a·s Norske Shel
OLJELETINGS- OG UTVINNINGSAVDELINGE
(EXPLORATION AND PRODUCTION

Lic 054 partners

(Address List attached)

Forus, 13 February 1980

Dear Sirs,

EXPLORATION WELL PROPOSAL - 31/2-D

In line with our agreed programme, Norske Shell propose to drill an exploration well 31/2-D at SP 540 on line 79-406. The TD is 5000 m or in Palaeozoic formations (whichever comes first) in order to satisfy the Lic. 054 drilling obligation of one deep well in block 31/2.

The proposed location is 10 km NNW of 31/2-1 in a separate fault compartment near the crest of the Jurassic gas accumulation. This crestal area also coincides with the culminations of all deeper horizons that can be mapped.

The objectives of the well are two-fold:

a) The Palaeozoic or Early Triassic formations

- to test the possible presence of hydrocarbons in the structurally highest fault block of a deep structure in block 31/2
- to evaluate the reservoirs, seals and possible pre-Jurassic source rocks
- to determine the age of the as yet unpenetrated deeper horizons for a better understanding of the regional geologic setting
- to drill in a location without major faults

b) The Jurassic gas accumulation

- test hydrocarbons at a location of nearly maximum gross hydrocarbon column
- test lateral variations in reservoir characteristics

...../2

a·s Norske Shell
OLJELETINGS- OG UTVINNINGSAVDELINGEN
(EXPLORATION AND PRODUCTION)

Tel. 045-76100
P. O. Box 10, N-4033 Forus
Telex 33046 shelp n

Lic 054 partners

(Address List attached)

Deres ref.
Your ref.

Vår ref.
Our ref. EPX/tr

Forus, 13 February 1980

Dear Sirs,

EXPLORATION WELL PROPOSAL - 31/2-D (31/2-4)

In line with our agreed programme, Norske Shell propose to drill an exploration well 31/2-D at SP 540 on line 79-406. The TD is 5000 m or in Palaeozoic formations (whichever comes first) in order to satisfy the Lic. 054 drilling obligation of one deep well in block 31/2.

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...../2

CONFIDENTIAL

NSEP-79

A/S NORSKE SHELL

PRODUCTION LICENCE 054

BLOCK 31/2

EXLORATION WELL PROPOSAL 31/2-D

A/S NORSKE SHELL
FORUS

FEBRUARY 1980

31/2-D WELL PROPOSAL

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1. INTRODUCTION

It is proposed to drill an exploration well 31/2-D in block 31/2 on seismic line 79-406 at shotpoint 540. The location is in a waterdepth of 335 m and proposed TD is 5000 m or in Palaeozoic formations, whatever comes first. This well will satisfy the concession commitment of a deep test in block 31/2.

The co-ordinates for the well are:

Latitude 60° 51' 23.5"N
Longitude 03° 30' 45.6"E

The proposed location is 10 km NNW of 31/2-1 in a separate fault compartment near the crest of the Jurassic gas accumulation. This crestal area appears also to coincide with the culminations of all the deeper horizons that can be mapped.

The objectives of the well are two-fold:

a) The Palaeozoic or Early Triassic formations

- to test the possible presence of hydrocarbons in the structurally highest fault block of a deep structure in block 31/2.
- to evaluate the reservoirs, seals and possible pre-Jurassic source rocks
- to determine the age of the as yet unpenetrated deeper horizons for a better understanding of the regional geologic setting.
- to drill in a location without major faults

b) The Jurassic gas accumulation

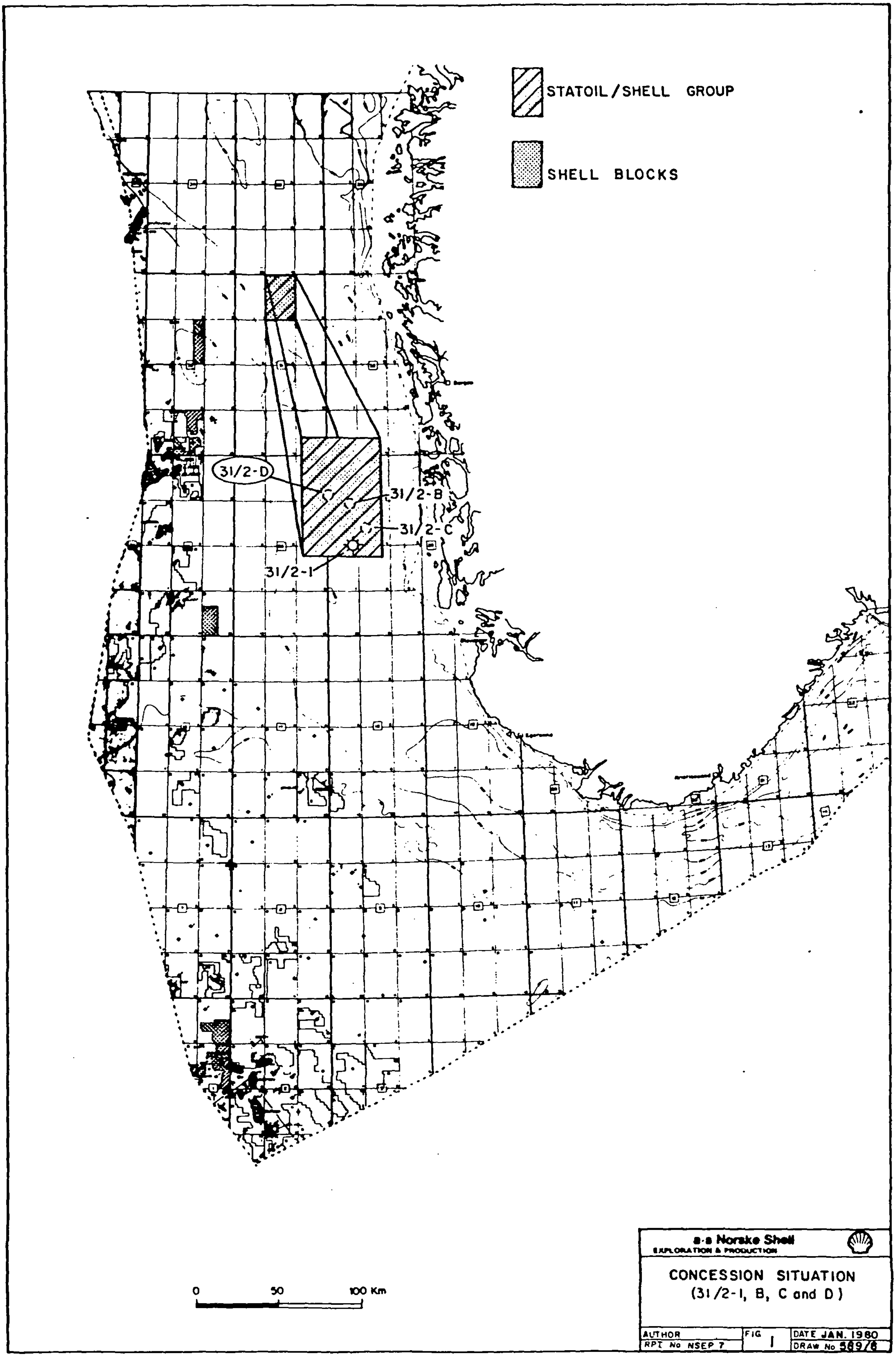
- test hydrocarbons at a location of nearly maximum gross hydrocarbon column.
- test lateral variations in reservoir characteristics

