steig deep prospect has been performed according to industry standards and leads to an acceptable representation of the structure.

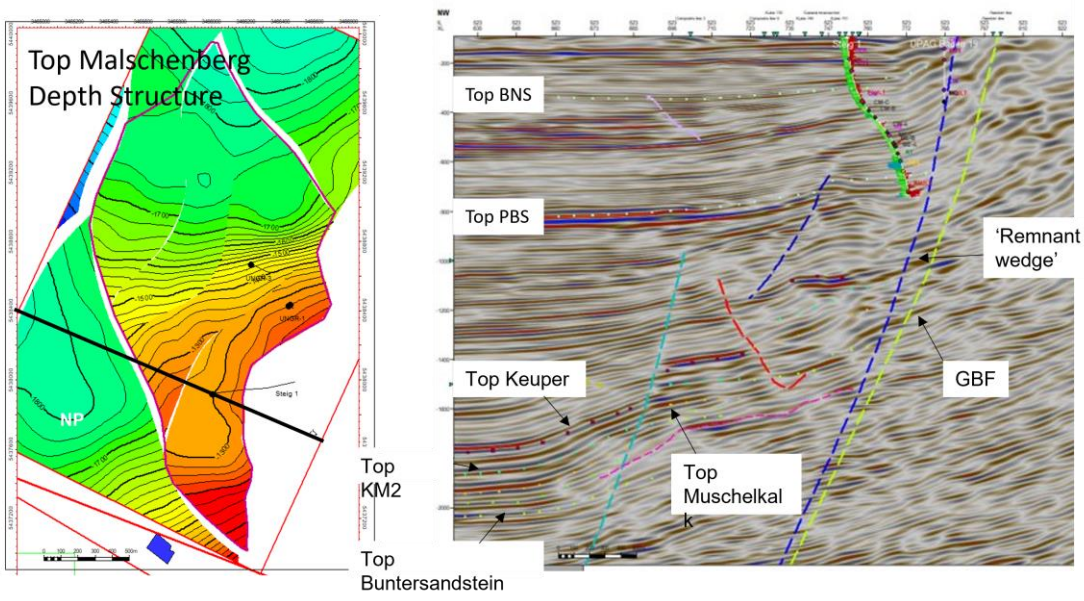


Figure 9-2 Malschenberg top depth map and seismic line through the Steig-1 well. *Source: SGS*

The seismic interpretation review was based on technical presentations provided by Rhein Petroleum as background information, and a Petrel project from 2021 containing reprocessed 3D seismic data set, faults, interpreted horizons, geological well markers, and input for the structural model. A stretch version of the seismic volumes was also provided in depth domain using the velocity model called "Steig Vint model update 28102020".

The main horizons have been interpreted in TWT domain based on the 2020 Pre-STM from the KAN survey reprocessing.

The seismic quality is impacted by being at the edge of the seismic survey and the significant faulting in the overburden. However, the Pre-STM reprocessed in 2020 shows good reflectivity at Meletta level and reasonable for deeper reflectors.

The Base Tertiary Unconformity doesn't correspond to a distinct reflector and is therefore sometimes challenging to interpret. In some areas, alternative interpretations can be considered, especially near the graben boundary fault. The impact on this is in the final depth conversion.

9.3.4 STOIIP RANGES

Table 9-3 Volumetric range for Steig Deep, Buntsandstein reservoir

IN MMSTB	P90	P50	P10
BUNTSANDSTEIN	15	56	82

9.3.5 RECOVERY FACTOR RANGES

A notional recovery factor (RF) range was applied considering the field is waterflooded with a Low RF of 15% (i.e. no benefit from water injection), Best RF of 30% and a High RF of 50%

9.3.6 PROBABILITY OF GEOLOGICAL DISCOVERY (POS)

A chance of geological discovery of 30% has been ascribed to the prospect.

9.3.7 PROSPECTIVE RESOURCES

Table 9-4 Steig Deep, Buntsandstein reservoir Prospective Resources (100% WI Unrisked)

IN X1000STB	1U	2U	3U
Steig Deep - Buntsandstein	9,000	16,000	24,000

9.4 TECHNICAL ASSESSMENT – FELDSCHLAG

Located near the Huttenheim, Graben and Leopoldshafen oil fields, Feldschlag is an elongated, east-dipping two-way dip closed footwall structure, bounded to the west by a NE-SW normal fault (see Figure 9-3)

9.4.1 OVERVIEW

The primary reservoirs are at BNS, CM and Meletta. Recent 3D seismic has allowed for a robust interpretation of the associated reflectors. The throw on the bounding fault reduces towards the south of the structure and there is a risk that here the lateral seal can lose its integrity through juxtaposition of sands across this fault.

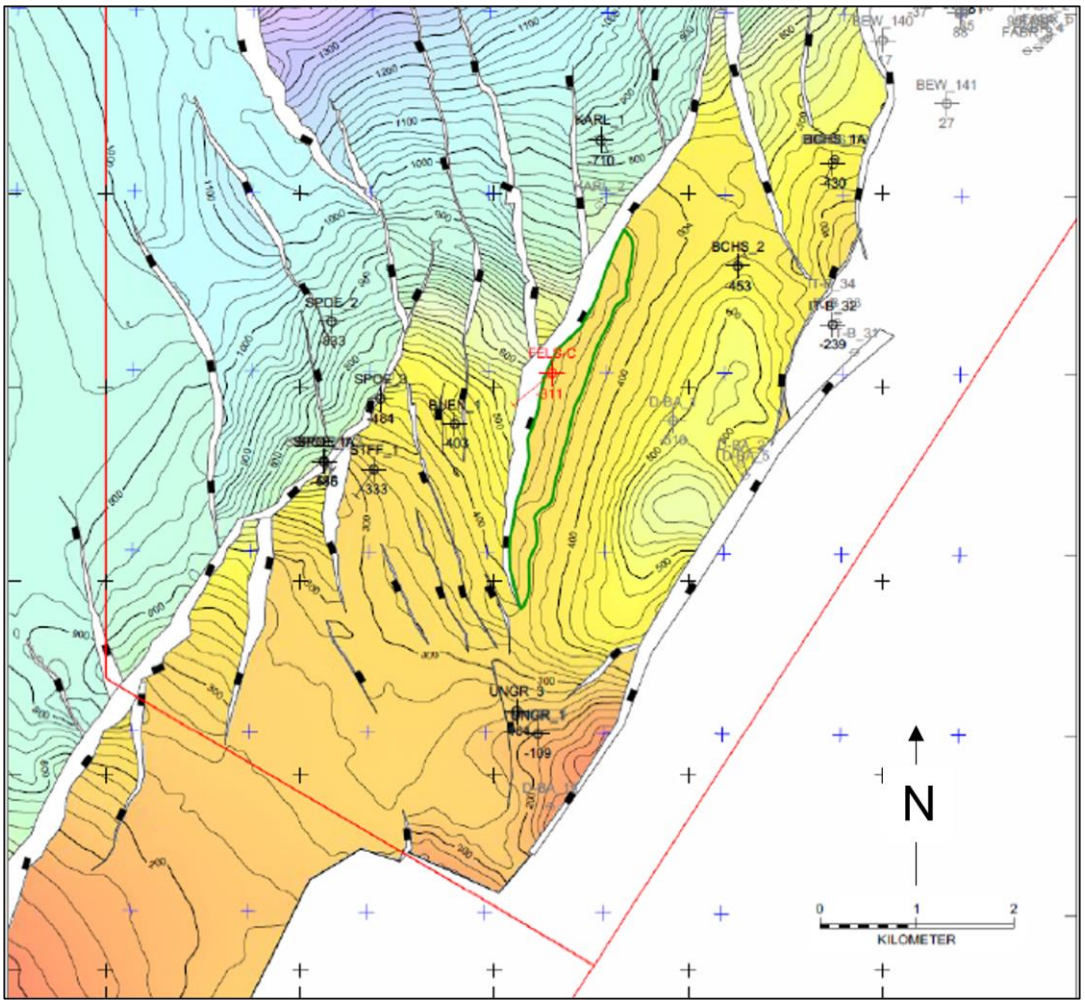


Figure 9-3 Feldschlag prospect Top BNS depth structure. *Source: Beacon Energy plc*

9.4.2 EVALUATION METHODOLOGY

Note that this prospect has not been evaluated to the same level as Steig Deep or Graben, since no Petrel project was made available. Accordingly, SGS reviewed and assessed presentation material and assumed the volumetric estimates of the operator are valid. SGS carried out an estimation of geological risk from the limited data provided.

9.4.3 STOIIP RANGES

Table 9-5 Volumetric ranges for Feldschlag [Source Rhein Petroleum].

IN MMSTB	P90	P50	P10
BNS	2.4	4.6	8.8
CM	1.3	2.7	5.1
ME	1.6	3.1	6.0

9.4.4 RECOVERY FACTOR RANGES

A notional recovery factor (RF) range was applied considering the field is waterflooded with a Low RF of 15% (i.e. no benefit from water injection), Best RF of 30% and a High RF of 50%

9.4.5 PROBABILITY OF GEOLOGICAL DISCOVERY (POS)

SGS consider reservoir, top seal and charge to be low risk, whereas lateral seal is potentially a problem in the south of the structure. Overall POS assigned to Feldschlag – BNS and Feldschlag – CM of 40% and a POS of 20% for the deeper Feldschlag – ME.

9.4.6 PROSPECTIVE RESOURCES

Table 9-6 Prospective Resources range for Feldschlag (100% WI Unrisked)

IN X1000STB	1U	2U	3U
Feldschlag - BNS	996	1,585	2,417
Feldschlag - CM	568	888	1,433
Feldschlag - ME	675	1,094	1,690

10 OPERATIONAL AND CAPITAL EXPENDITURES

10.1 SURFACE FACILITY DESIGN

The Erfelden field will be redeveloped by drilling 3 new wells: 2 production wells and one injection well, and the conversion of the existing Schwarzbach 1a producer well to a water source well. The existing Schwarzbach production location will be modified to accommodate the new wells and the required water treatment.

Produced oil is degassed and dewatered, and subsequently trucked to a nearby refinery. Produced water is treated and injected.

10.2 CAPEX

An estimate of the various CAPEX elements was provided by Rhein Petroleum. The CAPEX estimates are summarised in Table 10-1. SGS has reviewed the cost estimate and found them to be reasonably well underpinned by evidence. Drilling costs were backed by itemized cost estimates. The total drilling CAPEX amounts to over 80% of the total CAPEX estimate. Facilities cost estimates provided a less detailed breakdown, but the overall involved CAPEX was fairly limited and in line with the simple design of the existing facilities. The assumptions underpinning the OPEX estimates could not be verified, but the calculated OPEX was found to be in line with historical OPEX data. To reflect current market conditions, a 10% inflation factor was applied to the calculated OPEX estimates. Since the drilling costs are the most significant contributor to the overall CAPEX, the total CAPEX as provided by Rhein Petroleum have been adopted as given.

For Erfelden, a drilling CAPEX of 13.0 mln€ was presented for the three wells, and a facilities CAPEX of 2.7 mln€ for preparation of the wellsite, construction of flowlines for the three new wells and from the water source well to the injection well, including filters and pumps (forward looking).

The breakdown of the development CAPEX for both fields is presented in Table 10-1:

Table 10-1 Capital Cost (CAPEX) breakdown (Real Terms 2022) in mln€.

