P183 RELINQUISHMENT REPORT

BLOCK 207/1a

Chevron North Sea Limited

June 2018

Contents

1. Licence Information and Synopsis

The P183 Block 207/1a licence information is presented in Table 1 and location in Figure 1. The licence was awarded in 1972 to Texaco North Sea U.K. Limited and 50% of the area was relinquished in 1978. A further 55% was relinquished in 2003 (Figure 2).

Licence name	Quad / block	Area start date	Area end date	Operator				Block area (km^2)
				Name	Equity percent	Effective date	Expiry date	
P183	207/1	16-Mar-72	16-Mar-78	TEXACO NORTH SEA U.K. LIMITED	100	16-Mar-72	16-Mar-78	201.5
P183	207/1a	16-Mar-78	16-Mar-03	TEXACO NORTH SEA U.K. LIMITED	100	16-Mar-78	16-Mar-03	100.8
P183	207/1a	16-Mar-03	15-Mar-18	TEXACO NORTH SEA U.K. LIMITED	100	16-Mar-03	01-Jan-05	45.3
P183	207/1a	16-Mar-03	15-Mar-18	CHEVRON NORTH SEA LIMITED	100	01-Jan-05	15-Mar-18	45.3

Table 1. P183 licence information

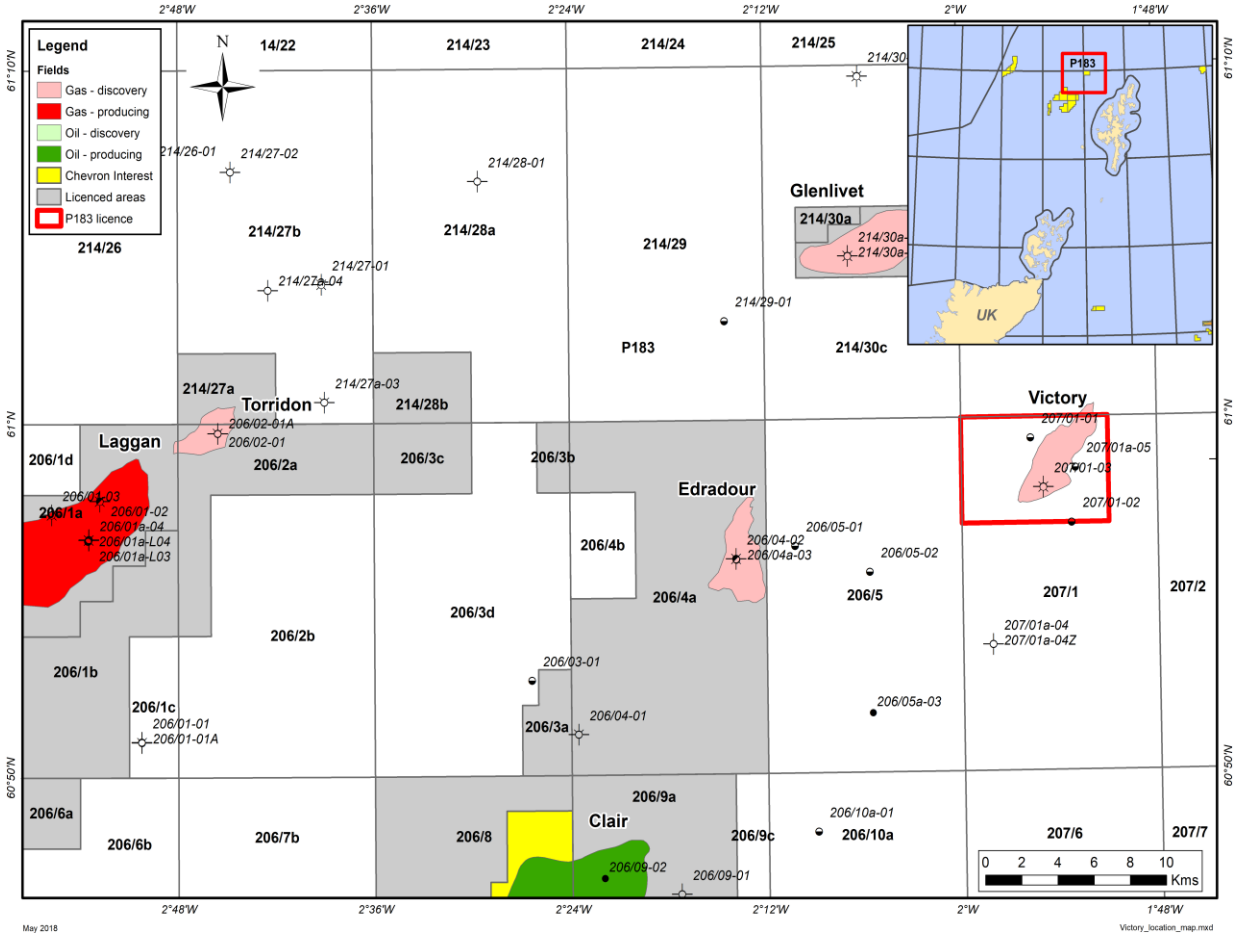

Figure 1. P183 licence outline in red.

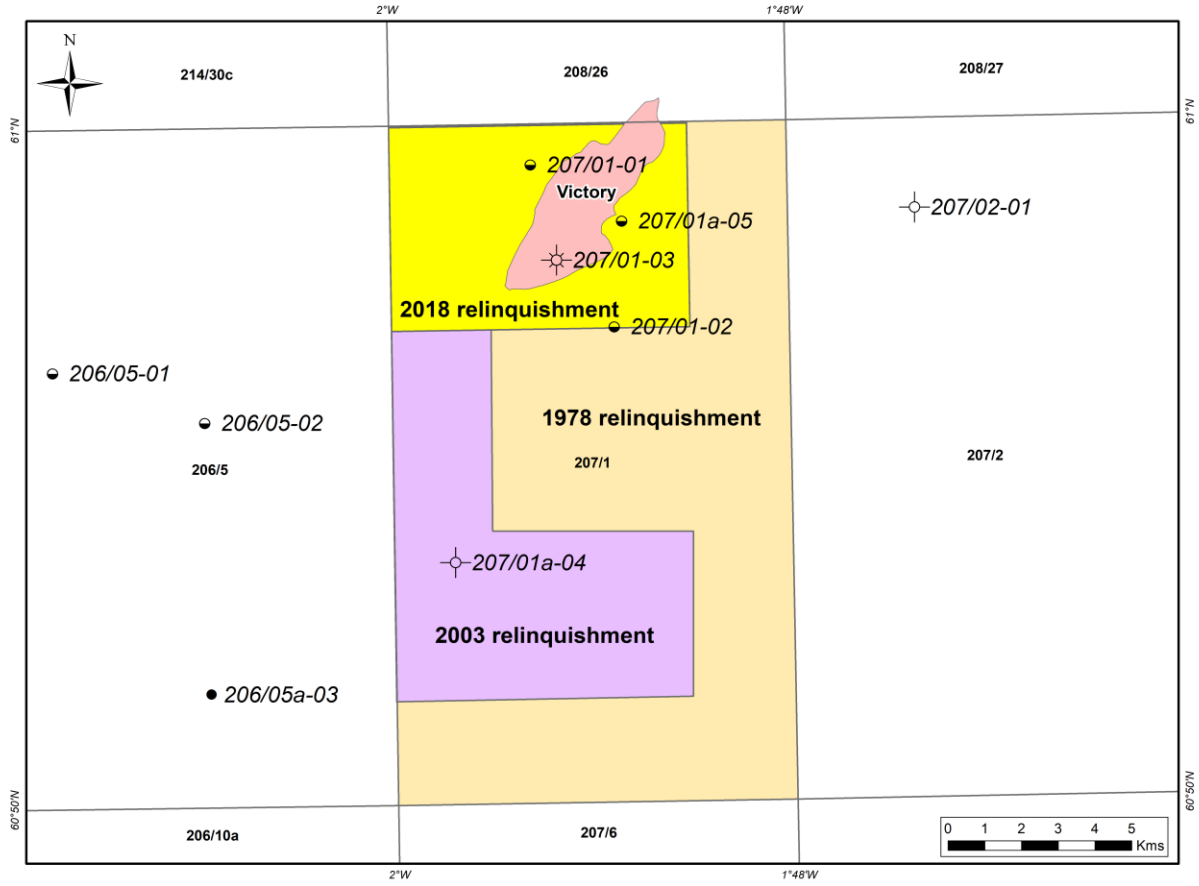

Figure 2. Relinquishment of Victory licence since award in 1972.