2. CONCESSION SITUATION (Fig. 1)

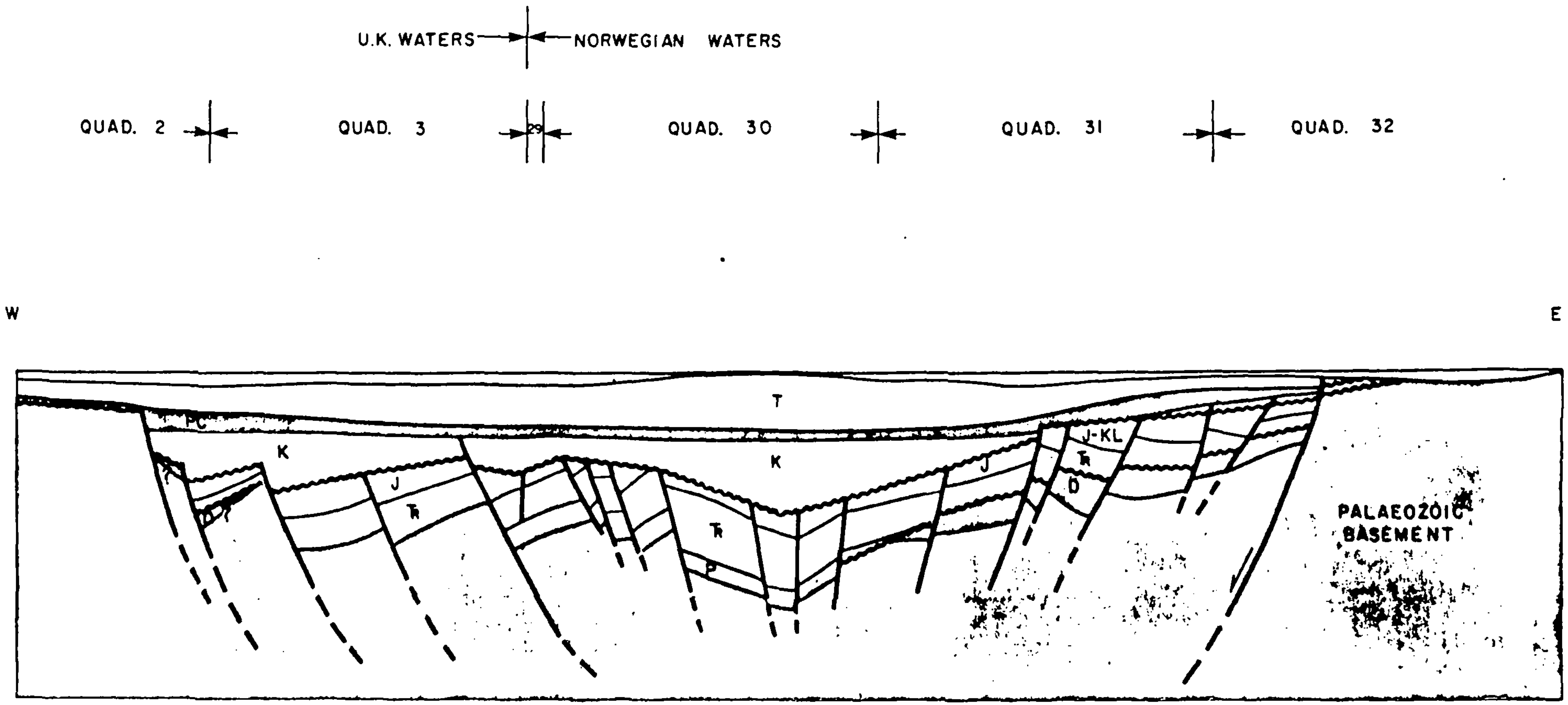
The concession carries a six well commitment, one of which must reach the Palaeozoic or a maximum of 5000 m. The other five wells must fully penetrate the prospective Jurassic sequence and bottom in Triassic or older sediments. Well 31/2-1 satisfied the Triassic requirement, and 31/2-D should satisfy the deep test requirement.

3. REGIONAL SETTING (Fig. 2)

The Flathead structure is located near the boundary between the Northern Viking Graben and the Horda Platform. It is formed by a large N-S trending tilted fault block, heavily broken by younger Jurassic faults in the north, but more gentle in the central and southern parts.