Cost Item	Erfelden
Drilling cost	**13.0**
No. of Producer well / Injection wells/water supply well	(2/1)
Facilities cost	**2.7**
Total CAPEX	**15.7**

10.3 OPEX

The OPEX estimate for the two fields is based on a number of fixed and variable cost elements, for which the underlying assumptions are briefly discussed in the following paragraphs.

For Erfelden, the fixed OPEX is estimated at 0.56 mln€/a, including G&A cost allocation. Variable OPEX is calculated on the basis of cost factors for oil trucking and lifting (2.15 €/bbl), produced water treatment and lifting (0.72 €/bbl), and water sourcing and injection (0.72 €/bbl).

Well workover costs for ESP replacements have been separately calculated, based on an assumed ESP replacement of once every three years for each production and for the water supply well, with estimated cost for ESP replacement of 0.273 mln€ for a producer well and 0.153 mln€ for the water source well.

Table 10-2 Operational Cost (OPEX) breakdown (Real Terms 2022), in mln€/a

Cost Item	Erfelden
Annual fixed OPEX	**0.56**
Annual variable OPEX (well W/O)	**0.23**
Annual variable OPEX Liquids (2025)	**0.68**

10.4 ABEX

In accordance with previously assumed abandonment costs, the abandonment costs (ABEX) have been estimated at 0.5 mln€ + 10% of the facilities CAPEX.

Abandonment costs for wells are assumed to follow the same formula and are included in the ABEX estimate. Thus calculated ABEX for the field are presented in Table 10-3.

Table 10-3 Abandonment Cost (ABEX) breakdown (Real Terms 2022) in mln€

Cost Item	Erfelden
Abandonment Cost*	**3.1**

[*] *ABEX including assumed notional 10 mln€ existing facilities, based on engineering judgment by SGS*

11 ECONOMICS

11.1 INTRODUCTION

SGS has determined the economics of the Lauben field and the Erfelden project developments.

SGS has re-used an economic model that was applied for a reserves assessment YE21 to determine the Reserves for Rhein Petroleum. The model is a 'portfolio' model, whereby the economics for various scenarios can be executed to ultimately determine the economics of the combined portfolio.

The economic model has been reviewed and Inputs have been updated with latest available information. In the model a so-called 'earn out' royalty was added, which is a 10% of gross production (less any state royalties paid) payable to the Seller. The Earn Out royalty will accrue from 1.1.23 until 31.3.2025 and then be paid on 30.6.2025. Earn Out during the quarter ending 30.6.25 will be paid on 30.9.25. Thereafter, the Earn Out will be paid one quarter in arrears.

In the course of our review, SGS has executed the following scenarios:

- Lauben Technical Low + Erfelden Technical Low
- Lauben Technical Best + Erfelden Technical Best
- Lauben Technical High + Erfelden Technical High

The table below reflects the key economic results of the scenarios pertaining to Lauben and Erfelden.

Table 11-1 Economics & Reserves overview

Base scenario (incl. €34.5 TLCF)	(Economic) Production mmbbl	Cumulative Cash € mln	NPV @10% € mln	Break-even Month	CoP Month
Erfelden Low	0.000	N/A	N/A	N/A	N/A
Erfelden Best	3.847	€ 95.0	€ 52.8	Sep-23	Sep-44
Erfelden High	5.824	€ 160.1	€ 105.3	Jun-23	Dec-45

SGS has determined that the Erfelden Best-scenario is economic and can therefore be deemed 'Reserves' according to PRMS guidelines. The table below represents the cumulative volumes from 1/1/2023 onwards that can be economically produced until the Economic Limit, e.g. until the point that the lifecycle cumulative free after tax cashflow has reached its maximum, which in the Base-case is September 2044.

Table 11-2 Erfelden and Lauben Summary of Best and High reserves

Field		Best Reserves	High Reserves
Erfelden	mmbbl	3.784	5.754
Lauben	mmbbl	0.063	0.071
Grandtotal	**mmbbl**	**3.847**	**5.824**

In sections 16 and 17, the detailed cashflow-calculations have been included, whereby value marked in Red font are not part of the economic cashflow.

Table 11-3 Erfelden Best Summary of annual profiles

Year	Production	Revenues	Opex	Capex	Abex	Tax & Royalties	Earn Out Royalty	Economic Free Cashflow
	(mln bbbl)	(€ mln)	(€ mln)	(€ mln)	(€ mln)	(€ mln)	(€ mln)	(€ mln)
2023	0.19	€ 15.6	-€ 2.5	-€ 9.5	€ 0.0	-€ 2.8	€ 0.0	€ 0.8
2024	0.32	€ 24.9	-€ 2.9	-€ 5.8	€ 0.0	-€ 4.5	€ 0.0	€ 11.7
2025	0.28	€ 20.2	-€ 2.6	-€ 0.4	€ 0.0	-€ 3.5	-€ 5.0	€ 8.7
2026	0.25	€ 18.0	-€ 2.4	€ 0.0	€ 0.0	-€ 3.3	-€ 1.7	€ 10.5
2027	0.24	€ 16.2	-€ 2.4	€ 0.0	€ 0.0	-€ 4.7	-€ 1.5	€ 7.6
2028	0.22	€ 14.9	-€ 2.4	€ 0.0	€ 0.0	-€ 4.4	-€ 1.4	€ 6.7
2029	0.21	€ 12.9	-€ 2.4	€ 0.0	€ 0.0	-€ 3.6	-€ 1.2	€ 5.6
2030	0.21	€ 11.3	-€ 2.5	€ 0.0	€ 0.0	-€ 3.1	-€ 1.0	€ 4.7
2031	0.20	€ 11.3	-€ 2.5	€ 0.0	€ 0.0	-€ 3.1	-€ 1.0	€ 4.7
2032	0.20	€ 11.5	-€ 2.6	€ 0.0	€ 0.0	-€ 3.1	-€ 1.0	€ 4.8
2033	0.20	€ 11.6	-€ 2.6	€ 0.0	€ 0.0	-€ 3.2	-€ 1.0	€ 4.8
2034	0.19	€ 11.5	-€ 2.7	€ 0.0	€ 0.0	-€ 3.1	-€ 1.0	€ 4.7
2035	0.18	€ 10.9	-€ 2.7	€ 0.0	€ 0.0	-€ 2.9	-€ 1.0	€ 4.3
2036	0.17	€ 10.3	-€ 2.7	€ 0.0	€ 0.0	-€ 2.7	-€ 0.9	€ 4.0
2037	0.16	€ 9.8	-€ 2.7	€ 0.0	€ 0.0	-€ 2.6	-€ 0.9	€ 3.7
2038	0.14	€ 9.3	-€ 2.7	€ 0.0	€ 0.0	-€ 2.4	-€ 0.9	€ 3.3
2039	0.13	€ 8.4	-€ 2.7	€ 0.0	€ 0.0	-€ 2.1	-€ 0.8	€ 2.8
2040	0.11	€ 7.2	-€ 2.7	€ 0.0	€ 0.0	-€ 1.7	-€ 0.7	€ 2.1
2041	0.09	€ 5.9	-€ 2.7	€ 0.0	€ 0.0	-€ 1.2	-€ 0.6	€ 1.4
2042	0.07	€ 4.8	-€ 2.6	€ 0.0	-€ 0.3	-€ 0.9	-€ 0.5	€ 0.6
2043	0.06	€ 4.1	-€ 2.7	€ 0.0	€ 0.0	-€ 0.6	-€ 0.4	€ 0.4
2044	0.05	€ 3.5	-€ 2.7	€ 0.0	€ 0.0	-€ 0.4	-€ 0.3	€ 0.0
2045	0.04	€ 3.1	-€ 2.7	€ 0.0	-€ 2.8	-€ 0.3	-€ 0.3	-€ 2.9
Economic Life	**3.847**	**€ 253.3**	**-€ 57.3**	**-€ 15.7**	**-€ 3.1**	**-€ 59.7**	**-€ 22.8**	**€ 95.0**

Table 11-4 Erfelden High Summary of annual profiles

Year	Production (mln bbbl)	Revenues (€ mln)	Opex (€ mln)	Capex (€ mln)	Abex (€ mln)	Tax & Royalties (€ mln)	Earn Out Royalty (€ mln)	Economic Free Cashflow (€ mln)
2023	0.54	€ 44.9	-€ 3.3	-€ 9.5	€ 0.0	-€ 8.7	€ 0.0	€ 23.4
2024	0.53	€ 40.6	-€ 3.3	-€ 5.8	€ 0.0	-€ 9.8	€ 0.0	€ 21.7
2025	0.47	€ 34.6	-€ 3.4	-€ 0.4	€ 0.0	-€ 11.1	-€ 10.0	€ 9.7
2026	0.51	€ 35.7	-€ 3.4	€ 0.0	€ 0.0	-€ 11.6	-€ 3.2	€ 17.5
2027	0.54	€ 37.2	-€ 3.5	€ 0.0	€ 0.0	-€ 12.0	-€ 3.3	€ 18.3
2028	0.55	€ 37.3	-€ 3.5	€ 0.0	€ 0.0	-€ 12.1	-€ 3.4	€ 18.3
2029	0.43	€ 26.1	-€ 3.3	€ 0.0	€ 0.0	-€ 8.1	-€ 2.7	€ 12.0
2030	0.27	€ 15.1	-€ 3.0	€ 0.0	€ 0.0	-€ 4.4	-€ 1.5	€ 6.2
2031	0.21	€ 11.8	-€ 2.9	€ 0.0	€ 0.0	-€ 3.2	-€ 1.1	€ 4.6
2032	0.19	€ 10.6	-€ 2.9	€ 0.0	€ 0.0	-€ 2.8	-€ 1.0	€ 3.9
2033	0.17	€ 10.0	-€ 3.0	€ 0.0	€ 0.0	-€ 2.6	-€ 0.9	€ 3.5
2034	0.16	€ 9.7	-€ 3.0	€ 0.0	€ 0.0	-€ 2.5	-€ 0.9	€ 3.3
2035	0.16	€ 9.6	-€ 3.1	€ 0.0	€ 0.0	-€ 2.4	-€ 0.9	€ 3.2
2036	0.15	€ 9.5	-€ 3.1	€ 0.0	€ 0.0	-€ 2.4	-€ 0.9	€ 3.1
2037	0.15	€ 9.3	-€ 3.2	€ 0.0	€ 0.0	-€ 2.3	-€ 0.8	€ 3.0
2038	0.14	€ 8.9	-€ 3.2	€ 0.0	€ 0.0	-€ 2.2	-€ 0.8	€ 2.7
2039	0.13	€ 8.3	-€ 3.3	€ 0.0	€ 0.0	-€ 2.0	-€ 0.8	€ 2.4
2040	0.11	€ 7.6	-€ 3.3	€ 0.0	€ 0.0	-€ 1.7	-€ 0.7	€ 1.9
2041	0.10	€ 6.8	-€ 3.3	€ 0.0	€ 0.0	-€ 1.4	-€ 0.6	€ 1.5
2042	0.09	€ 6.1	-€ 3.2	€ 0.0	-€ 0.3	-€ 1.2	-€ 0.6	€ 0.9
2043	0.08	€ 5.7	-€ 3.3	€ 0.0	€ 0.0	-€ 1.0	-€ 0.5	€ 0.9
2044	0.07	€ 5.4	-€ 3.3	€ 0.0	€ 0.0	-€ 0.9	-€ 0.5	€ 0.6
2045	0.07	€ 5.1	-€ 3.4	€ 0.0	€ 0.0	-€ 0.8	-€ 0.5	€ 0.4
2046	0.01	€ 0.4	-€ 1.5	€ 0.0	-€ 2.8	€ 0.0	-€ 0.1	-€ 2.9
Economic Life	**5.824**	**€ 395.9**	**-€ 74.6**	**-€ 15.7**	**-€ 3.1**	**-€ 107.1**	**-€ 35.6**	**€ 160.1**

11.1 Corporate Income Tax and Royalties

In Germany, the independent 'Bundesländer' have their own regime for Royalties. Municipalities have their own Trade Tax. On top of the State-taxation, there's a Federal Income Tax. The tax-assumptions for the various fields have been reflected in the table below.