The licence expired at the end of its full term on 15 March 2018. All work obligations have been fulfilled. Exploration of the block resulted in the Victory gas discovery, however the lack of regional gas export infrastructure led to the discovery being classified as a fallow discovery. Victory is not of sufficient size for a standalone development.

2. Database

Table 2 summarises the seismic data coverage within P183 acquired over the licence period. These surveys are available for download from CDA.

Acquisition year	Survey name	2D or 3D	kms	Comments
1976	T207-76	2D	270.4 km	Reprocessed 1995
1989	T207-89	2D	213 km	Reprocessed 1995
1994	T207-94	2D	196.8 km	16th round acquisition
1996	W96001 wosneag96 3D	3D	101 km^2	Post 16th round acquisition

Table 2. Proprietary 2D seismic data used to evaluate P183 following licence award and 3D group shoot seismic data. Further non-proprietary datasets have been purchased over the licence, shown in Figure 4.

In addition to those surveys described in Table 2, there is a patchwork of 2D seismic surveys. Part of the block is covered by the 3D PGS MegaSurveyPlus which is a reprocessed merge of multiple 3D released seismic surveys. This was purchased by Chevron in 2013 and showed an improvement in image quality compared to the 1996 3D seismic data. Seismic imaging is hampered by the presence of volcanic sills (Figure 3). Figure 4 shows the Chevron seismic data coverage which is a mixture of multiclient and proprietary datasets.

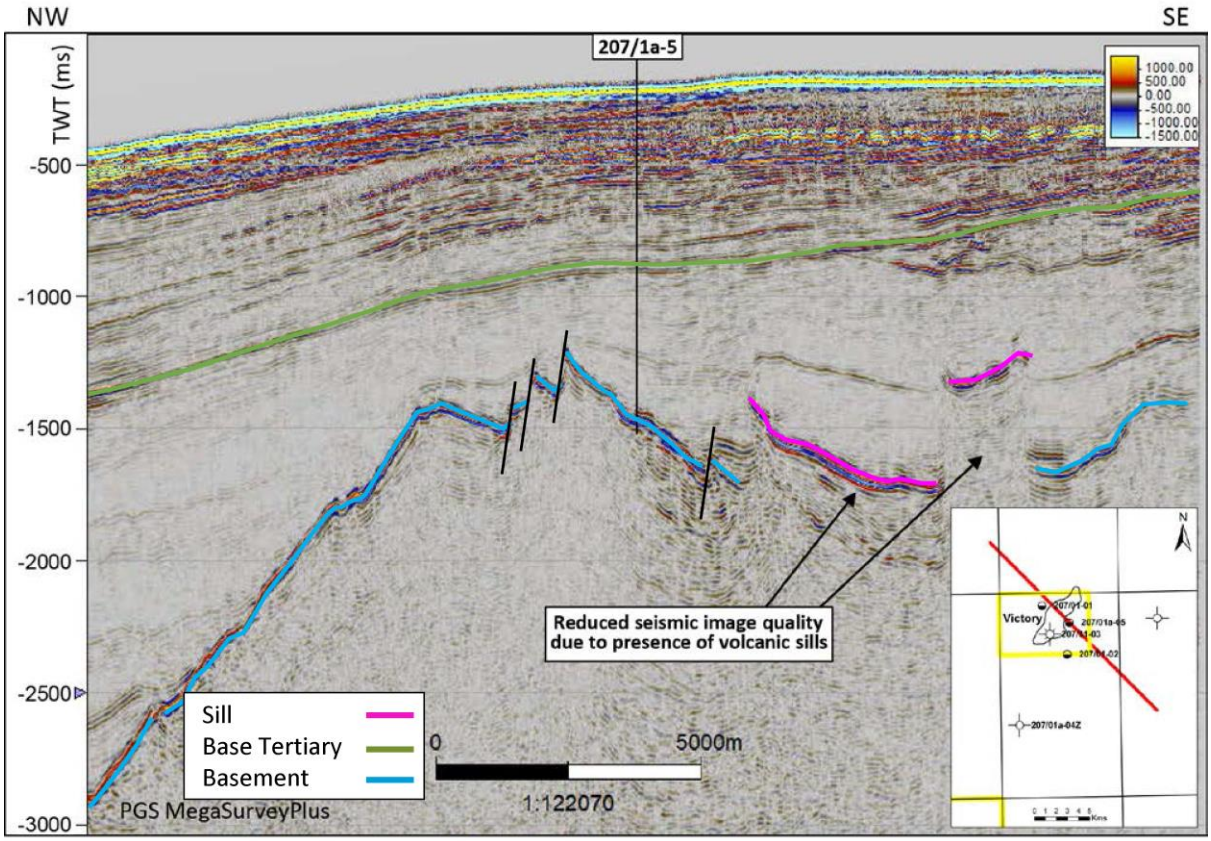

Figure 3. Volcanic sills hampering seismic image quality. 5x vertical exaggeration. Data courtesy of PGS Exploration UK Ltd.

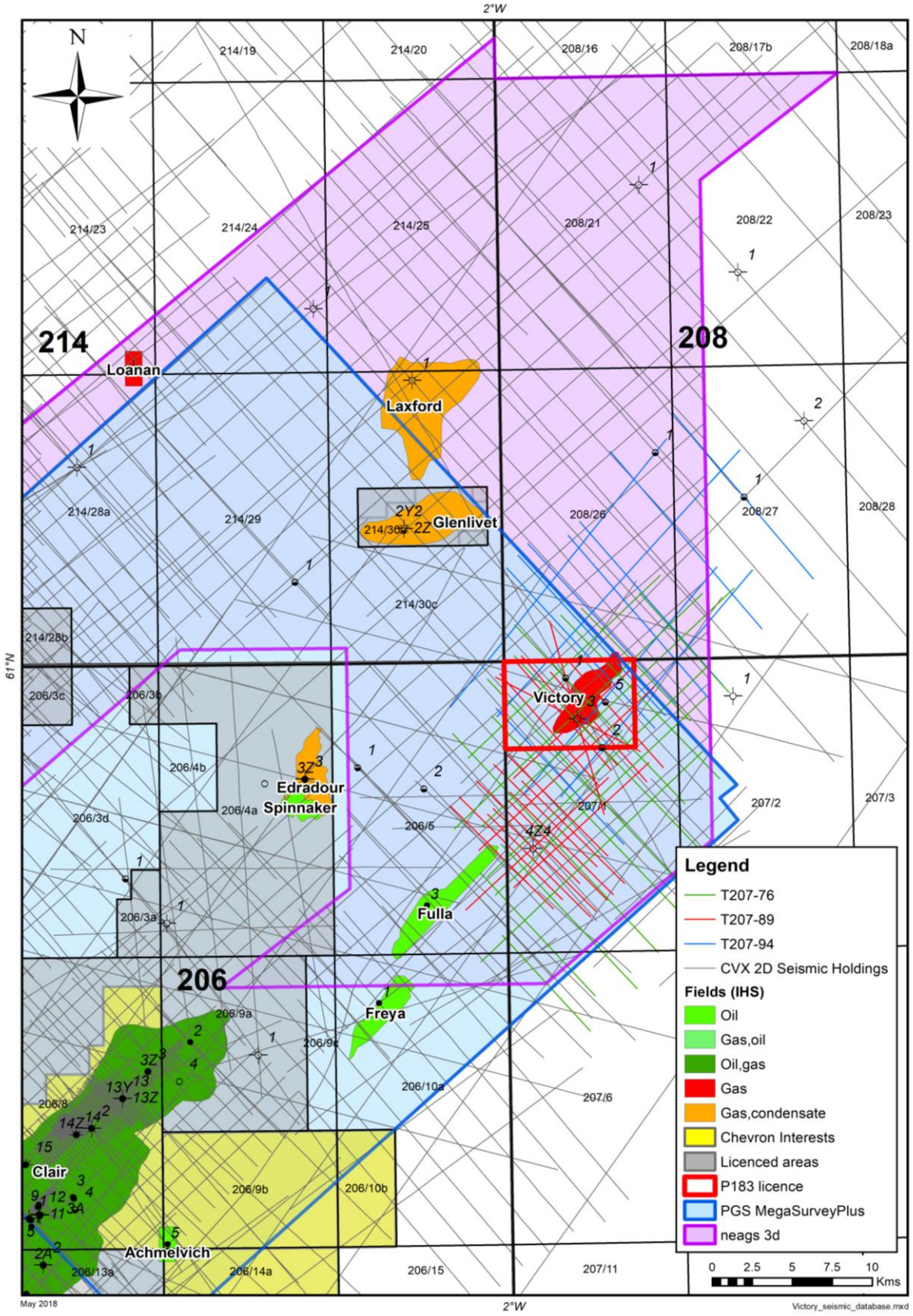

Figure 4. P183 seismic and well database.