STATOIL/SHELL GROUP
SHELL BLOCKS
31/2-D
31/2-B
31/2-C
31/2-1
0
50
100 Km
a-s Norske Shell
EXPLORATION & PRODUCTION
CONCESSION SITUATION
(31/2-1, B, C and D)
AUTHOR
RPT No NSEP 7
FIG 1
DATE JAN. 1980
DRAW No 589/6

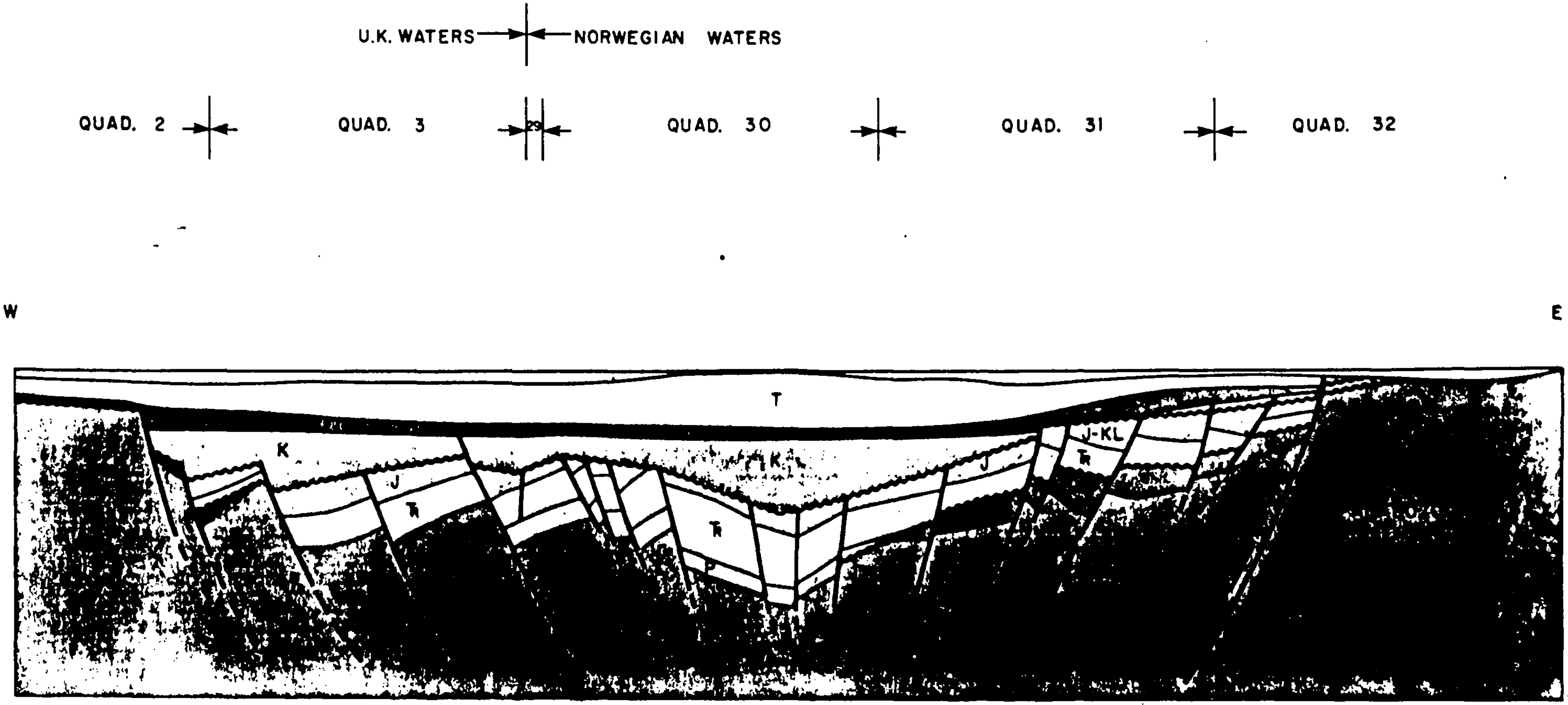


VERTICAL SCALE ca. 1: 200 000
HORIZONTAL SCALE 1: 1 000 000

a-s Norske Shell
EXPLORATION & PRODUCTION FORUS

NORTHERN NORTH SEA
SCHEMATIC CROSS SECTION

AUTHOR EPXT/13 FIG 2 DATE JAN 1980
REPORT NO NSEP 79 DRAW NO 589/9



VERTICAL SCALE ca. 1: 200 000
HORIZONTAL SCALE 1: 1000 000

a-s Norske Shell
EXPLORATION & PRODUCTION FORUS

NORTHERN NORTH SEA
SCHEMATIC CROSS SECTION

AUTHOR EPXT/13	FIG.	DATE JAN. 1980
REPORT NO NSEP 79	2	DRAW NO 589/9

P.L. 054 TECHNICAL SUBCOMMITTEE

COMPANY ADDRESS	TELEX TELEPHONE	DELEGATE	DEPUTY
A/S Norske Shell P.O. Box 10 4033 FORUS	33046 shelp n 045-76100	P.B. Watts (Chairman)	I.A.G. Willis
Statoil P.O. Box 300 4001 STAVANGER	33326 stato n 045-33180	P. Røise	P-T- Svela
Conoco Norway Inc. P.O. Box 488 4001 STAVANGER	33285 codrl n 045-28050	P.J. Eberlein	I. Gray
Superior Oil Norge P.O. Box 457 4601 KRISTIANSAND S	21959 042-25500	H.M. Hayes	J.P. Froning
Norsk Hydro A/S Bygdøy Allé 2 OSLO 2	17327 hydro n 02-423920	K.A. Oppebøen	F.E. Skaar
Norwegian Petroleum Directorate Lagårdsveien 80 4000 STAVANGER	33100 noped n 045-33160	F. Aamodt	I. Aarseth
Ministry of Petroleum and Energy P.O. Box 8148 OSLO - Dep.	18680 oedep n 02-119090	O.A. Lindseth	

Lic. 054 Partners EPX/tr 13.2.80

We are looking forward to reviewing the details of this location at the Lic. 054 Technical Sub-Committee meeting on Tuesday 19 February.