Based on advice from the Client and their Tax-advisor, Grant Thornton AG, the base case assumption is that there is a 50% chance that the total Tax Loss Carry Forward (TLCF) for Rhein Petroleum per 30/09/2022 (€69 mln) may be used to offset against future taxable income. For valuation-purposes, a risked value of €34.5mln has been included as Opening Balance for TLCF per 1/1/2023. The Maximum Direct Loss Deductible per annum is € 1mln. On top of that, a maximum of 60% of any remaining Taxable Income after subtracting the €1 mln direct loss deduction can be offset against carried forward Tax-losses. Royalty Rates are dependent on the relevant rate applied by the specific Federal State.

Annual depreciation for Tax-purposes is computed based on the methodology of Unit of Production.

Table 11-5 German fiscal regime

Bundesland	Royalty Rate	Field	Trade Tax
Hesse	10%	Erfelden	13.91%
Baden-Wuerttemberg	15%	Steig	12.60%
Bavaria	0%	Lauben	10.90%

The Federal Corporate Income Tax (CIT) rate is 15% and an additional 0.825% (=5.5% of German CIT-rate) Solidarity Tax, which is confirmed by the Due Diligence report from the Tax advisor of the Client (Grant Thornton AG) and is also consistent with Tax Summaries-information as published by PWC (https://taxsummaries.pwc.com/germany). Trade Tax has is imposed by Local Cities/Municipalities and for Erfelden as a base-rate of 3.5% multiplied with a factor per City/Municipality. The assumption of 13.91% for Erfelden is in line with the advice from the Tax advisor of the Client and appears to be reasonable when reviewing the local website of the nearest Municipality (https://www.mabya.de/rechner/gewerbesteuer-riedstadt-buechnerstadt).

The Royalty Rate of 10% for Erfelden and 0% for Lauben was advised by the Client and has been assumed in the economic valuation.

11.1 Oil Price and Foreign Exchange Rate

For the Oil-price assumption, SGS has included the Intercontinental Exchange (ICE) End-of-Day Brent Crude Futures curve of 14/11/2022 for the period up till and including March 2029 (see below).

https://www.theice.com.

For the period thereafter SGS assumed the Rystad Forecast (published on 9/9/2022) of 2030 adjusted for an annual inflation of 2% as provided by the Client.

For the Foreign Exchange Rate to convert USD to EUR a rate of 1.04 USD/EUR has been used, as published by the European Central Bank at 16/11/2022.(https://www.ecb.europa.eu/).

A discount of $3 / bbl has been assumed for the actual Sales price of crude from Erfelden to the refinery, based on current discount for crude sales of the Lauben field.

The graph below reflects the net Oil price assumption for Rhein Petroleum.

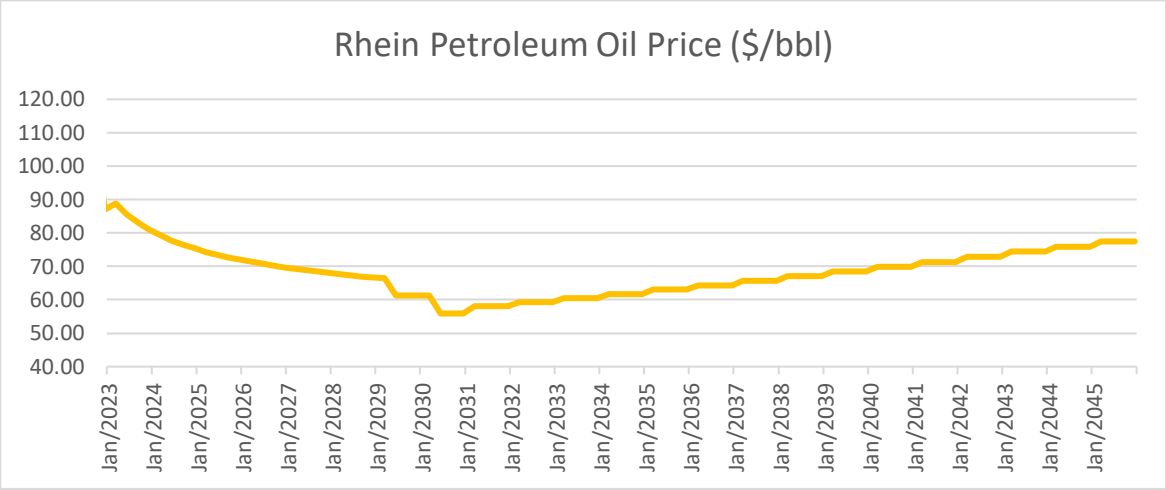


Figure 11-1 SGS adopted oil price forecast (including USD 3 quality discount)

11.2 Economics

Technical production profiles have been established by SGS which have been used as input to run final economics. In the section 16 and 17 detailed profiles can be found, split by field and by Quarter.

SGS has established that for the Erfelden Best scenario the cumulative cashflow and the Net Present Value at a discount rate of 10% (NPV10) is positive.

The charts below reflect the Quarterly Cashflows for the Erfelden Best Base Case scenario.

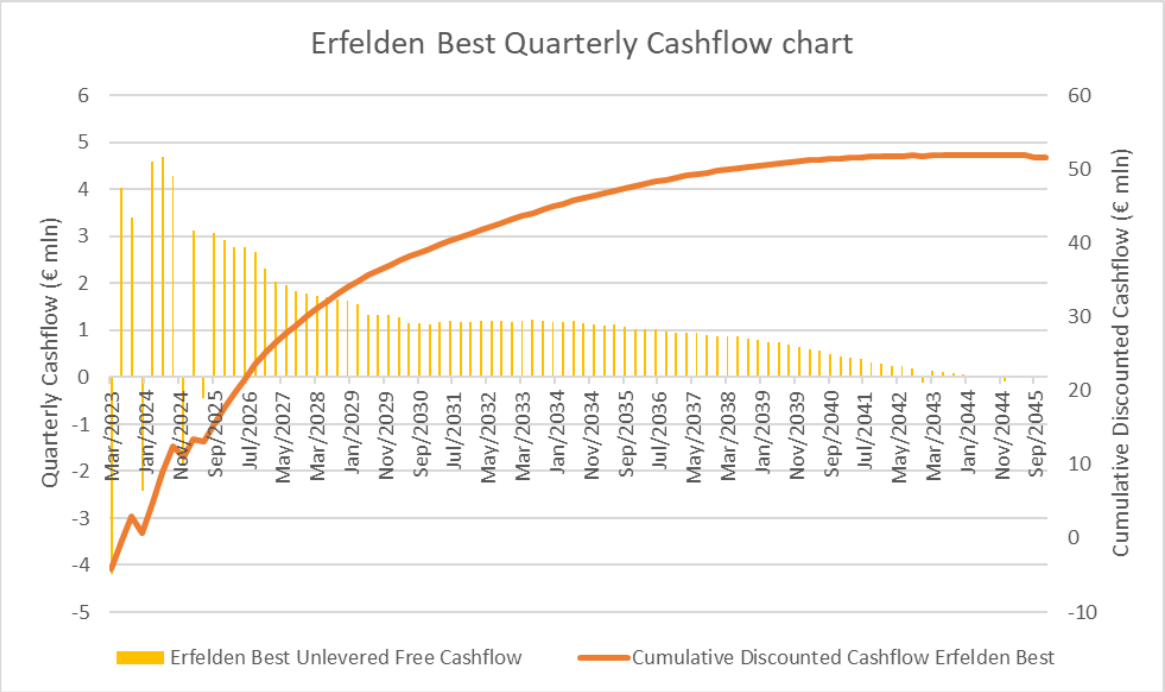


Figure 11-2 Erfelden cashflows and cumulative discounted cashflows

11.3 FURTHER ABANDONMENT LIABILITIES

The Rhein Petroleum portfolio includes wells at Bedernau Stockstadt and Allmend which are scheduled to be decommissioned within 12 months of closing at an estimated cost to Rhein Petroleum of 1.385 mln €.

11.1 SENSITIVITIES

Sensitivities on the NPV10 have been compiled on the scenario ‘Lauben Best + Erfelden Best’ and the results have been plotted in the graph below.

The Base NPV10 is 52.8 mln €.

Key sensitivities are those on the Oil Volumes, the Oil Price and the Tax Loss Carry Forward, whereas the economics are not very sensitive to changes in Opex and/or Capex.

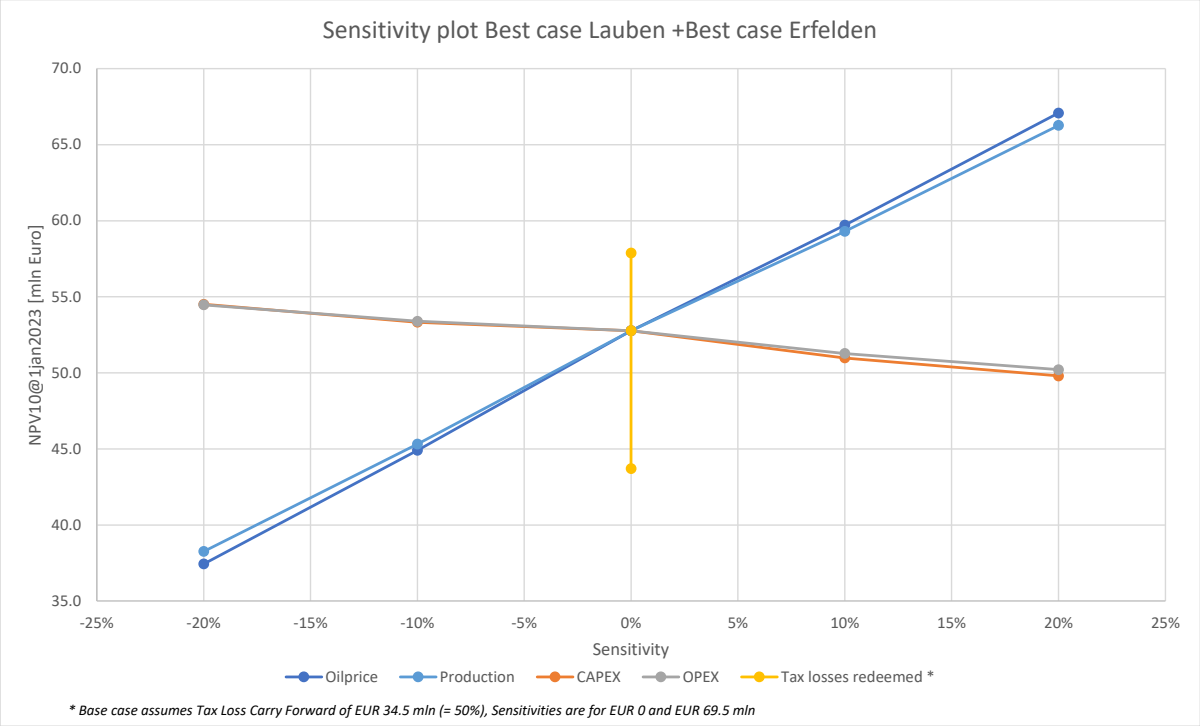


Figure 11-3 Spider-plot economic sensitivities

12 AVAILABLE DATA

An extensive data package was available, as provided by Rhein Petroleum, including amongst others:

1. Introductory slide-packs on board approved field development plans
2. A Petrel project entitled “2021_Stockstadt_Erfelden_Phase1and2” was used for the evaluations.
3. A Petrel project entitled “2021_r5_Steig_Development_Phase1” was made available for the evaluations. (static and dynamic)
4. Seismic cubes in ZGY format
5. Material balance model for Erfelden
6. Steig well-test information
7. Petrophysical information for relevant wells, including IP projects
8. Analogue data from several nearby fields close to Erfelden and Steig
9. Facilities information on Erfelden, Lauben and Steig
10. Costing information on Erfelden development
11. Economic portfolio model Erfelden, Lauben and Steig
12. Fiscal terms applicable to Erfelden, Lauben and Steig
13. Other non-technical data related to permitting and license aspects, e.g., the HBP application for Steig
14. Wintershall report on the Weingarten development from the 90s.
15. Prospect summary slide-packs
16. Graben field Petrel model
17. Outline of earn-out terms and conditions
18. FDPs for Erfelden and Steig-ME
19. Xodus site visit report.

13 UNITS & GLOSSARY

List of key abbreviations and units used in this assessment.

ABEX	abandonment costs
bbl	barrel
BHP	bottom hole pressure
BOPD	barrels of oil per day
BOEPD	barrels of oil equivalent per day
CAPEX	capital expenditure
CH	hydrocarbon column height
CoP	cessation of production
DST	drill stem test (i.e. production test)
EoL	expiration of licence
FDP	Field Development Plan
FEED	front end engineering design
FTHP	flowing tubing head pressure
FWL	free water level
ODT	oil down to
OWC	Oil Water Contact
GRV	gross rock volume
IRR	internal rate of return
k	thousand (10^3) (metric system)
Km	kilometres
M	million (10^6) (metric system)
MBAL	Material Balance
ME	Meletta-Schichten
m^3	cubic meter
mln	million (metric system)
MM	million
NN	Normal Null
NPV	Net Present Value
NTG	net to gross
OCM	operating committee meeting
OPEX	operating expenditure
PBS	Pechelbronner-Schichten
Phi	porosity
PLA	production licence application
PLT	production logging tool
PRMS	Petroleum Resources Management System
PTA	pressure transient analysis
rm^3	reservoir cubic meter
RF	recovery factor
RP	Rhein Petroleum GmbH
RT	real terms
SGS	Societe Generale de Surveillance
SPA	sales and purchase agreement
ss	subsea

stb		stock tank barrel (at standard conditions)
STOIIP		Stock tank oil initially in place
Sw		water saturation
TCM		technical committee meeting
THP		tubing head pressure
TVDss	/ tvdss	true vertical depth subsea
TWT		two-way time (seismic)
UR		ultimate recovery
URF		ultimate recovery factor
URG		Upper Rhein Graben
WI		working interest
WUT		water up to

Standard Conditions are defined at:
pressure=1.01325 bara & temperature= 15˚C

Oil conversion factor:

1 sm^3 = 6.2893 bbl

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15 RESERVES AND RESOURCES OVERVIEW

Overview of reserves, Contingent Resources and Prospective resources

License	Reserves	Gross			Net attributable			Operator
	All figures in 1000bbls	1P	2P	3P	1P	2P	3P	
Lauben	Lauben	-	126	144	-	63	72	ONEO
Schwarchbach	Erfelden STK-Mitte and SWB-Mai	-	3,784	5,754	-	3,784	5,754	Rhein Petroleum
	Total reserves	-	3,910	5,898	-	3,847	5,826	

License	Contingent resources	Gross			Net attributable			chance of development	Operator
	All figures in 1000bbls	1C	2C	3C	1C	2C	3C		
Schwarchbach	Schwarzbach South	1,669	2,417	3,315	1,669	2,417	3,315	50%	Rhein Petroleum
Karlsruhe-Leopoldhaven	Graben - East Block CM+CMD	2,000	3,200	4,800	1,200	1,920	2,880	70%	Rhein Petroleum
Graben-Neudorf	Steig ME	499	1,627	2,213	499	1,627	2,213	50%	Rhein Petroleum
	Steig PBS	13,000	17,000	22,000	13,000	17,000	22,000	50%	Rhein Petroleum
	Total CR	17,168	24,244	32,328	16,368	22,964	30,408		

License	Prospective Resources	Gross			Net attributable			Probability of geological discovery	Operator
	All figures in 1000bbls	1U	2U	3U	1U	2U	3U		
Karlsruhe-Leopoldhaven	Graben - West Block CM+CMD	2,600	4,100	5,900	1,560	2,460	3,540	50%	Rhein Petroleum
	Graben - West Block - ME C	730	1,100	1,600	438	660	960	40%	Rhein Petroleum
	Graben - West Block - ME B	150	500	1,100	90	300	660	40%	Rhein Petroleum
	Graben Total	3,480	5,700	8,600	2,088	3,420	5,160		
Graben-Neudorf	Steig Deep - Buntsandstein	9,000	16,000	24,000	9,000	16,000	24,000	30%	Rhein Petroleum
Weschnitz	Weinheim - CM+BNS+ME+PBS	92,000	150,000	234,000	92,000	150,000	234,000	42%	Rhein Petroleum
	Weinheim - Buntsandstein	18,000	30,000	45,000	18,000	30,000	45,000	15%	Rhein Petroleum
	Weinheim - Total	110,000	180,000	279,000	110,000	180,000	279,000		
Nordlicher Oberrhein	Hamm - PBS	918	1,435	2,081	918	1,435	2,081	45%	Rhein Petroleum
	Hamm - Buntsandstein	1,480	2,367	3,484	1,480	2,367	3,484	15%	Rhein Petroleum
	Hamm - Total	2,398	3,802	5,565	2,398	3,802	5,565		
	Feldschlag - BNS	996	1,585	2,417	996	1,585	2,417	40%	Rhein Petroleum
	Feldschlag - CM	568	888	1,433	568	888	1,433	40%	Rhein Petroleum
	Feldschlag - ME	675	1,094	1,690	675	1,094	1,690	20%	Rhein Petroleum
	Feldschlag-Total	2,239	3,567	5,540	2,239	3,567	5,540		
	Dungau	344	552	848	344	552	848	50%	Rhein Petroleum
	Gross Rohrheim - Rotliegend	294	490	811	294	490	811	40%	Rhein Petroleum
	Total PR	127,755	210,111	324,364	126,363	207,831	320,924		