3. Work Programme Summary

Five wells were drilled by Texaco North Sea U.K. Ltd. to test prospectivity and delineate the 207/1-3 gas discovery, summarised in Table 3. The first three wells were drilled consecutively in 1977 during the initial term of the licence. The fourth and fifth wells were drilled during the second term of the licence. The well locations are shown in Figure 2.

Well name	Year spudded	Well type	TD (ft, MD)	Current status	Original operator
207/1-1	1977	Exploration	4812	P&A with shows	Texaco North Sea U.K. Ltd.
207/1-2	1977	Exploration	5780	P&A with shows	Texaco North Sea U.K. Ltd.
207/1-3	1977	Exploration	4706	P&A gas discovery	Texaco North Sea U.K. Ltd.
207/1a-4&4Z	1990	Exploration	8800	P&A	Texaco North Sea U.K. Ltd.
207/1a-5	1996	Appraisal	4920	P&A with shows	Texaco North Sea U.K. Ltd.

Table 3. Exploration and appraisal wells drilled on licence P183.

4. Victory Discovered Resource Opportunity

4.1. Exploration history

The Victory gas field was discovered in 1977 following interpretation of 2D seismic data which indicated a structure with four-way dip closure overlying a NE-SW trending tilted fault block (Goodchild, *et al*, 1999). The primary aim was to penetrate a prognosed Jurassic sandstone reservoir with a secondary objective to find Cretaceous sandstones, however the Jurassic was not encountered. The trap is now confirmed to be a three-way dip closure on the footwall of the Rona Ridge combined with stratigraphic trapping elements in the overlying interval. The gross structure has remained as mapped from the time of discovery with 3D seismic data improving fault imaging. A seismic line through the trap is shown in Figure 5 and mid case top reservoir structure map in Figure 6.

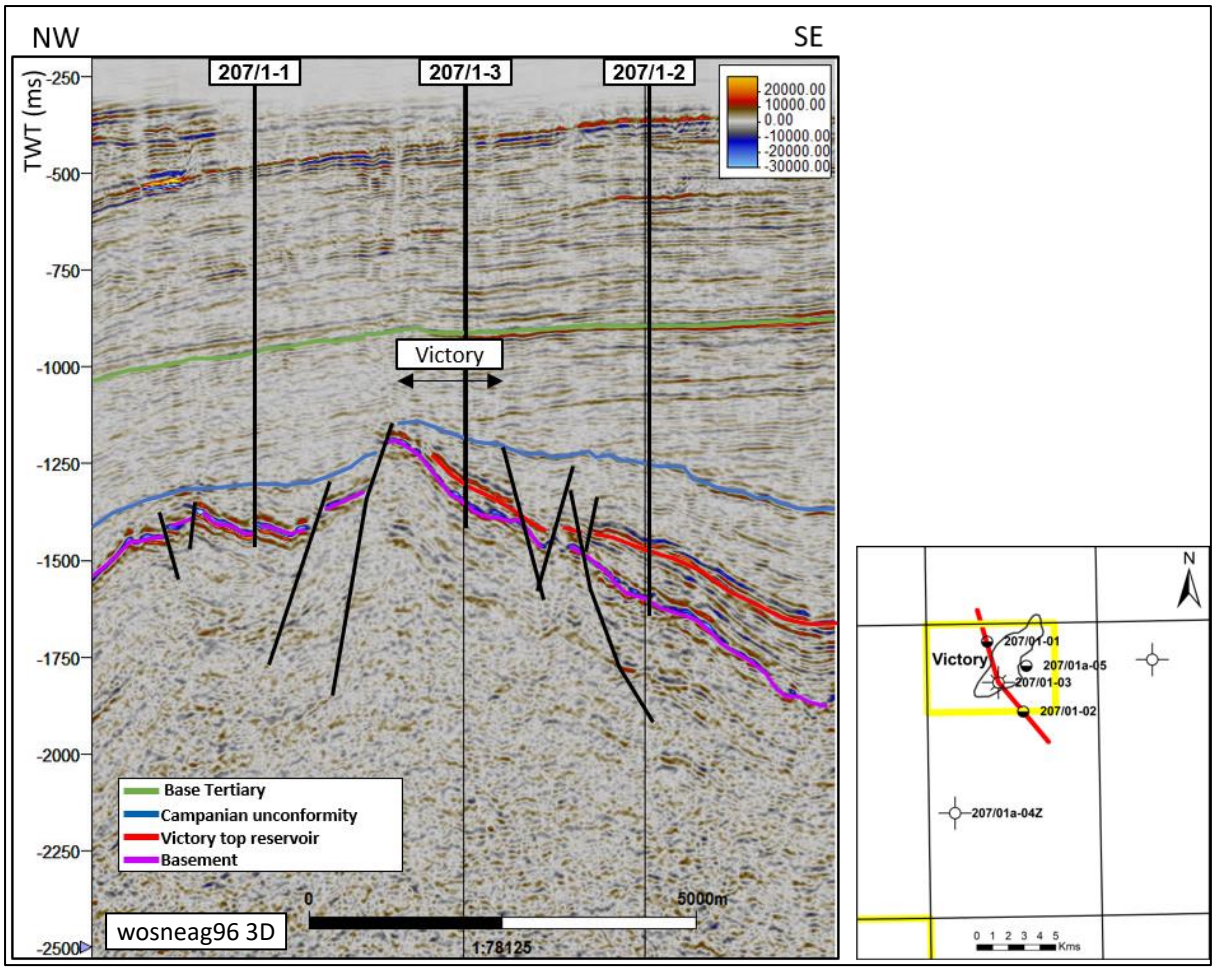

Figure 5. Seismic dip line through Victory discovery well (207/1-3). Victory top reservoir pinches out on the footwall of the Rona Ridge. 5x vertical exaggeration. Four main seismic events can be mapped: Base Tertiary, Late Campanian unconformity, top Lower Cretaceous (Victory top reservoir) and Base Cretaceous/Basement.