We would like to take this opportunity to make some general remarks on the forward drilling programme in Lic. 054.

The West Venture is expected to be towed to the 31/2-C location on or shortly after the 12 February. After drilling, coring and testing the 'C' location the rig should proceed to the deep location (31/2-D as proposed).

We understand that the Borgny Dolphin, currently drilling for Phillips, in the event that its present location is dry could be moving to block 31/2 by mid-March. If the Borgny Dolphin comes back this early Norske Shell as operator proposes that:

i) the rig first drill 31/2-B, thus re-entering and testing 31/2-1 later in better weather;

ii) drills 31/2-B to a TD of 3500 m in order to allow optimum design of the 31/2-D drilling programme and thus the best chance of achieving the TD of 5000 m in 31/2-D.

In the case that the Borgny Dolphin arrives later, the opportunity to drill 31/2-B deeper in time to influence the drilling programme of 31(2-D may lapse. Consequently we propose to submit the 31/2-B drilling programme to the NPD with a TD of 3500 m indicated as tentative only to be firmed up later. The programme must be submitted shortly in order to satisfy the NPD regulations.

We trust that this proposed course of action will meet with the approval of partners and look forward to discussing its technical merits at a forthcoming sub-committee meeting prior to seeking management committee approval.

Yours faithfully,
A/S NORSKE SHELL

PBWatts.

P.B. Watts
Exploration Manager E&P

4. STRATIGRAPHY (Enc. 9) (Figs. 2, 3, 4)

The Tertiary sequence of silty claystones is expected to be very similar to that encountered in 31/2-1. The Lower Palaeocene limestones and Cretaceous marls and claystones are thought to be absent over the crest of the Flathead structure, but a very thin Lower Cretaceous organic shale may be present.

The Jurassic/Triassic sequence is also expected to be similar to that penetrated in 31/2-1 (Fig. 3) described below.

The upper part of the section (Interval 4, (PT-OX)) consists of a coarse, well sorted, but poorly consolidated sandstone, with occasional finer bands. Porosities in this section average 36% with permeabilities in the Darcy range. This sequence is thought to represent a coastal bar/channel facies with lagoonal interbeds. Underlying it is a series of reworked, condensed beds and prograding units (Interval 3 (OX-CA)) representing shallow marine shoreline deposits, which, although rather finer and extremely micaceous, maintain porosities averaging 30% and permeability averaging 100 md. The gas-fluid contact should occur within this interval.

Interval 2 approximately coincides with the Bathonian and is a massive coastal sand, possibly a beach deposit, which overlies the paralic sandstone, coal claystone beds of Interval 1 (BJ-AA)

The Lower Jurassic - late Triassic can be divided into the deeper marine sands and claystones of the Dunlin Unit Equivalent, and the more continental sandstones of the Statfjord Formation Equivalent. A paralic coal group occurs in the Statfjord overlying the red claystones and sandstones of the Triassic Cormorant Formation.

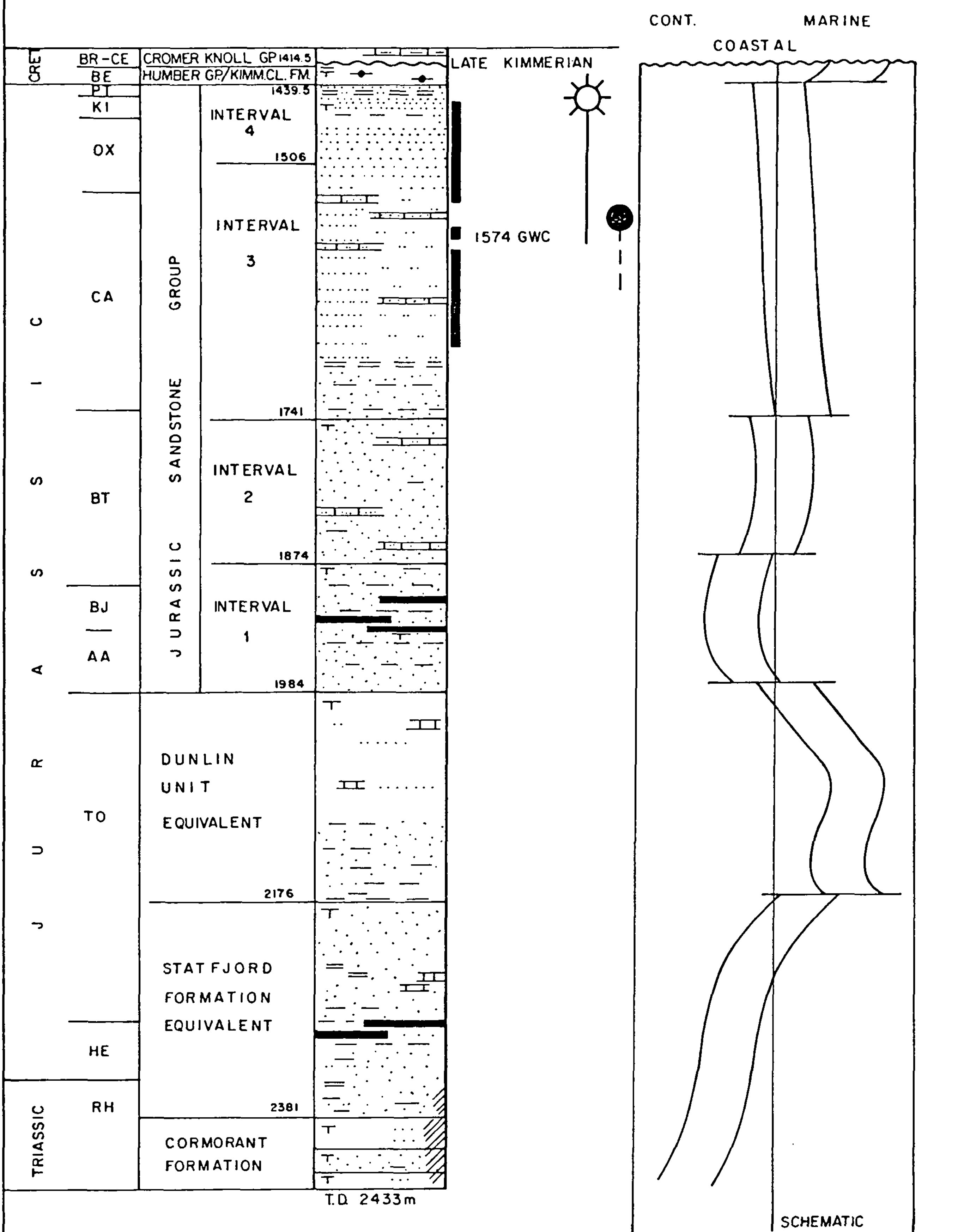
The Dunlin - Statfjord sequence thickens slightly westwards over the 31/2 block.