16 ERFELDEN BEST COST AND SALES PROFILES (RHEIN PETROLEUM WI)

Year	Production	Revenues	Opex	Capex	Abex	Tax & Royalties	Earn Out Royalty	Economic Free Cashflow
	(mln bbbl)	(€ mln)	(€ mln)	(€ mln)	(€ mln)	(€ mln)	(€ mln)	(€ mln)
Mar-23	0.00	€ 0.3	-€ 0.5	-€ 3.9	€ 0.0	€ 0.0	€ 0.0	-€ 4.2
Jun-23	0.07	€ 5.7	-€ 0.7	€ 0.0	€ 0.0	-€ 1.0	€ 0.0	€ 4.0
Sep-23	0.06	€ 5.0	-€ 0.7	€ 0.0	€ 0.0	-€ 0.9	€ 0.0	€ 3.4
Dec-23	0.06	€ 4.6	-€ 0.6	-€ 5.6	€ 0.0	-€ 0.8	€ 0.0	-€ 2.4
Mar-24	0.08	€ 6.5	-€ 0.7	€ 0.0	€ 0.0	-€ 1.2	€ 0.0	€ 4.6
Jun-24	0.09	€ 6.6	-€ 0.7	€ 0.0	€ 0.0	-€ 1.2	€ 0.0	€ 4.7
Sep-24	0.08	€ 6.1	-€ 0.7	€ 0.0	€ 0.0	-€ 1.1	€ 0.0	€ 4.3
Dec-24	0.07	€ 5.6	-€ 0.7	-€ 5.8	€ 0.0	-€ 1.0	€ 0.0	-€ 1.9
Mar-25	0.07	€ 5.2	-€ 0.8	-€ 0.4	€ 0.0	-€ 0.9	€ 0.0	€ 3.1
Jun-25	0.07	€ 5.2	-€ 0.6	€ 0.0	€ 0.0	-€ 0.9	-€ 4.1	-€ 0.5
Sep-25	0.07	€ 5.0	-€ 0.6	€ 0.0	€ 0.0	-€ 0.9	-€ 0.5	€ 3.1
Dec-25	0.07	€ 4.8	-€ 0.6	€ 0.0	€ 0.0	-€ 0.8	-€ 0.5	€ 2.9
Mar-26	0.06	€ 4.6	-€ 0.6	€ 0.0	€ 0.0	-€ 0.8	-€ 0.4	€ 2.8
Jun-26	0.06	€ 4.6	-€ 0.6	€ 0.0	€ 0.0	-€ 0.8	-€ 0.4	€ 2.8
Sep-26	0.06	€ 4.5	-€ 0.6	€ 0.0	€ 0.0	-€ 0.8	-€ 0.4	€ 2.7
Dec-26	0.06	€ 4.3	-€ 0.6	€ 0.0	€ 0.0	-€ 1.0	-€ 0.4	€ 2.3
Mar-27	0.06	€ 4.1	-€ 0.6	€ 0.0	€ 0.0	-€ 1.1	-€ 0.4	€ 2.0
Jun-27	0.06	€ 4.1	-€ 0.6	€ 0.0	€ 0.0	-€ 1.2	-€ 0.4	€ 1.9
Sep-27	0.06	€ 4.0	-€ 0.6	€ 0.0	€ 0.0	-€ 1.2	-€ 0.4	€ 1.8
Dec-27	0.06	€ 3.9	-€ 0.6	€ 0.0	€ 0.0	-€ 1.2	-€ 0.4	€ 1.8
Mar-28	0.06	€ 3.8	-€ 0.6	€ 0.0	€ 0.0	-€ 1.1	-€ 0.4	€ 1.7
Jun-28	0.06	€ 3.8	-€ 0.6	€ 0.0	€ 0.0	-€ 1.1	-€ 0.3	€ 1.7
Sep-28	0.06	€ 3.7	-€ 0.6	€ 0.0	€ 0.0	-€ 1.1	-€ 0.3	€ 1.7
Dec-28	0.05	€ 3.6	-€ 0.6	€ 0.0	€ 0.0	-€ 1.1	-€ 0.3	€ 1.6
Mar-29	0.05	€ 3.5	-€ 0.6	€ 0.0	€ 0.0	-€ 1.0	-€ 0.3	€ 1.6
Jun-29	0.05	€ 3.1	-€ 0.6	€ 0.0	€ 0.0	-€ 0.9	-€ 0.3	€ 1.3
Sep-29	0.05	€ 3.1	-€ 0.6	€ 0.0	€ 0.0	-€ 0.9	-€ 0.3	€ 1.3
Dec-29	0.05	€ 3.1	-€ 0.6	€ 0.0	€ 0.0	-€ 0.9	-€ 0.3	€ 1.3
Mar-30	0.05	€ 3.0	-€ 0.6	€ 0.0	€ 0.0	-€ 0.8	-€ 0.3	€ 1.3
Jun-30	0.05	€ 2.8	-€ 0.6	€ 0.0	€ 0.0	-€ 0.8	-€ 0.3	€ 1.1
Sep-30	0.05	€ 2.8	-€ 0.6	€ 0.0	€ 0.0	-€ 0.7	-€ 0.3	€ 1.1
Dec-30	0.05	€ 2.7	-€ 0.6	€ 0.0	€ 0.0	-€ 0.7	-€ 0.3	€ 1.1
Mar-31	0.05	€ 2.8	-€ 0.6	€ 0.0	€ 0.0	-€ 0.8	-€ 0.2	€ 1.2
Jun-31	0.05	€ 2.8	-€ 0.6	€ 0.0	€ 0.0	-€ 0.8	-€ 0.3	€ 1.2
Sep-31	0.05	€ 2.8	-€ 0.6	€ 0.0	€ 0.0	-€ 0.8	-€ 0.3	€ 1.2
Dec-31	0.05	€ 2.8	-€ 0.6	€ 0.0	€ 0.0	-€ 0.8	-€ 0.3	€ 1.2
Mar-32	0.05	€ 2.9	-€ 0.6	€ 0.0	€ 0.0	-€ 0.8	-€ 0.3	€ 1.2
Jun-32	0.05	€ 2.9	-€ 0.6	€ 0.0	€ 0.0	-€ 0.8	-€ 0.3	€ 1.2
Sep-32	0.05	€ 2.9	-€ 0.7	€ 0.0	€ 0.0	-€ 0.8	-€ 0.3	€ 1.2
Dec-32	0.05	€ 2.9	-€ 0.6	€ 0.0	€ 0.0	-€ 0.8	-€ 0.3	€ 1.2
Mar-33	0.05	€ 2.9	-€ 0.6	€ 0.0	€ 0.0	-€ 0.8	-€ 0.3	€ 1.2
Jun-33	0.05	€ 2.9	-€ 0.7	€ 0.0	€ 0.0	-€ 0.8	-€ 0.3	€ 1.2
Sep-33	0.05	€ 2.9	-€ 0.7	€ 0.0	€ 0.0	-€ 0.8	-€ 0.3	€ 1.2
Dec-33	0.05	€ 2.9	-€ 0.6	€ 0.0	€ 0.0	-€ 0.8	-€ 0.3	€ 1.2
Mar-34	0.05	€ 2.9	-€ 0.7	€ 0.0	€ 0.0	-€ 0.8	-€ 0.3	€ 1.2
Jun-34	0.05	€ 2.9	-€ 0.7	€ 0.0	€ 0.0	-€ 0.8	-€ 0.3	€ 1.2
Sep-34	0.05	€ 2.9	-€ 0.7	€ 0.0	€ 0.0	-€ 0.8	-€ 0.3	€ 1.2
Dec-34	0.05	€ 2.8	-€ 0.7	€ 0.0	€ 0.0	-€ 0.8	-€ 0.3	€ 1.1
Mar-35	0.05	€ 2.8	-€ 0.7	€ 0.0	€ 0.0	-€ 0.7	-€ 0.3	€ 1.1
Jun-35	0.05	€ 2.8	-€ 0.7	€ 0.0	€ 0.0	-€ 0.7	-€ 0.2	€ 1.1
Sep-35	0.04	€ 2.7	-€ 0.7	€ 0.0	€ 0.0	-€ 0.7	-€ 0.3	€ 1.1
Dec-35	0.04	€ 2.6	-€ 0.7	€ 0.0	€ 0.0	-€ 0.7	-€ 0.2	€ 1.0
Mar-36	0.04	€ 2.6	-€ 0.7	€ 0.0	€ 0.0	-€ 0.7	-€ 0.2	€ 1.0
Jun-36	0.04	€ 2.6	-€ 0.7	€ 0.0	€ 0.0	-€ 0.7	-€ 0.2	€ 1.0
Sep-36	0.04	€ 2.6	-€ 0.7	€ 0.0	€ 0.0	-€ 0.7	-€ 0.2	€ 1.0
Dec-36	0.04	€ 2.5	-€ 0.7	€ 0.0	€ 0.0	-€ 0.7	-€ 0.2	€ 0.9
Mar-37	0.04	€ 2.5	-€ 0.7	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.9
Jun-37	0.04	€ 2.5	-€ 0.7	€ 0.0	€ 0.0	-€ 0.7	-€ 0.2	€ 0.9
Sep-37	0.04	€ 2.5	-€ 0.7	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.9
Dec-37	0.04	€ 2.4	-€ 0.7	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.9
Mar-38	0.04	€ 2.4	-€ 0.7	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.9
Jun-38	0.04	€ 2.4	-€ 0.7	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.9
Sep-38	0.04	€ 2.3	-€ 0.7	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.8
Dec-38	0.03	€ 2.2	-€ 0.7	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.8
Mar-39	0.03	€ 2.2	-€ 0.7	€ 0.0	€ 0.0	-€ 0.5	-€ 0.2	€ 0.8
Jun-39	0.03	€ 2.2	-€ 0.7	€ 0.0	€ 0.0	-€ 0.5	-€ 0.2	€ 0.7
Sep-39	0.03	€ 2.1	-€ 0.7	€ 0.0	€ 0.0	-€ 0.5	-€ 0.2	€ 0.7
Dec-39	0.03	€ 2.0	-€ 0.7	€ 0.0	€ 0.0	-€ 0.5	-€ 0.2	€ 0.6
Mar-40	0.03	€ 1.9	-€ 0.7	€ 0.0	€ 0.0	-€ 0.5	-€ 0.2	€ 0.6
Jun-40	0.03	€ 1.9	-€ 0.7	€ 0.0	€ 0.0	-€ 0.4	-€ 0.2	€ 0.6
Sep-40	0.03	€ 1.8	-€ 0.7	€ 0.0	€ 0.0	-€ 0.4	-€ 0.2	€ 0.5
Dec-40	0.02	€ 1.7	-€ 0.7	€ 0.0	€ 0.0	-€ 0.4	-€ 0.2	€ 0.5
Mar-41	0.02	€ 1.6	-€ 0.7	€ 0.0	€ 0.0	-€ 0.3	-€ 0.1	€ 0.4
Jun-41	0.02	€ 1.5	-€ 0.7	€ 0.0	€ 0.0	-€ 0.3	-€ 0.1	€ 0.4
Sep-41	0.02	€ 1.4	-€ 0.7	€ 0.0	€ 0.0	-€ 0.3	-€ 0.1	€ 0.3
Dec-41	0.02	€ 1.4	-€ 0.7	€ 0.0	€ 0.0	-€ 0.3	-€ 0.1	€ 0.3
Mar-42	0.02	€ 1.3	-€ 0.7	€ 0.0	€ 0.0	-€ 0.2	-€ 0.1	€ 0.2
Jun-42	0.02	€ 1.2	-€ 0.7	€ 0.0	€ 0.0	-€ 0.2	-€ 0.1	€ 0.2
Sep-42	0.02	€ 1.2	-€ 0.7	€ 0.0	€ 0.0	-€ 0.2	-€ 0.1	€ 0.2
Dec-42	0.02	€ 1.1	-€ 0.7	€ 0.0	-€ 0.3	-€ 0.2	-€ 0.1	-€ 0.1
Mar-43	0.01	€ 1.1	-€ 0.7	€ 0.0	€ 0.0	-€ 0.2	-€ 0.1	€ 0.1
Jun-43	0.01	€ 1.0	-€ 0.7	€ 0.0	€ 0.0	-€ 0.2	-€ 0.1	€ 0.1
Sep-43	0.01	€ 1.0	-€ 0.7	€ 0.0	€ 0.0	-€ 0.1	-€ 0.1	€ 0.1
Dec-43	0.01	€ 0.9	-€ 0.7	€ 0.0	€ 0.0	-€ 0.1	-€ 0.1	€ 0.1
Mar-44	0.01	€ 0.9	-€ 0.7	€ 0.0	€ 0.0	-€ 0.1	-€ 0.1	€ 0.0
Jun-44	0.01	€ 0.9	-€ 0.7	€ 0.0	€ 0.0	-€ 0.1	-€ 0.1	€ 0.0
Sep-44	0.01	€ 0.9	-€ 0.7	€ 0.0	€ 0.0	-€ 0.1	-€ 0.1	€ 0.0
Dec-44	0.01	€ 0.8	-€ 0.7	€ 0.0	€ 0.0	-€ 0.1	-€ 0.1	-€ 0.1
Mar-45	0.01	€ 0.8	-€ 0.7	€ 0.0	€ 0.0	-€ 0.1	-€ 0.1	€ 0.0
Jun-45	0.01	€ 0.8	-€ 0.7	€ 0.0	€ 0.0	-€ 0.1	-€ 0.1	€ 0.0
Sep-45	0.01	€ 0.8	-€ 0.7	€ 0.0	-€ 2.8	-€ 0.1	-€ 0.1	-€ 2.9
Dec-45	0.01	€ 0.7	-€ 0.7	€ 0.0	€ 0.0	-€ 0.1	-€ 0.1	€ 0.0
Grand Total	**3.900**	**€ 257.2**	**-€ 60.3**	**-€ 15.7**	**-€ 3.1**	**-€ 60.1**	**-€ 23.1**	**€ 95.0**
CoP	Sep-44							
Economic Cashflow	**3.847**	**€ 253.3**	**-€ 56.9**	**-€ 15.7**	**-€ 3.1**	**-€ 59.7**	**-€ 22.8**	**€ 95.0**