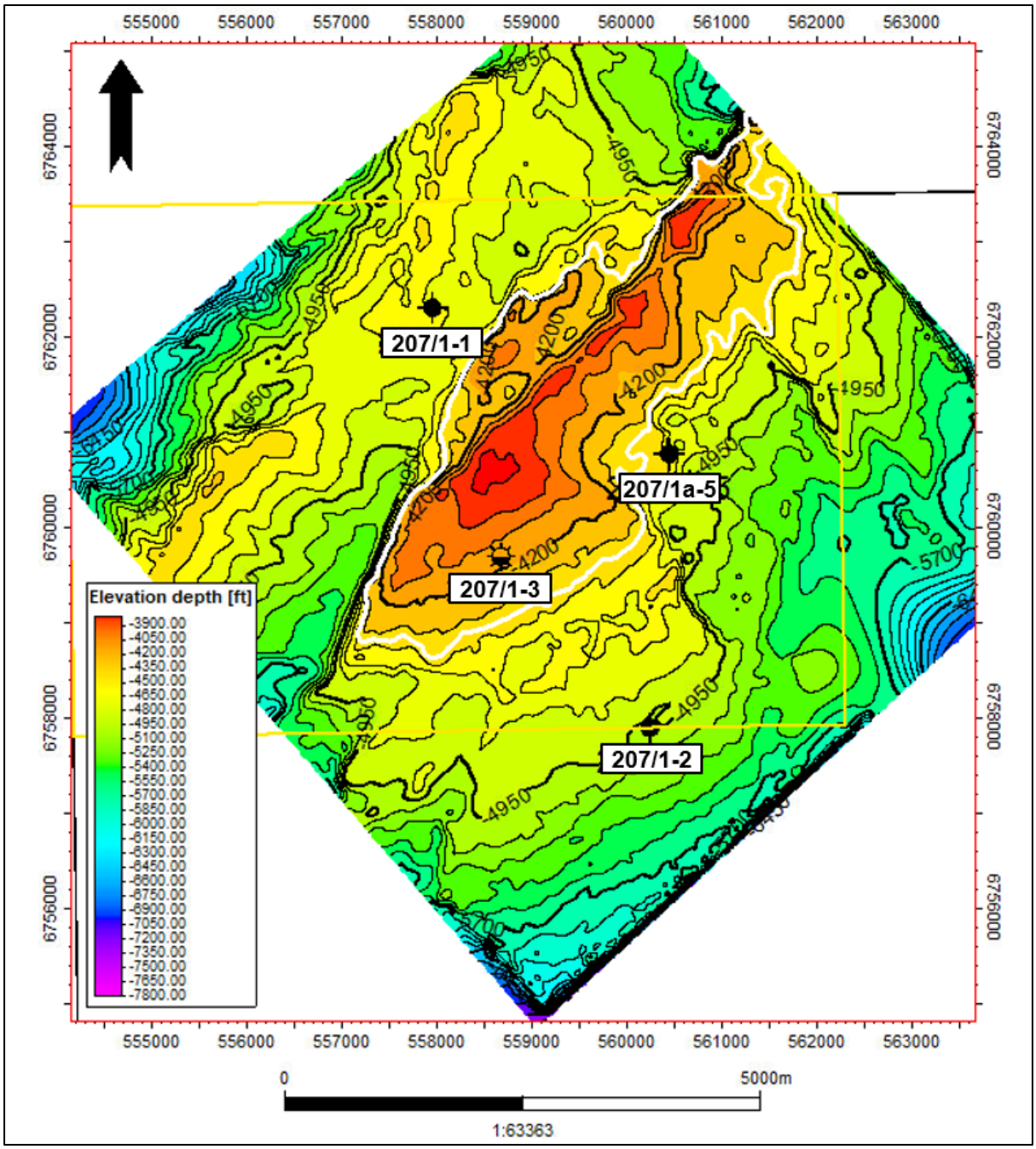

Figure 6. Victory field mid case top reservoir structure map (depth, ft). Three-way dip closure with up dip stratigraphic pinch out to the north west. Contour interval 150 ft. Mid case GWC 4431 ft TVDSS in white. Crest is 3714 ft TVDSS.

The first well, wildcat 207/1-1, drilled a downthrown fault closure and encountered 12 ft of tight Lower Cretaceous sandstone overlying Pre-Cambrian crystalline basement with oil shows at the base of the Tertiary. Two more wells were then drilled in the same year. Well 207/1-2, southeast of 207/1-1, encountered over 600 ft of good reservoir quality Lower Cretaceous sandstone exhibiting poor to moderate residual oil shows. This encouraged the drilling of well 207/1-3, further up-dip, close to the structural high. It encountered greater than 200 ft gas bearing column in high porosity (28%) and high net-to-gross (98%) Lower Cretaceous sandstone. Permeability ranges were from 200-4000 mD. A DST was run within the sandstone interval of 207/1-3 which briefly flowed dry gas of thermogenic origin, however the flow period was limited to 4 hours due to sand production. 207/1-3 also recorded poor

to good highly biodegraded oil shows throughout the reservoir and the basement. The CPI of the 207/1-3 discovery well is presented in Figure 7.

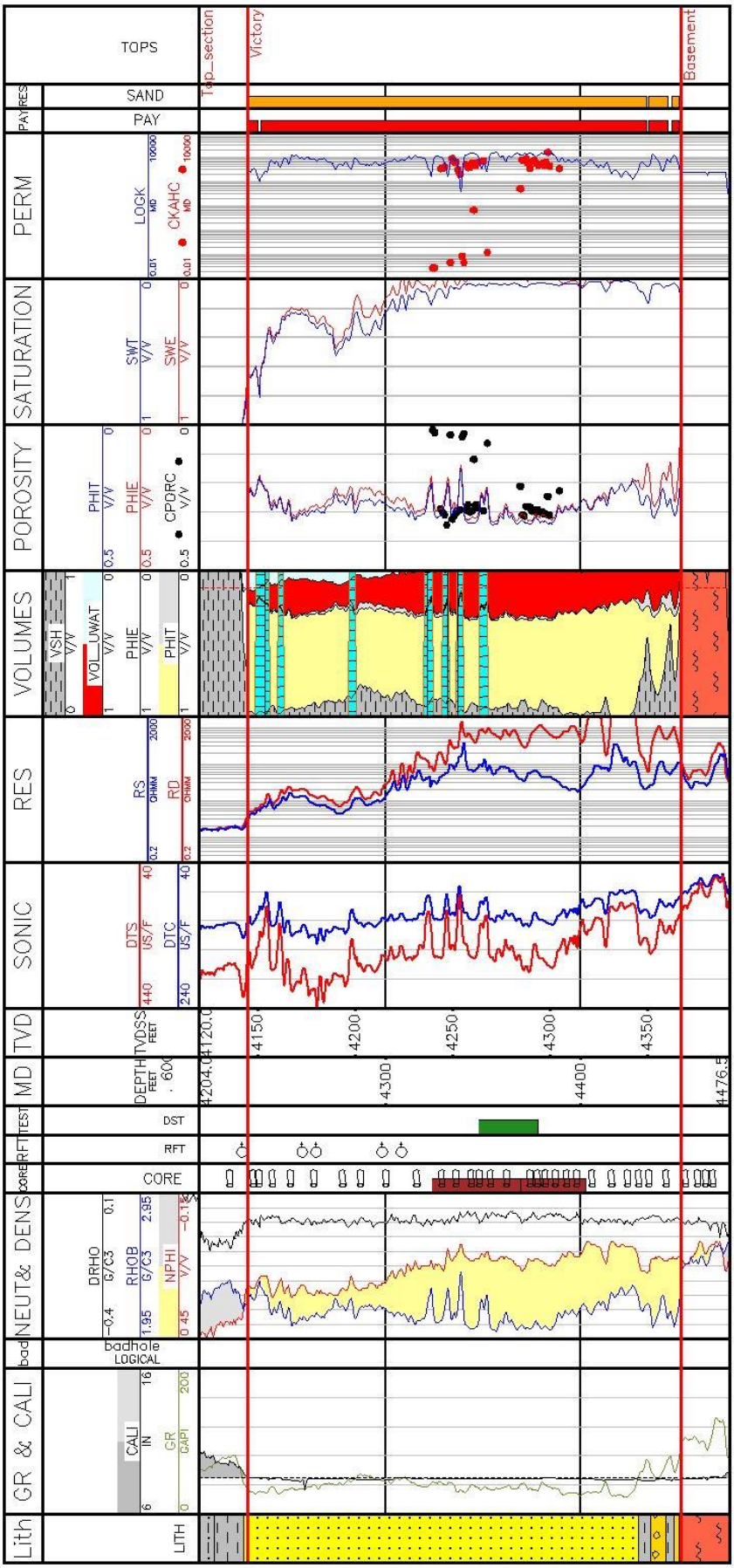

Figure 7. CPI of Victory discovery well 207/1-3.

A fourth well was drilled in 1990; 207/1a-4 with a step out 207/1a-4Z, into a separate structure south of Victory which was deemed prospective. The objectives were to test Lower Cretaceous, Jurassic and Carboniferous sandstones. The three intervals were encountered by 207/1a-4Z however the sandstones were water wet. A fifth well 207/1a-5 followed in 1996, to assess the possibility of an oil column present beneath the 207/1-3 gas discovery and up dip of the oil shows in 207/1-2, however RFT data confirmed the sandstones to be water saturated. Core was cut from the Lower Cretaceous in wells 207/1-3 (59.5 ft) and 207/1a-5 (81.5 ft). A summary of the petrophysical properties of the Lower Cretaceous in each well is presented in Table 4.