A considerable thickness of Triassic is expected in the 31/2-D location and is likely to consist of fine grained continental clastic deposits. A break in the seismic (U1) occurs at ca. 2750 m ss. which may reflect a lithology change within the Triassic (Encl. 4), though this cannot be mapped over a wide area.

Dipping reflections (U2, U3) are seen below the mapped Horizon D (Encl. 4) suggesting that 'D' is associated with or near an unconformity.

There are two main possibilities for the age of this event (i) an intra Triassic unconformity, one of the first phases of the Kimmerian movements. (ii) an unconformity at, or near top Palaeozoic.

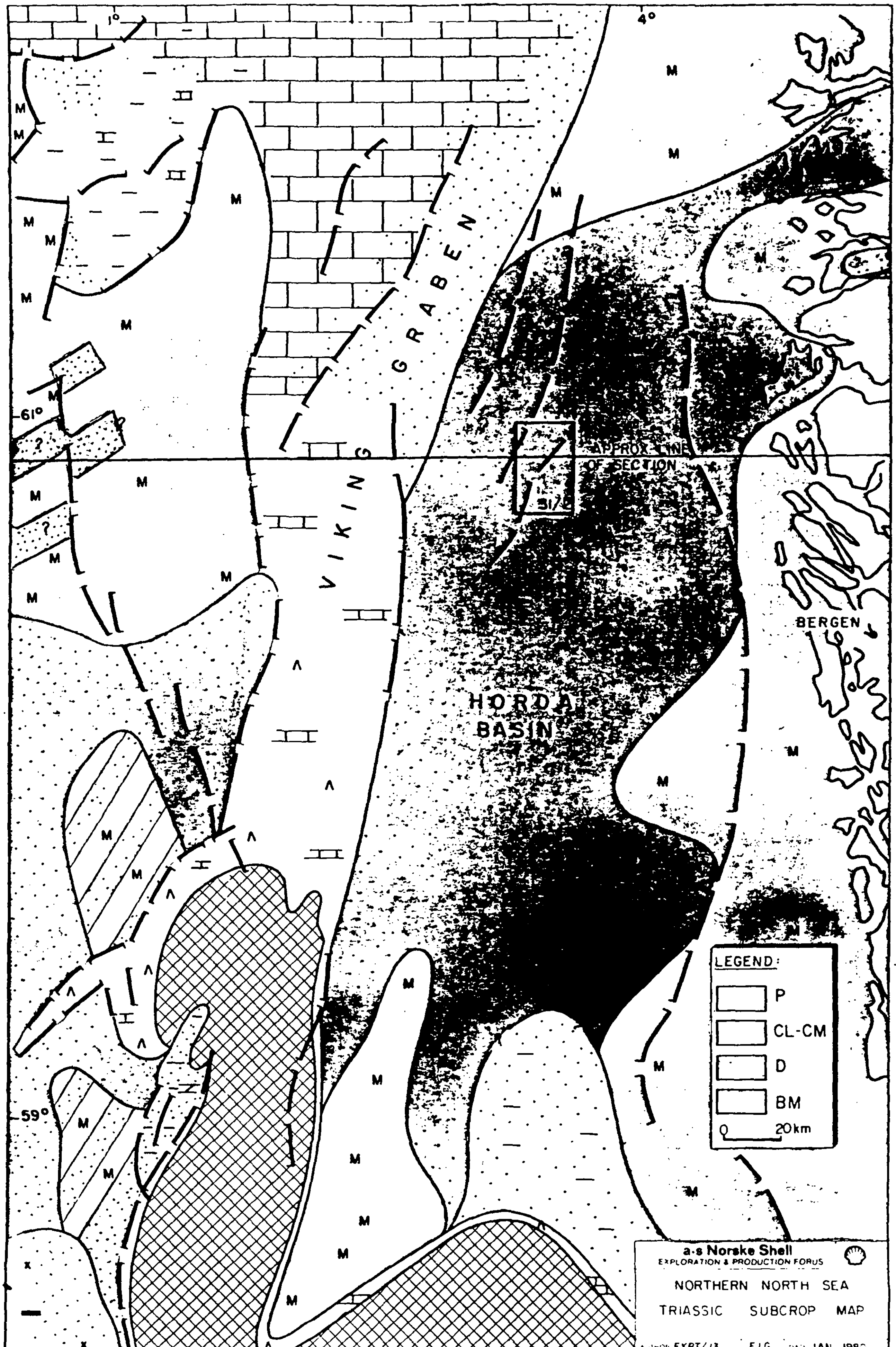
The presence of an onlapping Permian sequence below the Triassic is considered unlikely. A late Permian seaway has been postulated extending from an open sea in the north (Fig. 4), through the now Viking Graben to the northern salt basin. However, there is little evidence for the start of the subsidence of the Graben system at this time and the areas on the east and west would have remained high blocks. If Permian deposits were encountered they would be likely to be in either a sabkha or an arid red bed facies.