17 ERFELDEN HIGH COST AND SALES PROFILES (RHEIN PETROLEUM WI)

Year	Production	Revenues	Opex	Capex	Abex	Tax & Royalties	Earn Out Royalty	Economic Free Cashflow
	(mln bbbl)	(€ mln)	(€ mln)	(€ mln)	(€ mln)	(€ mln)	(€ mln)	(€ mln)
Mar-23	0.00	€ 0.3	-€ 0.5	-€ 3.9	€ 0.0	€ 0.0	€ 0.0	-€ 4.2
Jun-23	0.19	€ 15.9	-€ 0.9	€ 0.0	€ 0.0	-€ 3.1	€ 0.0	€ 11.8
Sep-23	0.19	€ 15.4	-€ 0.9	€ 0.0	€ 0.0	-€ 3.0	€ 0.0	€ 11.5
Dec-23	0.17	€ 13.3	-€ 0.9	-€ 5.6	€ 0.0	-€ 2.6	€ 0.0	€ 4.3
Mar-24	0.17	€ 13.2	-€ 0.9	€ 0.0	€ 0.0	-€ 2.5	€ 0.0	€ 9.8
Jun-24	0.14	€ 11.0	-€ 0.8	€ 0.0	€ 0.0	-€ 2.5	€ 0.0	€ 7.6
Sep-24	0.12	€ 9.0	-€ 0.8	€ 0.0	€ 0.0	-€ 2.5	€ 0.0	€ 5.7
Dec-24	0.10	€ 7.4	-€ 0.8	-€ 5.8	€ 0.0	-€ 2.2	€ 0.0	-€ 1.4
Mar-25	0.10	€ 7.1	-€ 0.9	-€ 0.4	€ 0.0	-€ 2.2	€ 0.0	€ 3.7
Jun-25	0.13	€ 9.2	-€ 0.8	€ 0.0	€ 0.0	-€ 3.0	-€ 8.3	-€ 3.0
Sep-25	0.13	€ 9.2	-€ 0.8	€ 0.0	€ 0.0	-€ 3.0	-€ 0.8	€ 4.5
Dec-25	0.13	€ 9.0	-€ 0.8	€ 0.0	€ 0.0	-€ 2.9	-€ 0.8	€ 4.4
Mar-26	0.12	€ 8.8	-€ 0.8	€ 0.0	€ 0.0	-€ 2.9	-€ 0.8	€ 4.3
Jun-26	0.13	€ 8.9	-€ 0.8	€ 0.0	€ 0.0	-€ 2.9	-€ 0.8	€ 4.4
Sep-26	0.13	€ 9.0	-€ 0.9	€ 0.0	€ 0.0	-€ 2.9	-€ 0.8	€ 4.4
Dec-26	0.13	€ 9.0	-€ 0.8	€ 0.0	€ 0.0	-€ 2.9	-€ 0.8	€ 4.4
Mar-27	0.13	€ 9.0	-€ 0.9	€ 0.0	€ 0.0	-€ 2.9	-€ 0.8	€ 4.4
Jun-27	0.14	€ 9.4	-€ 0.9	€ 0.0	€ 0.0	-€ 3.0	-€ 0.8	€ 4.7
Sep-27	0.14	€ 9.4	-€ 0.9	€ 0.0	€ 0.0	-€ 3.1	-€ 0.8	€ 4.6
Dec-27	0.14	€ 9.3	-€ 0.9	€ 0.0	€ 0.0	-€ 3.0	-€ 0.8	€ 4.6
Mar-28	0.14	€ 9.4	-€ 0.9	€ 0.0	€ 0.0	-€ 3.0	-€ 0.8	€ 4.6
Jun-28	0.14	€ 9.5	-€ 0.9	€ 0.0	€ 0.0	-€ 3.1	-€ 0.8	€ 4.7
Sep-28	0.14	€ 9.4	-€ 0.9	€ 0.0	€ 0.0	-€ 3.0	-€ 0.9	€ 4.6
Dec-28	0.13	€ 9.0	-€ 0.9	€ 0.0	€ 0.0	-€ 2.9	-€ 0.8	€ 4.4
Mar-29	0.12	€ 8.3	-€ 0.9	€ 0.0	€ 0.0	-€ 2.7	-€ 0.8	€ 4.0
Jun-29	0.11	€ 6.7	-€ 0.8	€ 0.0	€ 0.0	-€ 2.1	-€ 0.7	€ 3.1
Sep-29	0.10	€ 5.9	-€ 0.8	€ 0.0	€ 0.0	-€ 1.8	-€ 0.6	€ 2.7
Dec-29	0.09	€ 5.1	-€ 0.8	€ 0.0	€ 0.0	-€ 1.6	-€ 0.5	€ 2.3
Mar-30	0.08	€ 4.5	-€ 0.8	€ 0.0	€ 0.0	-€ 1.4	-€ 0.5	€ 1.9
Jun-30	0.07	€ 3.8	-€ 0.8	€ 0.0	€ 0.0	-€ 1.1	-€ 0.4	€ 1.6
Sep-30	0.07	€ 3.5	-€ 0.8	€ 0.0	€ 0.0	-€ 1.0	-€ 0.3	€ 1.4
Dec-30	0.06	€ 3.2	-€ 0.7	€ 0.0	€ 0.0	-€ 0.9	-€ 0.3	€ 1.3
Mar-31	0.06	€ 3.1	-€ 0.7	€ 0.0	€ 0.0	-€ 0.9	-€ 0.3	€ 1.2
Jun-31	0.05	€ 3.0	-€ 0.7	€ 0.0	€ 0.0	-€ 0.8	-€ 0.3	€ 1.2
Sep-31	0.05	€ 2.9	-€ 0.7	€ 0.0	€ 0.0	-€ 0.8	-€ 0.3	€ 1.1
Dec-31	0.05	€ 2.8	-€ 0.7	€ 0.0	€ 0.0	-€ 0.7	-€ 0.3	€ 1.0
Mar-32	0.05	€ 2.7	-€ 0.7	€ 0.0	€ 0.0	-€ 0.7	-€ 0.2	€ 1.0
Jun-32	0.05	€ 2.7	-€ 0.7	€ 0.0	€ 0.0	-€ 0.7	-€ 0.2	€ 1.0
Sep-32	0.05	€ 2.6	-€ 0.7	€ 0.0	€ 0.0	-€ 0.7	-€ 0.2	€ 0.9
Dec-32	0.04	€ 2.5	-€ 0.7	€ 0.0	€ 0.0	-€ 0.7	-€ 0.2	€ 0.9
Mar-33	0.04	€ 2.5	-€ 0.7	€ 0.0	€ 0.0	-€ 0.7	-€ 0.2	€ 0.9
Jun-33	0.04	€ 2.5	-€ 0.7	€ 0.0	€ 0.0	-€ 0.7	-€ 0.2	€ 0.9
Sep-33	0.04	€ 2.5	-€ 0.8	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.9
Dec-33	0.04	€ 2.4	-€ 0.7	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.8
Mar-34	0.04	€ 2.4	-€ 0.8	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.8
Jun-34	0.04	€ 2.5	-€ 0.8	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.9
Sep-34	0.04	€ 2.4	-€ 0.8	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.8
Dec-34	0.04	€ 2.4	-€ 0.8	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.8
Mar-35	0.04	€ 2.4	-€ 0.8	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.8
Jun-35	0.04	€ 2.4	-€ 0.8	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.8
Sep-35	0.04	€ 2.4	-€ 0.8	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.8
Dec-35	0.04	€ 2.4	-€ 0.8	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.8
Mar-36	0.04	€ 2.4	-€ 0.8	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.8
Jun-36	0.04	€ 2.4	-€ 0.8	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.8
Sep-36	0.04	€ 2.4	-€ 0.8	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.8
Dec-36	0.04	€ 2.3	-€ 0.8	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.8
Mar-37	0.04	€ 2.3	-€ 0.8	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.8
Jun-37	0.04	€ 2.4	-€ 0.8	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.8
Sep-37	0.04	€ 2.3	-€ 0.8	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.7
Dec-37	0.04	€ 2.3	-€ 0.8	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.7
Mar-38	0.04	€ 2.3	-€ 0.8	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.7
Jun-38	0.04	€ 2.3	-€ 0.8	€ 0.0	€ 0.0	-€ 0.6	-€ 0.2	€ 0.7
Sep-38	0.03	€ 2.2	-€ 0.8	€ 0.0	€ 0.0	-€ 0.5	-€ 0.2	€ 0.7
Dec-38	0.03	€ 2.2	-€ 0.8	€ 0.0	€ 0.0	-€ 0.5	-€ 0.2	€ 0.6
Mar-39	0.03	€ 2.1	-€ 0.8	€ 0.0	€ 0.0	-€ 0.5	-€ 0.2	€ 0.6
Jun-39	0.03	€ 2.1	-€ 0.8	€ 0.0	€ 0.0	-€ 0.5	-€ 0.2	€ 0.6
Sep-39	0.03	€ 2.1	-€ 0.8	€ 0.0	€ 0.0	-€ 0.5	-€ 0.2	€ 0.6
Dec-39	0.03	€ 2.0	-€ 0.8	€ 0.0	€ 0.0	-€ 0.5	-€ 0.2	€ 0.5
Mar-40	0.03	€ 2.0	-€ 0.8	€ 0.0	€ 0.0	-€ 0.5	-€ 0.2	€ 0.5
Jun-40	0.03	€ 1.9	-€ 0.8	€ 0.0	€ 0.0	-€ 0.4	-€ 0.2	€ 0.5
Sep-40	0.03	€ 1.9	-€ 0.8	€ 0.0	€ 0.0	-€ 0.4	-€ 0.2	€ 0.5
Dec-40	0.03	€ 1.8	-€ 0.8	€ 0.0	€ 0.0	-€ 0.4	-€ 0.2	€ 0.4
Mar-41	0.03	€ 1.8	-€ 0.8	€ 0.0	€ 0.0	-€ 0.4	-€ 0.2	€ 0.4
Jun-41	0.03	€ 1.7	-€ 0.8	€ 0.0	€ 0.0	-€ 0.4	-€ 0.2	€ 0.4
Sep-41	0.02	€ 1.7	-€ 0.8	€ 0.0	€ 0.0	-€ 0.3	-€ 0.2	€ 0.4
Dec-41	0.02	€ 1.6	-€ 0.8	€ 0.0	€ 0.0	-€ 0.3	-€ 0.2	€ 0.3
Mar-42	0.02	€ 1.6	-€ 0.8	€ 0.0	€ 0.0	-€ 0.3	-€ 0.1	€ 0.3
Jun-42	0.02	€ 1.6	-€ 0.8	€ 0.0	€ 0.0	-€ 0.3	-€ 0.1	€ 0.3
Sep-42	0.02	€ 1.5	-€ 0.8	€ 0.0	€ 0.0	-€ 0.3	-€ 0.1	€ 0.3
Dec-42	0.02	€ 1.5	-€ 0.8	€ 0.0	-€ 0.3	-€ 0.3	-€ 0.1	€ 0.0
Mar-43	0.02	€ 1.5	-€ 0.8	€ 0.0	€ 0.0	-€ 0.3	-€ 0.1	€ 0.2
Jun-43	0.02	€ 1.5	-€ 0.8	€ 0.0	€ 0.0	-€ 0.3	-€ 0.1	€ 0.2
Sep-43	0.02	€ 1.4	-€ 0.8	€ 0.0	€ 0.0	-€ 0.3	-€ 0.1	€ 0.2
Dec-43	0.02	€ 1.4	-€ 0.8	€ 0.0	€ 0.0	-€ 0.2	-€ 0.1	€ 0.2
Mar-44	0.02	€ 1.4	-€ 0.8	€ 0.0	€ 0.0	-€ 0.2	-€ 0.1	€ 0.2
Jun-44	0.02	€ 1.4	-€ 0.8	€ 0.0	€ 0.0	-€ 0.2	-€ 0.1	€ 0.2
Sep-44	0.02	€ 1.3	-€ 0.8	€ 0.0	€ 0.0	-€ 0.2	-€ 0.1	€ 0.2
Dec-44	0.02	€ 1.3	-€ 0.8	€ 0.0	€ 0.0	-€ 0.2	-€ 0.1	€ 0.1
Mar-45	0.02	€ 1.3	-€ 0.8	€ 0.0	€ 0.0	-€ 0.2	-€ 0.1	€ 0.1
Jun-45	0.02	€ 1.3	-€ 0.8	€ 0.0	€ 0.0	-€ 0.2	-€ 0.1	€ 0.1
Sep-45	0.02	€ 1.3	-€ 0.8	€ 0.0	€ 0.0	-€ 0.2	-€ 0.1	€ 0.1
Dec-45	0.02	€ 1.2	-€ 0.8	€ 0.0	€ 0.0	-€ 0.2	-€ 0.1	€ 0.1
Mar-46	0.01	€ 0.4	-€ 0.7	€ 0.0	€ 0.0	€ 0.0	-€ 0.1	-€ 0.1
Jun-46	-	€ 0.0	-€ 0.3	€ 0.0	€ 0.0	€ 0.0	€ 0.0	€ 0.0
Sep-46	-	€ 0.0	-€ 0.3	€ 0.0	€ 0.0	€ 0.0	€ 0.0	€ 0.0
Dec-46	-	€ 0.0	-€ 0.3	€ 0.0	-€ 2.8	€ 0.0	€ 0.0	-€ 2.8
Grand Total	**5.830**	**€ 396.3**	**-€ 75.7**	**-€ 15.7**	**-€ 3.1**	**-€ 107.2**	**-€ 35.7**	**€ 160.1**
CoP	Dec-45							
Economic Cashflow	**5.824**	**€ 395.9**	**-€ 74.2**	**-€ 15.7**	**-€ 3.1**	**-€ 107.1**	**-€ 35.7**	**€ 160.1**