Well name	Gross thickness (ft)	Net thickness (ft)	NTG	PHIT (average)	SWT (average)	Vshale
207/1-1	12	2.5	0.21	0.07	0.34	0.33
207/1-2	688	668.78	0.97	0.27	0.92	0.12
207/1-3	222.5	218.25	0.98	0.28	0.16	0.09
207/1a-4&4Z	1086.8	532.8	0.49	0.19	0.94	0.28
207/1a-5	194	190.8	0.98	0.19	0.96	0.22

Table 4. Petrophysical summary for the Lower Cretaceous of wells drilled within P183. NTG – net to gross; PHIT – total porosity; SWT – total water saturation; VSH – shale percentage.

All wells on the trend were drilled based on 2D seismic data. These 2D data were of sufficient quality to identify gross structure however fault trend mapping was challenged. In 1996, 3D seismic data were acquired over the area which improved resolution and data quality, and particularly improved the confidence in fault mapping. Further 2D seismic data purchased in 2007 (TGS North Sea Renaissance; NSR) showed improved imaging with reduced noise in the dataset, particularly with regard to multiple contamination (Figure 8).

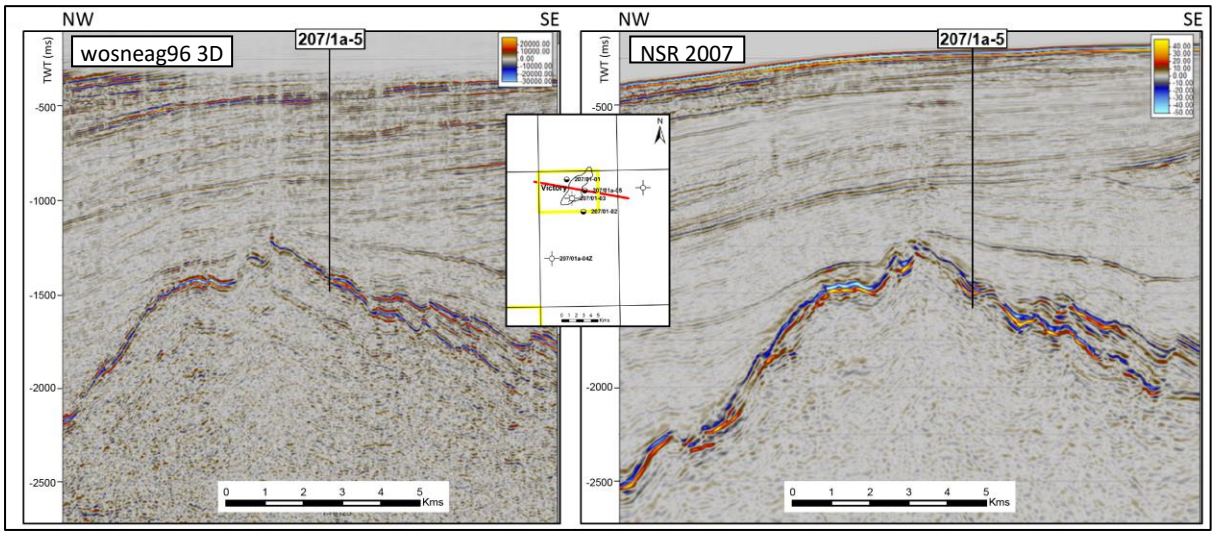

Figure 8. Comparison between 1996 3D seismic data (left) and 2007 2D seismic data (right) with improved signal to noise ratio. 5x vertical exaggeration. NSR 2007 data courtesy of TGS Geophysical Co. UK Ltd.

4.2. Petroleum system

The Rona Ridge is a long-lived NE-SW trending high comprising regional scale tilted fault blocks and composed of basement, defined as Precambrian metamorphic rock. The preserved overlying strata at

Victory are the Lower Cretaceous 'Victory Formation' Aptian-Albian age upper to lower shoreface sandstone deposits which form the gas reservoir. The base of the reservoir package is characterised by conglomerates, fining up to a thick stack of sandstones that are medium to coarse grained. Prior to the exploration drilling on P183, few wells had been drilled along the Rona Ridge. Top seal is the regionally extensive Upper Cretaceous mudstones. Source rock is the prolific Kimmeridge Clay which is deposited in the Faroe-Shetland basin and hydrocarbon migration is up dip through bounding faults. The presence of both mobile, free gas and biodegraded oils suggests multiple hydrocarbon charge and alteration episodes. Analysis of the gas composition indicates methane levels of up to 98% which is generated from a mature later stage oil prone source. Evidence of early oil charge comes from biodegraded residual oils in samples taken from wells 207/1-3 and 207/1a-5. Uplift in the Oligo-Miocene may have caused gas leakage as the trap is not considered full-to-spill. The petroleum systems diagram is presented in Figure 9 and Figure 10 shows the petroleum system elements in the context of the stratigraphic column.

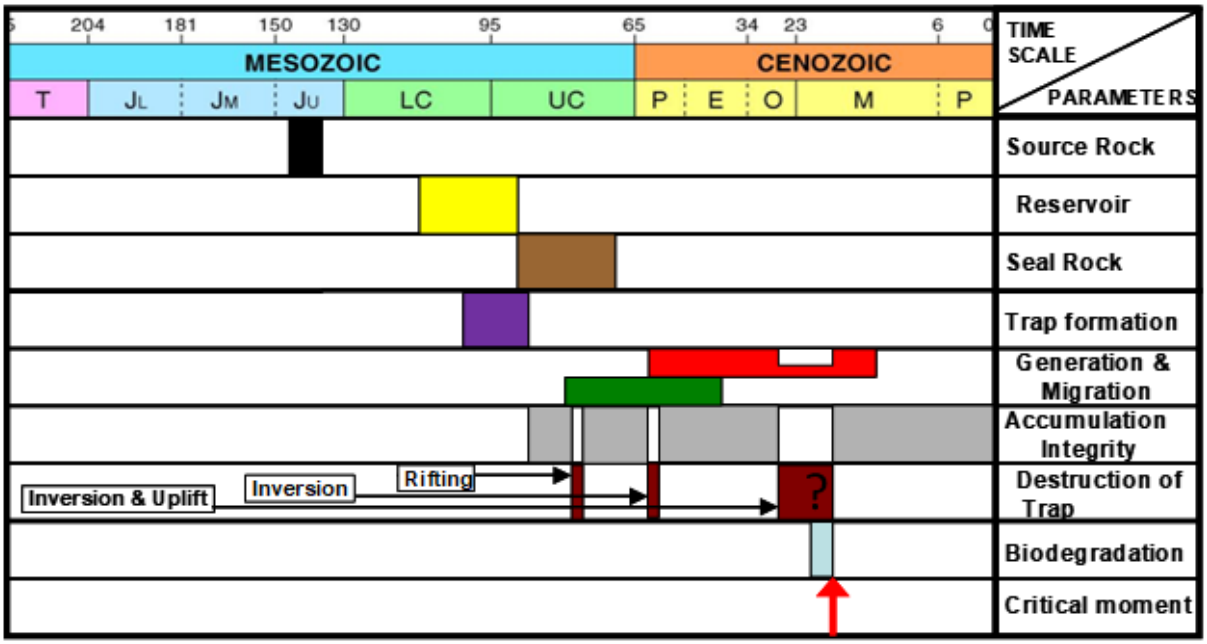

Figure 9. Petroleum systems diagram for the Victory gas discovery.