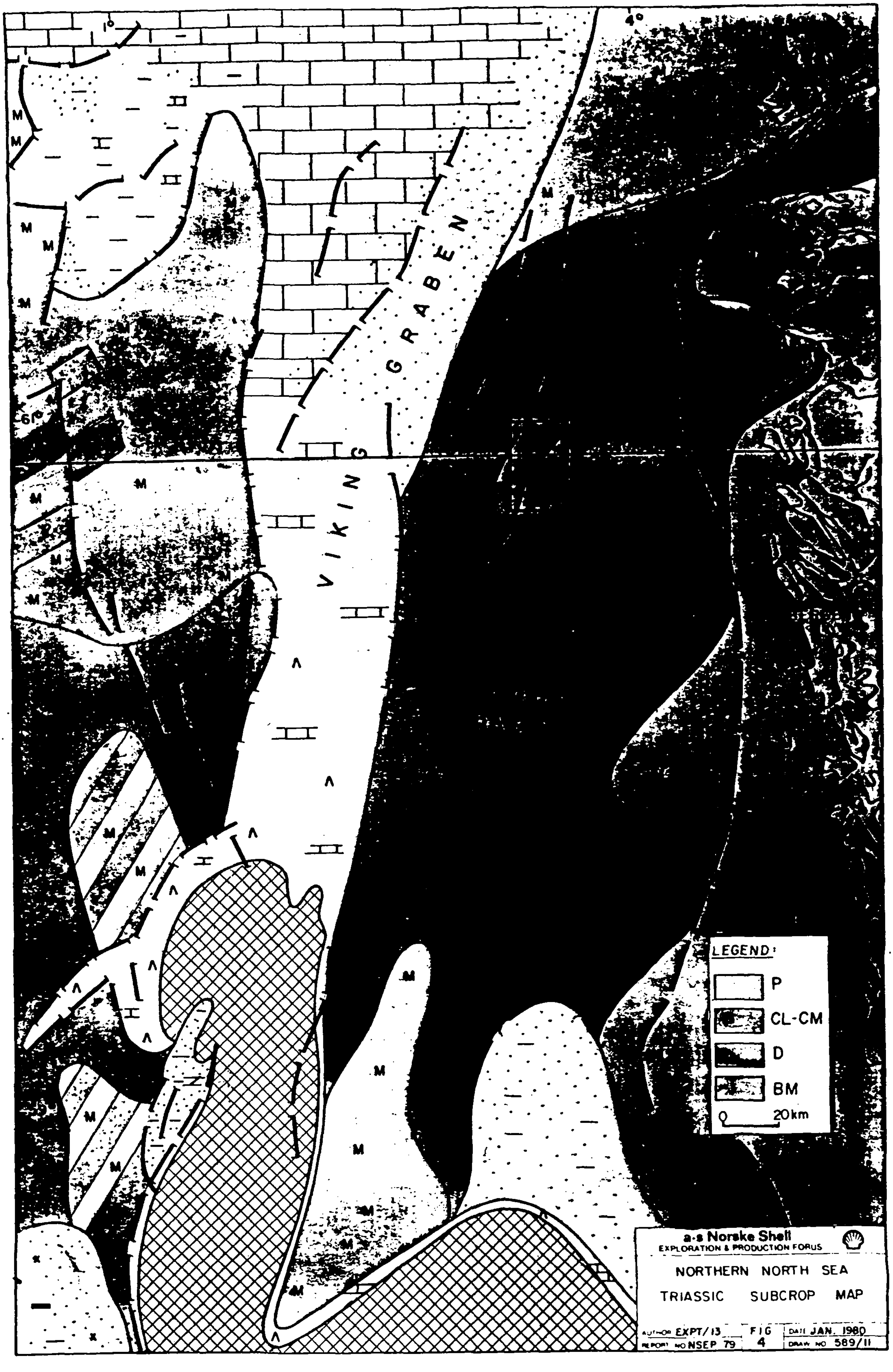
a·s Norske Shell
EXPLORATION & PRODUCTION FORUS

31/2-1
STRATIGRAPHY OF THE JURASSIC SECTION

AUTHOR EPXT/13	FIG.	DATE JAN. 1980
REPORT NO NSEP 79	3	DRAW NO 589/10



1°
4°
61°
59°
VIKING GRABEN
APPROX. LINE OF SECTION
31/2
HORDA BASIN
BERGEN
LEGEND:
P
CL-CM
D
BM
0 20km
a-s Norske Shell
EXPLORATION & PRODUCTION FORUS
NORTHERN NORTH SEA
TRIASSIC SUBCROP MAP
AUTHOR EXPT/13
REPORT NO NSEP 79
FIG 4
DATE JAN 1980
DRAW. NO 589/11



1°
4°
61°
VIKING GRABEN
M
LEGEND:
P
CL-CM
D
BM
20km
a·s Norske Shell
EXPLORATION & PRODUCTION FORUS
NORTHERN NORTH SEA
TRIASSIC SUBCROP MAP
AUTHOR EXPT/13
REPORT NO NSEP 79
FIG 4
DATE JAN. 1980
DRAW NO 589/11

It is generally thought that the Carboniferous basins of deposition did not extend very far north, and the most northerly penetratons in the North Sea are the Dinantian-Namunian deposits on the Mid North Sea High. However pre-Stephanian continental beds (Coal Measures?) are not absolutely discounted.