18 SITE VISITS

Figure 18-1 Schwarzbach production site plan view

The Schwarzbach facility is an unmanned oil producing facility. It currently produces from a single well. Currently construction is underway for the introduction of an additional 3 wells. The single well is routed to the Separator for processing. The Separator has 3 compartments. The first compartment performs the 3-Phase separation

• The gas phase is routed to the heating medium system as a fuel source.

• the oil phase overflows into the oil storage compartment. The oil compartment has skimming facilities to remove any water that has been carried over.

• the water phase underflows to the water storage compartment. The water compartment has skimming facilities to remove any oil that has been carried over.

The gas produced is routed to a heating medium system where it is burned as the fuel source. The heating medium is circulated throughout the plant. Primarily it is routed to the separation and oil storage compartments to keep the oil contents warm resulting in a less viscous fluid. The remaining heating medium is circulated through hosing that is wrapped around the production piping to so that its contents remain warm.

With this mode of separation and heating ensures that the oil quality specification is easily met.

When the levels within the oil and water storage tanks reach a pre-set level, offloading road tankers are scheduled to come and collect the contents. Standalone offloading facilities for the tankers are provided so that the driver can come collect the contents without the need of an operator to be present.

A cold vent stack is provided that is primarily used for venting the gas contents of the offloading road tankers when they are being filled.

Figure 18-2 Schwarzbach production site

Figure 18-3 Lauben production site

The Lauben facility is an unmanned oil producing facility. It currently produces from a single well.

The single well is routed to the Separator for processing. The Separator performs 2-Phase separation, where the gas routed to the adjacent buffer vessel and the liquid phase is retained in the separator until it reaches a level when an offloading road tanker arrives to empty the vessel. Standalone offloading facilities for the tankers are provided so that the driver can come collect the contents without the need of an operator to be present.

The oil/water mixture is road transported to Schwarzbach for separation.

The gas produced is routed to a heating medium system where it is burned as the fuel source. The heating medium is circulated throughout the plant. Primarily it is routed to the separator to keep the liquid contents warm resulting in a less viscous fluid. The amount of gas produced is insufficient to provide enough heating medium for the liquid contents of the separator. A temporary diesel top-up system is employed into order to meet the heating requirements.

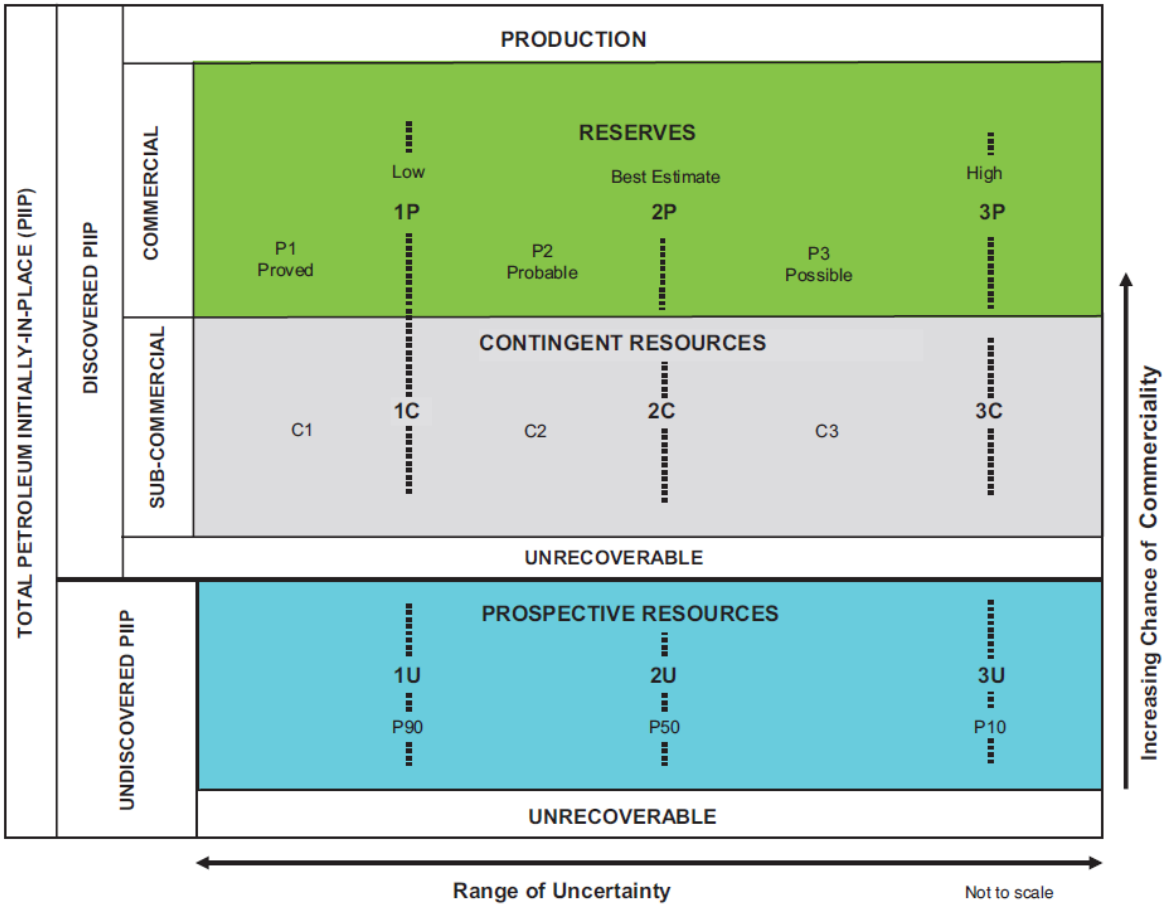
A cold vent stack is provided that is primarily used for venting the gas contents of the offloading road tankers when they are being filled.

Figure 18-4 Steig-1 well head (suspended as a potential producer)

19 SPE-PRMS-2018 GUIDELINES

Definitions

The petroleum reserves and resources definitions used in this report are those published in the documents entitled “Petroleum Resource Management System”, 2018, (PRMS) and “Guidelines for Application of the Petroleum Resources Management System”, November 2011, sponsored by the Society of Petroleum Engineers, the Society of Petroleum Evaluation Engineers, the American Association of Petroleum Geologists and the World Petroleum Council. The main definitions and extracts from the PRMS (2018) are presented below.



Source: Petroleum Resources Management System 2018

Petroleum Initially-In-Place

The total quantity of petroleum that is estimated to exist originally in naturally occurring reservoirs, as of a given date. Crude oil in-place, natural gas in-place, and natural bitumen in-place are defined in the same manner.

Production

The cumulative quantities of petroleum that have been recovered at a given date. Production can be reported in terms of the sales product specifications, but project evaluation requires that all production quantities (sales and non-sales), as measured to support engineering analyses requiring reservoir voidage calculations, are recognized

Reserves

Those quantities of petroleum anticipated to be commercially recoverable by application of development projects to known accumulations from a given date forward under defined conditions. Reserves must satisfy four criteria: they must be discovered, recoverable, commercial, and remaining (as of a given date) based on the development project(s) applied.

A project is commercial when there is evidence of a firm intention to proceed with development within a reasonable time-frame. Typically, this requires that the best estimate case meet or exceed the minimum evaluation decision criteria (e.g., rate of return, investment pay-out time). There must be a reasonable expectation that all required internal and external approvals will be forthcoming. Also, there must be evidence of a technically mature, feasible development plan and the essential social, environmental, economic, political, legal, regulatory, decision criteria, and contractual conditions are met.

Contingent Resources

Contingent Resources are those quantities of petroleum estimated, as of a given date, to be potentially recoverable from known accumulations, by the application of development project(s) not currently considered to be commercial owing to one or more contingencies. Contingent Resources have an associated chance of development. Contingent Resources may include, for example, projects for which there are currently no viable markets, or where commercial recovery is dependent on technology under development, or where evaluation of the accumulation is insufficient to clearly assess commerciality. Contingent Resources are further categorized in accordance with the range of uncertainty associated with the estimates and should be subclassified based on project maturity and/or economic status.

Prospective Resources

Prospective Resources are those quantities of petroleum estimated, as of a given date, to be potentially recoverable from undiscovered accumulations by application of future development projects. Prospective Resources have both an associated chance of geologic discovery and a chance of development. Prospective Resources are further categorized in accordance with the range of uncertainty associated with recoverable estimates, assuming discovery and development, and may be sub-classified based on project maturity.

Status	Definition	Guidelines
Developed Reserves	Expected quantities to be recovered from existing wells and facilities.	Reserves are considered developed only after the necessary equipment has been installed, or when the costs to do so are relatively minor compared to the cost of a well. Where required facilities become unavailable, it may be necessary to reclassify Developed Reserves as Undeveloped. Developed Reserves may be further sub-classified as Producing or Non-producing.
Developed Producing Reserves	Expected quantities to be recovered from completion intervals that are open and producing at the effective date of the estimate.	Improved recovery Reserves are considered producing only after the improved recovery project is in operation.
Developed Non-Producing Reserves	Shut-in and behind-pipe Reserves.	Shut-in Reserves are expected to be recovered from (1) completion intervals that are open at the time of the estimate but which have not yet started producing, (2) wells which were shut-in for market conditions or pipeline connections, or (3) wells not capable of production for mechanical reasons. Behind-pipe Reserves are expected to be recovered from zones in existing wells that will require additional completion work or future re-completion before start of production with minor cost to access these reserves. In all cases, production can be initiated or restored with relatively low expenditure compared to the cost of drilling a new well.
Undeveloped Reserves	Quantities expected to be recovered through future significant investments.	Undeveloped Reserves are to be produced (1) from new wells on undrilled acreage in known accumulations, (2) from deepening existing wells to a different (but known) reservoir, (3) from infill wells that will increase recovery, or (4) where a relatively large expenditure (e.g., when compared to the cost of drilling a new well) is required to (a) recomplete an existing well or (b) install production or transportation facilities for primary or improved recovery projects.