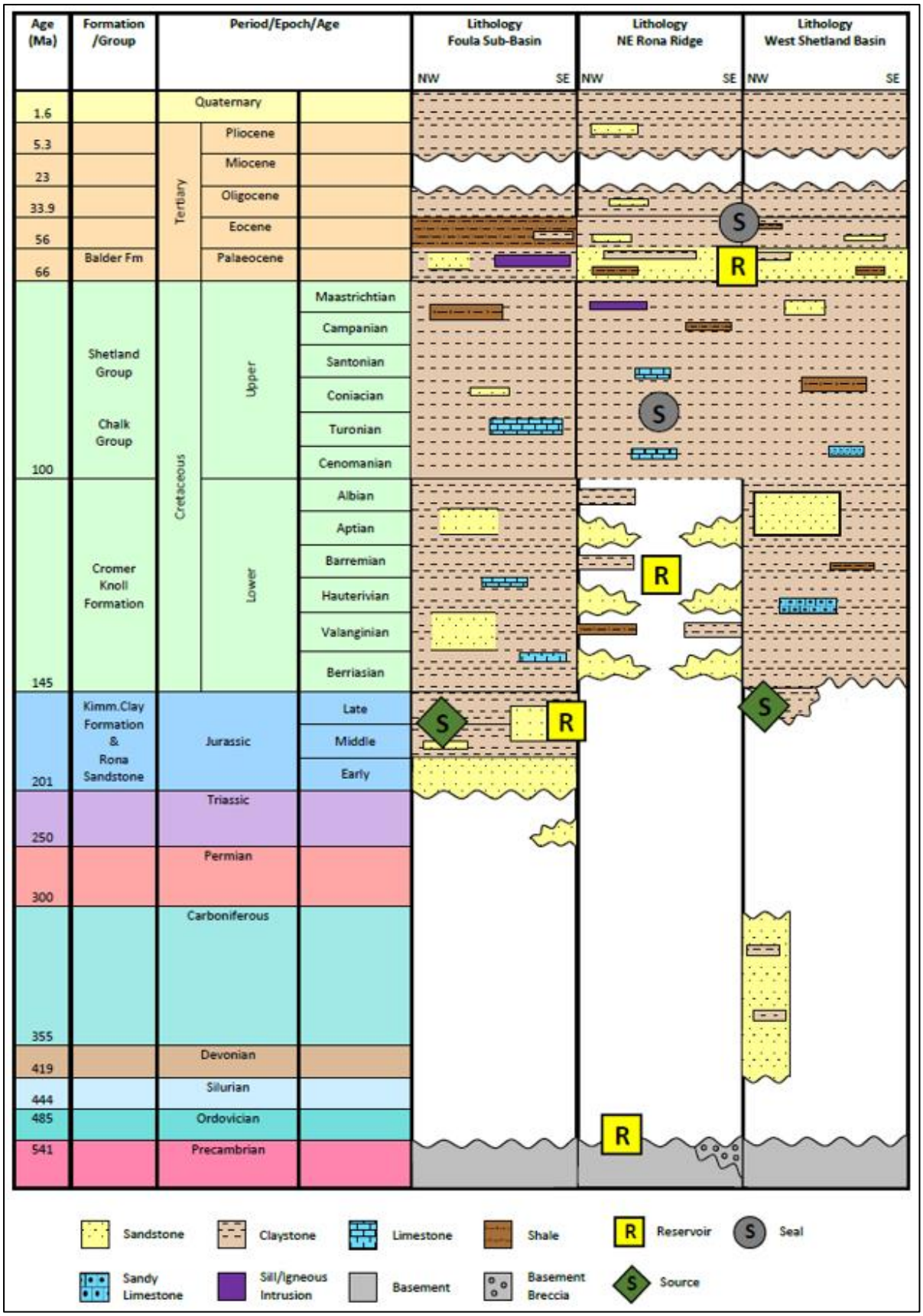

Figure 10. West of Shetlands stratigraphic column and petroleum system of the Rona Ridge and flanking basins. Victory reservoirs are Aptian-Albian age. Other possible reservoirs are represented on the column: Palaeocene (example: Laggan-Tormore), Jurassic and Precambrian basement (examples: Clair, Lancaster).

Exploration and appraisal well drilling has delineated the field extent, however the up-dip extent of the stratigraphic pinch out is uncertain due to limitations in seismic resolution. The gas is underlain by an aquifer however a gas-water contact (GWC) has not been penetrated, a 'gas down to' (GDT, 4367 ft TVDSS) only has been determined. There is a flat spot interpreted to correspond to the GWC observed on seismic data. The mid case GWC is 4431 ft TVDSS based on pressures collected from Victory wells and the resulting intersection between water and gas gradients. The depth of the GWC is the largest uncertainty with respect to the volumetrics. A geoseismic cross section is presented in Figure 11.

It has been suggested that there may be additional prospectivity within the fractured Precambrian basement. This was tested with a DST on discovery well 207/1-3 however no hydrocarbons were recovered. No further prospectivity is identified over block 207/1a.

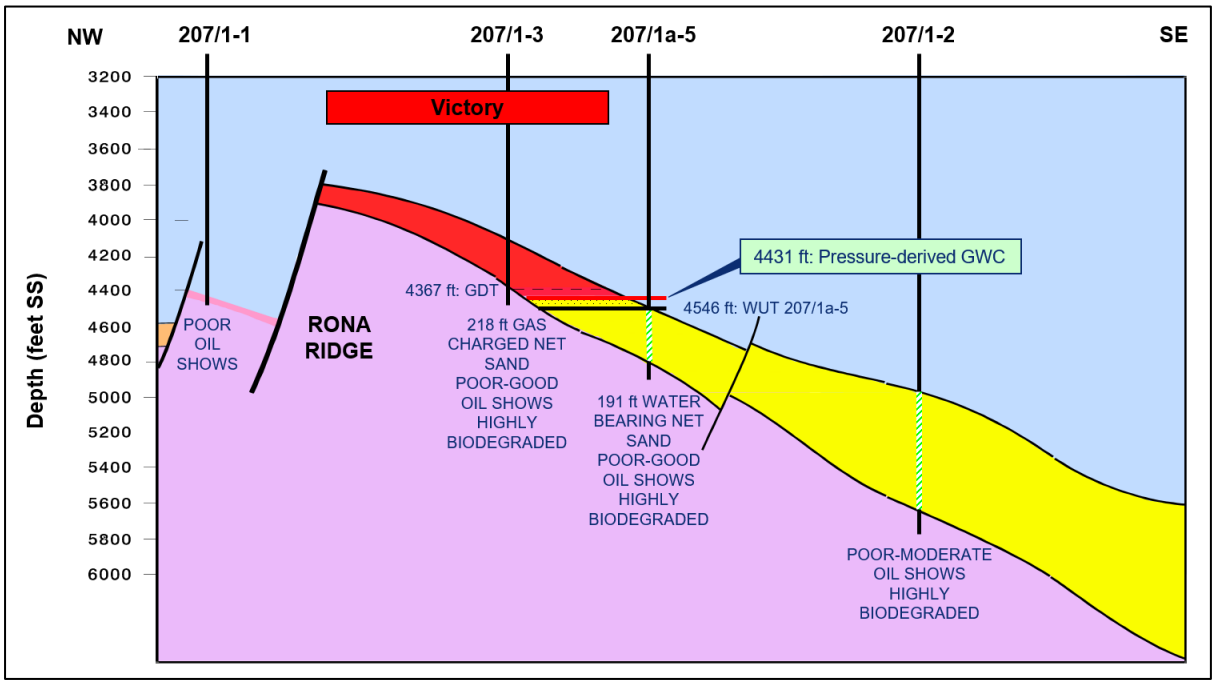

Figure 11. Geoseismic section across the Victory gas discovery.

4.3. Further technical work undertaken

Several subsurface evaluations and modelling efforts have been undertaken of Victory to determine volumetrics and therefore development potential. A full subsurface refresh was carried out in 2013 which included seismic interpretation, petrophysics, reservoir properties from seismic studies, static & dynamic modelling and well design.

The main subsurface uncertainties are depth of GWC and the extent and properties of reservoir sands.

4.3.1. Geophysics

Rock physics studies were carried out in 1998 to ascertain if seismic data can be used to predict the distribution of gas sands. AVO modelling showed that gas sand could be detected, however the technique is not able to differentiate thin wet sand and gas sand. Figure 12 illustrates the interpreted limit of the gas with the solid red line. The background trend representing water-

bearing sandstones is red on the map and ties the 207/1a-5 and 207/1-2 wells. Well 207/1-3 is sited within the interpreted gas zone (black). Faults which compartmentalize the structure do not restrict the gas to the fault block penetrated by 207/1-3. There is complexity around 207/1-1 where AVO is not able to differentiate the thin (12 ft gross thickness) wet sand from the gas sand. The AVO results were used to infer that faults do not compartmentalize the structure.