The strata penetrated below the Horizon 'D', in case ii, are most likely to be of Devonian age. Continental and lacustrine deposits of great thickness were built up in the intra montane basins, remnants of which are now found in Ireland, Scotland, West Norway, East Greenland and Svalbard. The Orcadian basin is thought to have extended across the North Sea from Eastern Scotland to Norway and drilling in the North Sea has to some extent confirmed this. Old Red Sandstone beds are found in the Hornelen Basin on the Norwegian Coast NW of 31/2, and may originally have been laterally extensive.

4. SEISMIC INTERPRETATION

4.1 Seismic Coverage

Block 31/2 is covered by a reasonably dense seismic grid of several different vintages, but at present migrated data is limited to the recently acquired 1979 survey of some 550 km. This survey is orientated in a predominantly NE-SW direction with a line spacing of about 1 km. (Fig. 5)

The quality of the migrated data is good and gives a reliable fault definition over the main structure at the Jurassic objective levels at 1.5 to 2.0 sec., but in the north the very complex faulting and a regional dip to the NW inhibit the accuracy of the migration.

Data quality at deeper levels in the section is far more varied. Experience gained during reprocessing of data through the 31/2-1 well location suggests that this mixed quality is caused by

i) a transparent seismic section

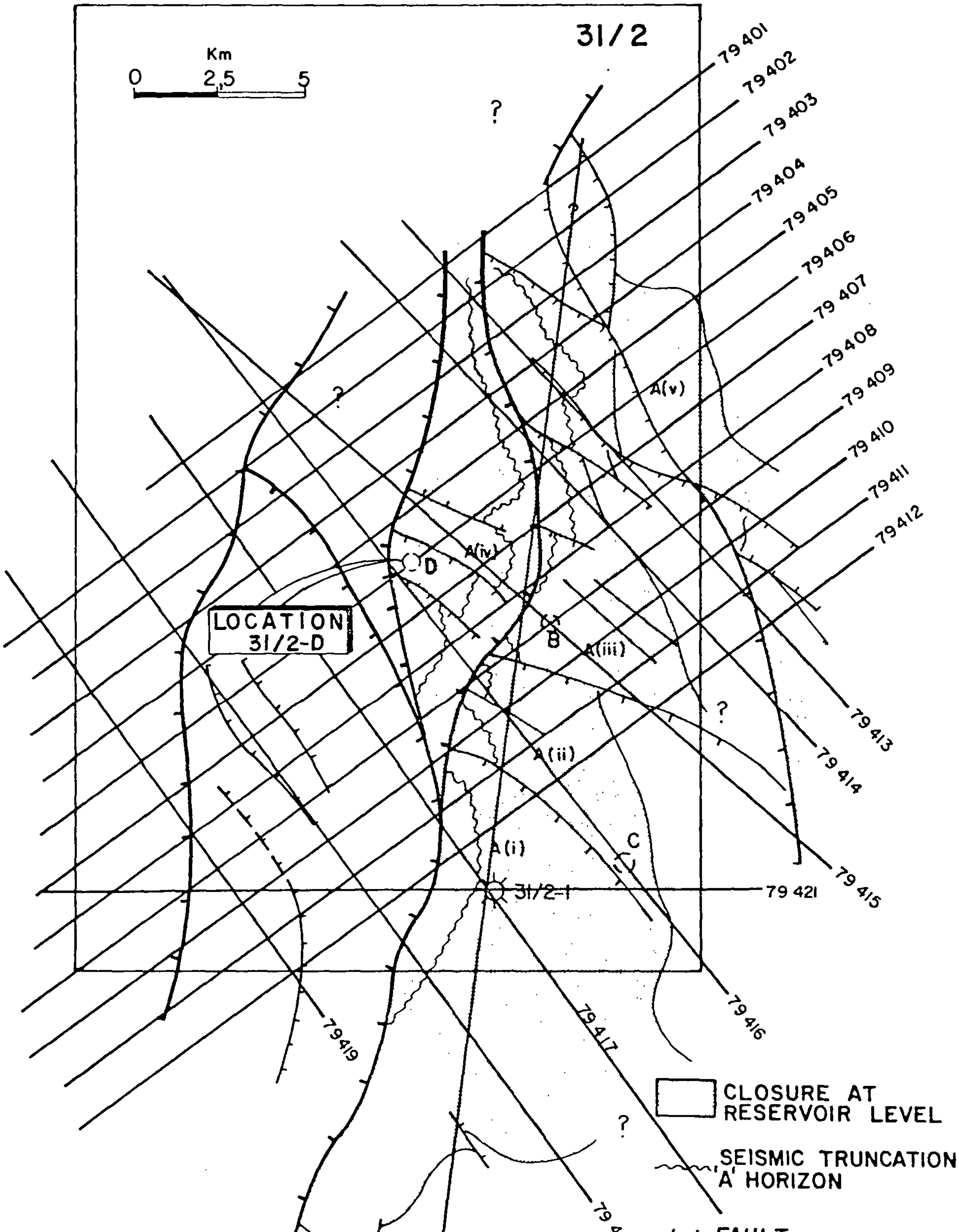
ii) residual multiple energy.

The older unmigrated data has provided a more significant contribution to the map of the deep 'D' marker than to the top Jurassic reservoir map.

4.2 Stratigraphic Identification of Reflections

Shallow horizons have been identified from the tie to well 31/2-1, using a band limited impedance log and impedance sections through the well location.

In the following all depths are measured from RKB and the corresponding times from MSL.



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EXPLORATION & PRODUCTION

BLOCK 31/2
1979
SEISMIC PROGRAMME

EPXT/12	FIG.	NOV. 1979
NSEP 79	5	589/12

The most important ties are:

- The onset of marls and argillacous limestone near the base of the Paleocene 1392 m ties at 1.516 sec.

- the Late Kimmerian unconformity, 1414 m ties at 1.534 sec.