Category	Definition	Guidelines
Proved Reserves	Those quantities of petroleum that, by analysis of geoscience and engineering data, can be estimated with reasonable certainty to be commercially recoverable from a given date forward from known reservoirs and under defined economic conditions, operating methods, and government regulations.	If deterministic methods are used, the term "reasonable certainty" is intended to express a high degree of confidence that the quantities will be recovered. If probabilistic methods are used, there should be at least a 90% probability (P90) that the quantities actually recovered will equal or exceed the estimate. The area of the reservoir considered as Proved includes (1) the area delineated by drilling and defined by fluid contacts, if any, and (2) adjacent undrilled portions of the reservoir that can reasonably be judged as continuous with it and commercially productive on the basis of available geoscience and engineering data. In the absence of data on fluid contacts, Proved quantities in a reservoir are limited by the LKH as seen in a well penetration unless otherwise indicated by definitive geoscience, engineering, or performance data. Such definitive information may include pressure gradient analysis and seismic indicators. Seismic data alone may not be sufficient to define fluid contacts for Proved. Reserves in undeveloped locations may be classified as Proved provided that: A. The locations are in undrilled areas of the reservoir that can be judged with reasonable certainty to be commercially mature and economically productive. B. Interpretations of available geoscience and engineering data indicate with reasonable certainty that the objective formation is laterally continuous with drilled Proved locations. For Proved Reserves, the recovery efficiency applied to these reservoirs should be defined based on a range of possibilities supported by analogs and sound engineering judgment considering the characteristics of the Proved area and the applied development program.
Probable Reserves	Those additional Reserves that analysis of geoscience and engineering data indicates are less likely to be recovered than Proved Reserves but more certain to be recovered than Possible Reserves.	It is equally likely that actual remaining quantities recovered will be greater than or less than the sum of the estimated Proved plus Probable Reserves (2P). In this context, when probabilistic methods are used, there should be at least a 50% probability that the actual quantities recovered will equal or exceed the 2P estimate. Probable Reserves may be assigned to areas of a reservoir adjacent to Proved where data control or interpretations of available data are less certain. The interpreted reservoir continuity may not meet the reasonable certainty criteria. Probable estimates also include incremental recoveries associated with project recovery efficiencies beyond that assumed for Proved.

Category	Definition	Guidelines
Possible Reserves	Those additional reserves that analysis of geoscience and engineering data indicates are less likely to be recoverable than Probable Reserves.	The total quantities ultimately recovered from the project have a low probability to exceed the sum of Proved plus Probable plus Possible (3P), which is equivalent to the high-estimate scenario. When probabilistic methods are used, there should be at least a 10% probability (P10) that the actual quantities recovered will equal or exceed the 3P estimate. Possible Reserves may be assigned to areas of a reservoir adjacent to Probable where data control and interpretations of available data are progressively less certain. Frequently, this may be in areas where geoscience and engineering data are unable to clearly define the area and vertical reservoir limits of economic production from the reservoir by a defined, commercially mature project. Possible estimates also include incremental quantities associated with project recovery efficiencies beyond that assumed for Probable.
Probable and Possible Reserves	See above for separate criteria for Probable Reserves and Possible Reserves.	The 2P and 3P estimates may be based on reasonable alternative technical interpretations within the reservoir and/ or subject project that are clearly documented, including comparisons to results in successful similar projects. In conventional accumulations, Probable and/or Possible Reserves may be assigned where geoscience and engineering data identify directly adjacent portions of a reservoir within the same accumulation that may be separated from Proved areas by minor faulting or other geological discontinuities and have not been penetrated by a wellbore but are interpreted to be in communication with the known (Proved) reservoir. Probable or Possible Reserves may be assigned to areas that are structurally higher than the Proved area. Possible (and in some cases, Probable) Reserves may be assigned to areas that are structurally lower than the adjacent Proved or 2P area. Caution should be exercised in assigning Reserves to adjacent reservoirs isolated by major, potentially sealing faults until this reservoir is penetrated and evaluated as commercially mature and economically productive. Justification for assigning Reserves in such cases should be clearly documented. Reserves should not be assigned to areas that are clearly separated from a known accumulation by non-productive reservoir (i.e., absence of reservoir, structurally low reservoir, or negative test results); such areas may contain Prospective Resources. In conventional accumulations, where drilling has defined a highest known oil elevation and there exists the potential for an associated gas cap, Proved Reserves of oil should only be assigned in the structurally higher portions of the reservoir if there is reasonable certainty that such portions are initially above bubble point pressure based on documented engineering analyses. Reservoir portions that do not meet this certainty may be assigned as Probable and Possible oil and/or gas based on reservoir fluid properties and pressure gradient interpretations.

Class/Sub-Class	Definition	Guidelines
Reserves	Reserves are those quantities of petroleum anticipated to be commercially recoverable by application of development projects to known accumulations from a given date forward under defined conditions.	Reserves must satisfy four criteria: discovered, recoverable, commercial, and remaining based on the development project(s) applied. Reserves are further categorized in accordance with the level of certainty associated with the estimates and may be sub-classified based on project maturity and/or characterized by the development and production status. To be included in the Reserves class, a project must be sufficiently defined to establish its commercial viability (see Section 2.1.2, Determination of Commerciality). This includes the requirement that there is evidence of firm intention to proceed with development within a reasonable time-frame. A reasonable time-frame for the initiation of development depends on the specific circumstances and varies according to the scope of the project. While five years is recommended as a benchmark, a longer time-frame could be applied where, for example, development of an economic project is deferred at the option of the producer for, among other things, market-related reasons or to meet contractual or strategic objectives. In all cases, the justification for classification as Reserves should be clearly documented. To be included in the Reserves class, there must be a high confidence in the commercial maturity and economic producibility of the reservoir as supported by actual production or formation tests. In certain cases, Reserves may be assigned on the basis of well logs and/or core analysis that indicate that the subject reservoir is hydrocarbon-bearing and is analogous to reservoirs in the same area that are producing or have demonstrated the ability to produce on formation tests.
On Production	The development project is currently producing or capable of producing and selling petroleum to market.	The key criterion is that the project is receiving income from sales, rather than that the approved development project is necessarily complete. Includes Developed Producing Reserves. The project decision gate is the decision to initiate or continue economic production from the project.
Approved for Development	All necessary approvals have been obtained, capital funds have been committed, and implementation of the development project is ready to begin or is under way.	At this point, it must be certain that the development project is going ahead. The project must not be subject to any contingencies, such as outstanding regulatory approvals or sales contracts. Forecast capital expenditures should be included in the reporting entity's current or following year's approved budget. The project decision gate is the decision to start investing capital in the construction of production facilities and/or drilling development wells.

Class/Sub-Class	Definition	Guidelines
Justified for Development	Implementation of the development project is justified on the basis of reasonable forecast commercial conditions at the time of reporting, and there are reasonable expectations that all necessary approvals/contracts will be obtained.	To move to this level of project maturity, and hence have Reserves associated with it, the development project must be commercially viable at the time of reporting (see Section 2.1.2, Determination of Commerciality) and the specific circumstances of the project. All participating entities have agreed and there is evidence of a committed project (firm intention to proceed with development within a reasonable time-frame}) There must be no known contingencies that could preclude the development from proceeding (see Reserves class). The project decision gate is the decision by the reporting entity and its partners, if any, that the project has reached a level of technical and commercial maturity sufficient to justify proceeding with development at that point in time.
Contingent Resources	Those quantities of petroleum estimated, as of a given date, to be potentially recoverable from known accumulations by application of development projects, but which are not currently considered to be commercially recoverable owing to one or more contingencies.	Contingent Resources may include, for example, projects for which there are currently no viable markets, where commercial recovery is dependent on technology under development, where evaluation of the accumulation is insufficient to clearly assess commerciality, where the development plan is not yet approved, or where regulatory or social acceptance issues may exist. Contingent Resources are further categorized in accordance with the level of certainty associated with the estimates and may be sub-classified based on project maturity and/or characterized by the economic status.
Development Pending	A discovered accumulation where project activities are ongoing to justify commercial development in the foreseeable future.	The project is seen to have reasonable potential for eventual commercial development, to the extent that further data acquisition (e.g., drilling, seismic data) and/or evaluations are currently ongoing with a view to confirming that the project is commercially viable and providing the basis for selection of an appropriate development plan. The critical contingencies have been identified and are reasonably expected to be resolved within a reasonable time-frame. Note that disappointing appraisal/evaluation results could lead to a reclassification of the project to On Hold or Not Viable status. The project decision gate is the decision to undertake further data acquisition and/or studies designed to move the project to a level of technical and commercial maturity at which a decision can be made to proceed with development and production.

Class/Sub-Class	Definition	Guidelines
Development on Hold	A discovered accumulation where project activities are on hold and/or where justification as a commercial development may be subject to significant delay.	The project is seen to have potential for commercial development. Development may be subject to a significant time delay. Note that a change in circumstances, such that there is no longer a probable chance that a critical contingency can be removed in the foreseeable future, could lead to a reclassification of the project to Not Viable status. The project decision gate is the decision to either proceed with additional evaluation designed to clarify the potential for eventual commercial development or to temporarily suspend or delay further activities pending resolution of external contingencies.
Development Unclarified	A discovered accumulation where project activities are under evaluation and where justification as a commercial development is unknown based on available information.	The project is seen to have potential for eventual commercial development, but further appraisal/evaluation activities are ongoing to clarify the potential for eventual commercial development. This sub-class requires active appraisal or evaluation and should not be maintained without a plan for future evaluation. The sub-class should reflect the actions required to move a project toward commercial maturity and economic production.
Development Not Viable	A discovered accumulation for which there are no current plans to develop or to acquire additional data at the time because of limited production potential.	The project is not seen to have potential for eventual commercial development at the time of reporting, but the theoretically recoverable quantities are recorded so that the potential opportunity will be recognized in the event of a major change in technology or commercial conditions. The project decision gate is the decision not to undertake further data acquisition or studies on the project for the foreseeable future.
Prospective Resources	Those quantities of petroleum that are estimated, as of a given date, to be potentially recoverable from undiscovered accumulations.	Potential accumulations are evaluated according to the chance of geologic discovery and, assuming a discovery, the estimated quantities that would be recoverable under defined development projects. It is recognized that the development programs will be of significantly less detail and depend more heavily on analog developments in the earlier phases of exploration.
Prospect	A project associated with a potential accumulation that is sufficiently well defined to represent a viable drilling target.	Project activities are focused on assessing the chance of geologic discovery and, assuming discovery, the range of potential recoverable quantities under a commercial development program.
Lead	A project associated with a potential accumulation that is currently poorly defined and requires more data acquisition and/or evaluation to be classified as a Prospect.	Project activities are focused on acquiring additional data and/or undertaking further evaluation designed to confirm whether or not the Lead can be matured into a Prospect. Such evaluation includes the assessment of the chance of geologic discovery and, assuming discovery, the range of potential recovery under feasible development scenarios.
Play	A project associated with a prospective trend of potential prospects, but that requires more data acquisition and/or evaluation to define specific Leads or Prospects.	Project activities are focused on acquiring additional data and/or undertaking further evaluation designed to define specific Leads or Prospects for more detailed analysis of their chance of geologic discovery and, assuming discovery, the range of potential recovery under hypothetical development scenarios.