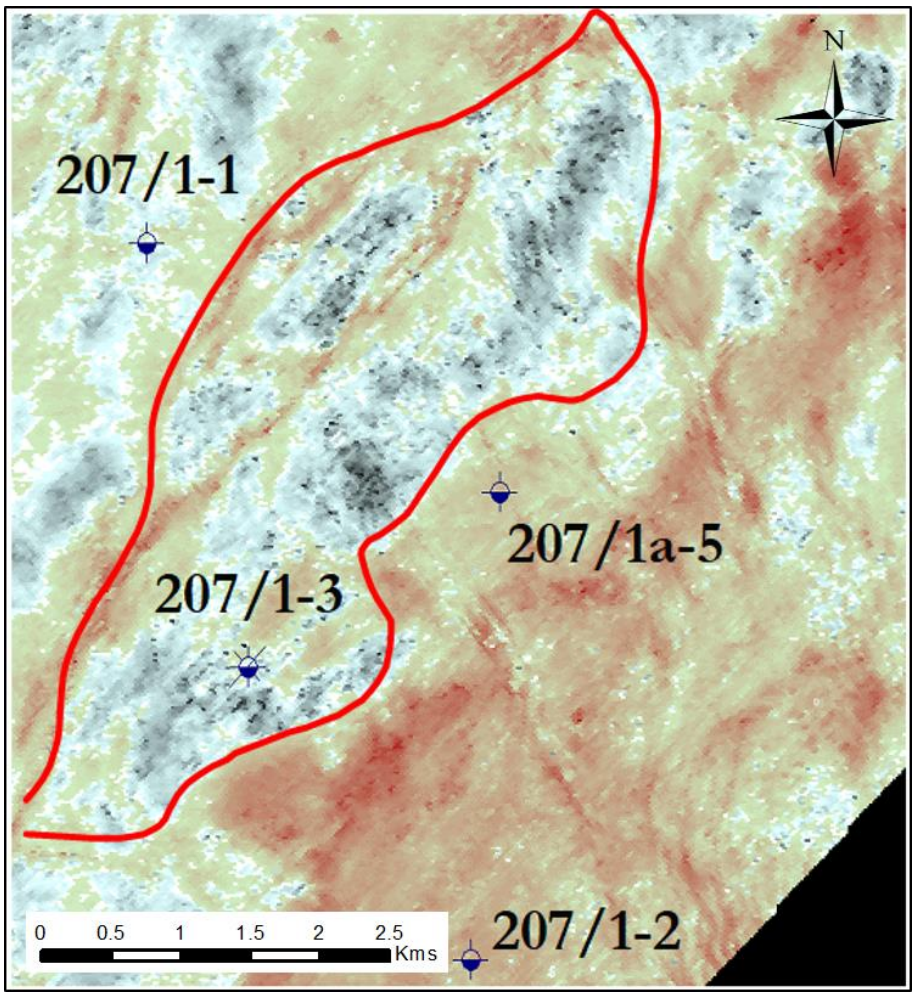

Figure 12. Difference section shear impedance minus acoustic impedance.

Seismic modelling was carried out to validate that the interpreted flat spot was due to the presence of a GWC. It was shown that for sand with a porosity of greater than 20% it is expected that a GWC could be imaged on seismic data (Figure 13).

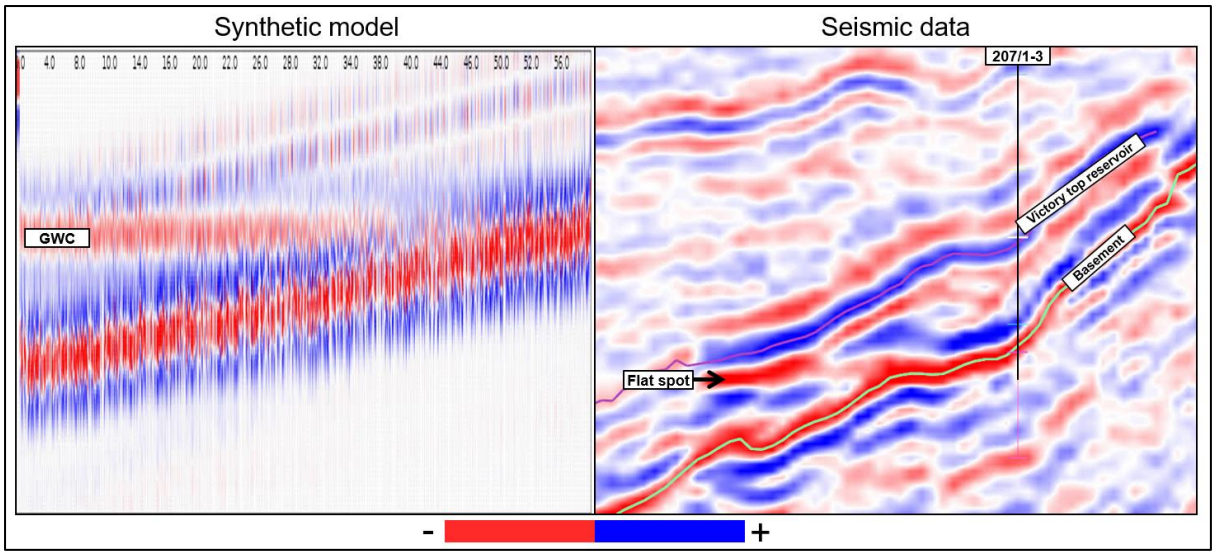

Figure 13. Left: synthetic seismic modelling showing predicted GWC; right: flat spot interpreted to correspond to GWC imaged on seismic data. Increase in acoustic impedance is red trough.

4.3.2. Additional studies

Geological studies were undertaken with external vendors and a full listing can be obtained through CDA along with the well data. Some examples of the studies are:

- Geochem Group Limited – Biostratigraphy and Lithostratigraphy of 207/1a-5 and 207/1-2
- Corex Special Core Analysis for 207/1a-5
- Robertson – Geochemistry Oil Analysis
- Oilphase Fluid Properties Estimation for 207/1a-5 and PVT Study
- Badley Ashton – Assessment of Lower Cretaceous reservoir quality in 207/1a-5
- Robertson – Stratigraphy of 207/1a-4&4Z
- Core Laboratories, Inc. – Core Analysis of 207/1-3
- Robertson Research International Limited – Biostratigraphy of 207/1-2
- Geolab UK – Sidewall core geochemistry, 207/1-2
- GeoChem Laboratories U.K. Limited – Vitrinite Reflectance on 207/1-2

4.4. Resource summary

A probabilistic range for in-place volume was generated by inputting low, mid and high scenarios for top reservoir, and six GWC depths and distributions for the reservoir properties were input to Chevron's proprietary eVolUM tool. eVolUM generates a probabilistic range for hydrocarbons in place using the user defined inputs, which may be in the form of distributions, for parameters such as porosity, NTG, etc. The parameter with the largest uncertainty is the GWC depth; the range of GWC depths is presented in Table 5.

GWC depth (ft)	-4367	-4422	-4431	-4442	-4450	-4546

Table 5. Range of GWC depths used for Victory resource assessment.

The reservoir and fluid property inputs are presented in Table 6 along with the resulting in-place resource range.

Parameter	P90	P50	P10
NTG (v/v)	0.7	0.9	0.98
Porosity (v/v)	0.2	0.24	0.28
Hydrocarbon saturation (v/v)	0.8	0.84	0.86
Formation volume factor (rbbl/stbbl)	0.00698	0.007115	0.00725
RESULTS			
In-place resource (bcf)	**81**	**115**	**167**

Table 6. Inputs for Victory volumetric range.

4.5. Development options and production profiles

The Laggan, Tormore, Edradour and Glenlivet gas fields and their associated subsea production systems together with the Shetland Gas Plant (SGP) make up the Greater Laggan Area (GLA) development in the West of Shetlands. Laggan and Tormore came on production in Q1 2016 with Edradour and Glenlivet tied in subsequently in Q3 2017.

The Victory discovery lies in proximity to the Edradour and Glenlivet fields. The two subsea fields produce into two multiphase flow lines tied back to the Shetland Gas Plant 143 km to the south east.

Development options are based on tie-in to the Greater Laggan infrastructure which is operated by Total. The viability of a Victory development is dependent upon the feasibility of tie-in to the GLA export system. The two options for tie in points to the pipeline are the Edradour Manifold and the HTT-2 Hot Tap (Figure 14).

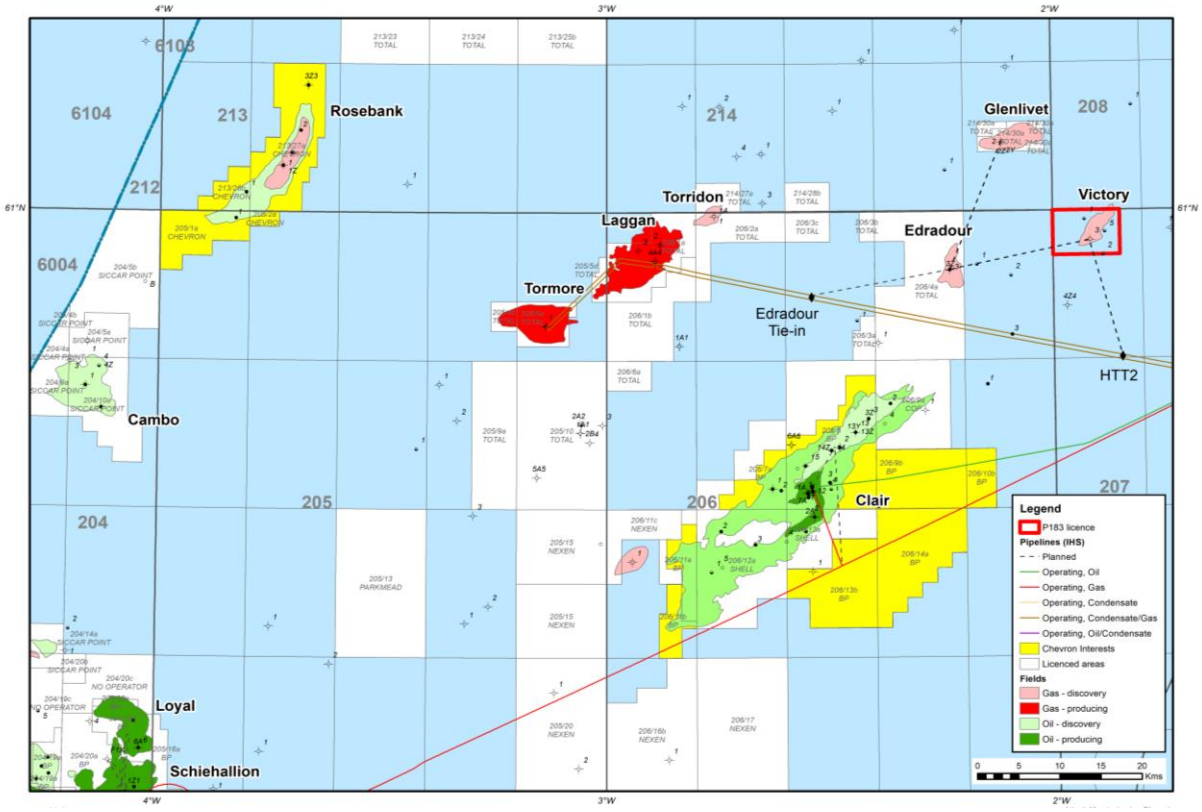

Figure 14. Greater Laggan area development and tie in points for Victory development.

Production profiles for both development options have been generated by Chevron Energy Technology Company (ETC; Figure 15) which form the basis for the resources presented in Table 7.

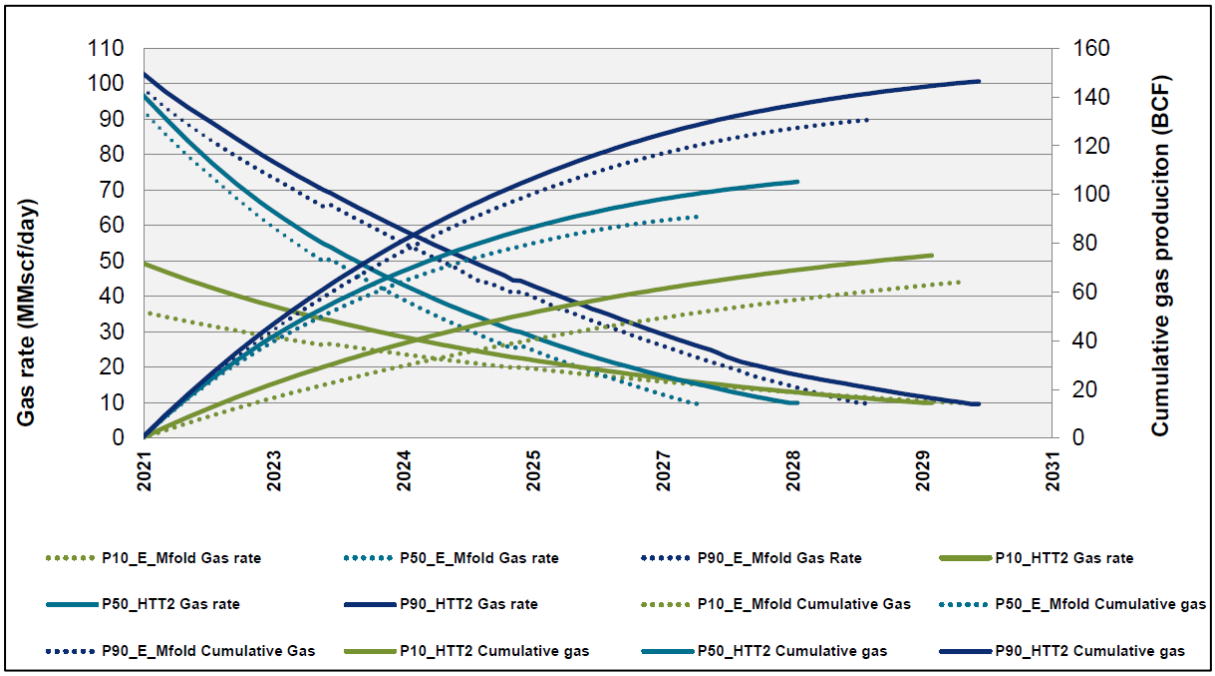

Figure 15. Victory gas field productivity comparing two development options. Profiles via the Edradour Manifold underperform by almost 20 bcf compared to export via HTT-2.

Provisional production profiles through the Edradour manifold appear to underperform by approximately 20 bcf compared to export via the HTTP2 hot tap given the higher back pressures.

Timing of peak production is controlled by the availability of pipeline capacity resulting in a ramp up of Victory gas through-put in early years.

Prospect / Lead / Discovery Name	PLD	Stratigraphic level	Offtake route	Unrisked recoverable resources Gas (bcf)			Geological Chance of Success (%)
				Low (P90)	Central (P50)	High (P10)	
Victory	D	Lower Cretaceous	'HTT2'	74	102	132	100
Victory	D	Lower Cretaceous	Edradour manifold	66	92	118	100

Table 7. Recoverable resource range for Victory field

Prior to relinquishment Chevron had considered the feasibility of production tie-in to GLA, however, a detailed scoping study was not completed.

Combined, these issues led to uncertainty in development economics resulting in Chevron's decision to relinquish the licence.

5. Conclusions

Licence P183 Block 207/1a Victory fallow gas discovery was relinquished upon expiry of the licence on 15 March 2018 due to uncertainty in export route and associated development economics.

6. References

Goodchild, M. W., Henry, K. L., Hinkley, R. J. & Imbus, S. W. (1999). *The Victory gas field, West of Shetland*. In: Geological Society, London, Petroleum Geology Conference series, 5, 713-724.

Clearance

OGA is free to publish the report and all third party ownership rights (on any contained data and/or interpretations) have been considered and appropriately cleared for publication purposes.