- the 'A' reflection previously mapped ties with the base of the organic *Kimmeridge shale, 1439 m ties at 1.557 sec.*

- the base of the 50% gas saturation, from log interpretation corresponds with 1574 m and 1.673 sec, while the mappable 'flatspot' at 1.685 msec. ties at 1587 m.

- the 'B' reflection at 1.877 sec. corresponds to 1877 m and is caused by the onset of the sequence of chalky marls, silty claystones and coals in the Middle Jurassic.

- the 'C' reflection is again generated by a coal sequence at 2282 m corresponding to 2.137 sec.

The top of the massive sandstone of interval 2 at 1741 m can be identified locally as a weak seismic reflection at 1.790 sec.

A reliable mappable Top Statfjord equivalent reflection has not yet been identified.

The coal sequence associated with the 'B' and 'C' reflections are likely to be subject to rapid lateral variations, hence some caution should be exercised when using these reflections to evaluate detailed structure beneath the unconformity.

The stratigraphic identification of deeper horizons is speculative, and is discussed below.

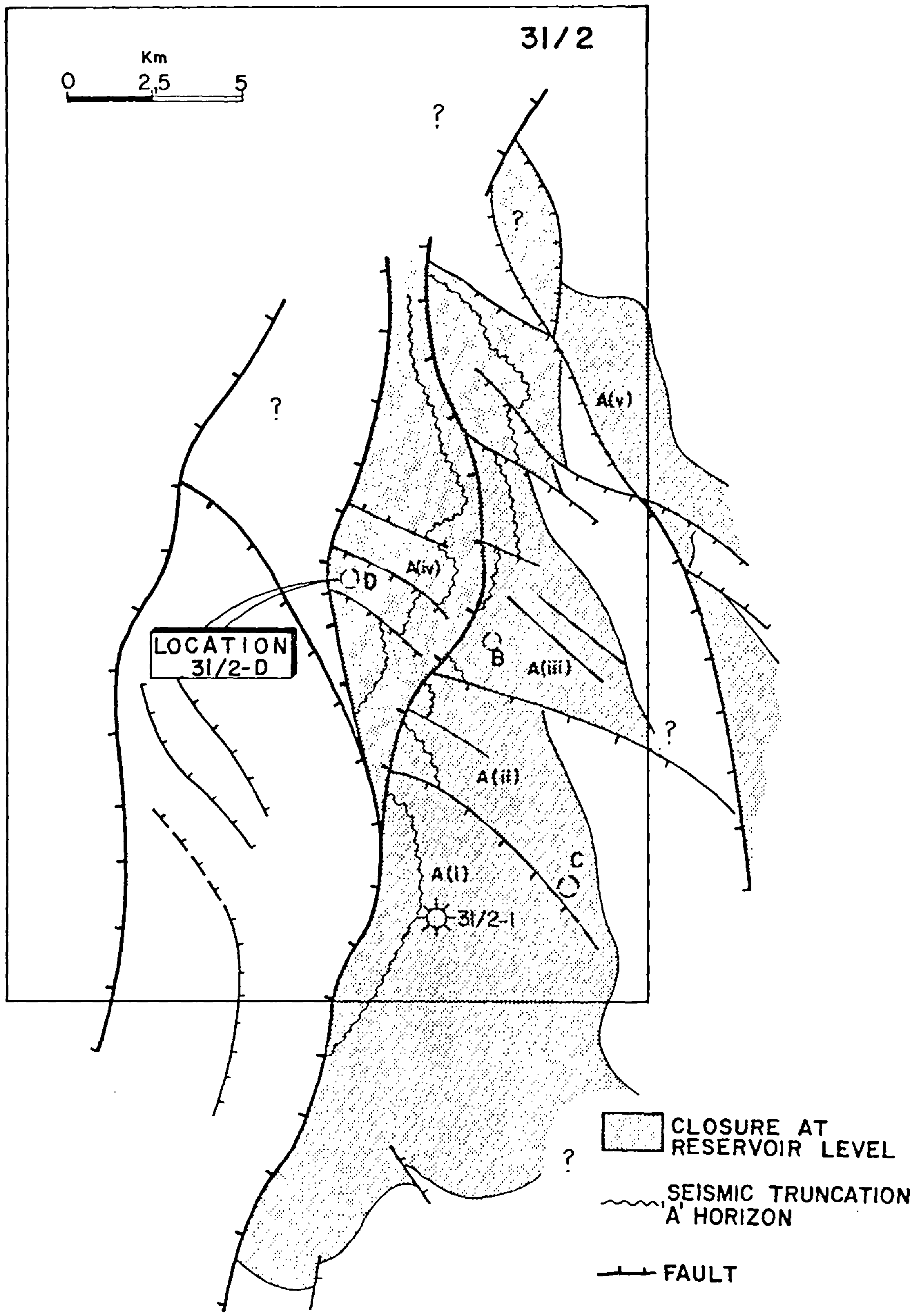
4.3 Seismic Mapping (Encl. 1, 2, 3)

The interpretation of the structure at the top of the Jurassic reservoir has already been presented in the well proposals for 31/2-B and 31/2-C. Here the interpretation of the top Jurassic reservoir isochrone map (Encl. 1) has been extended towards the west, with the reservation that correlation beneath the Late Kimmerian unconformity is more tenuous than over the main part of the gas-bearing structure.

For convenience the four main fault blocks of the Upper Jurassic hydrocarbon bearing structure are shown in figure 6.

The location proposed is in fault block A (iv) marginally downdip from the highest part of the structure and hence the maximum hydrocarbon column. Using a 50% gas saturation cut off at 1550 m ss. a gas column of some 215 m is expected on the present interpretaion (Encl. 2).

The well will penetrate the reservoir where the reflection generated by the Late Kimmerian unconformity is weak. This is believed to be caused by the subcrop or near subcrop of the gas



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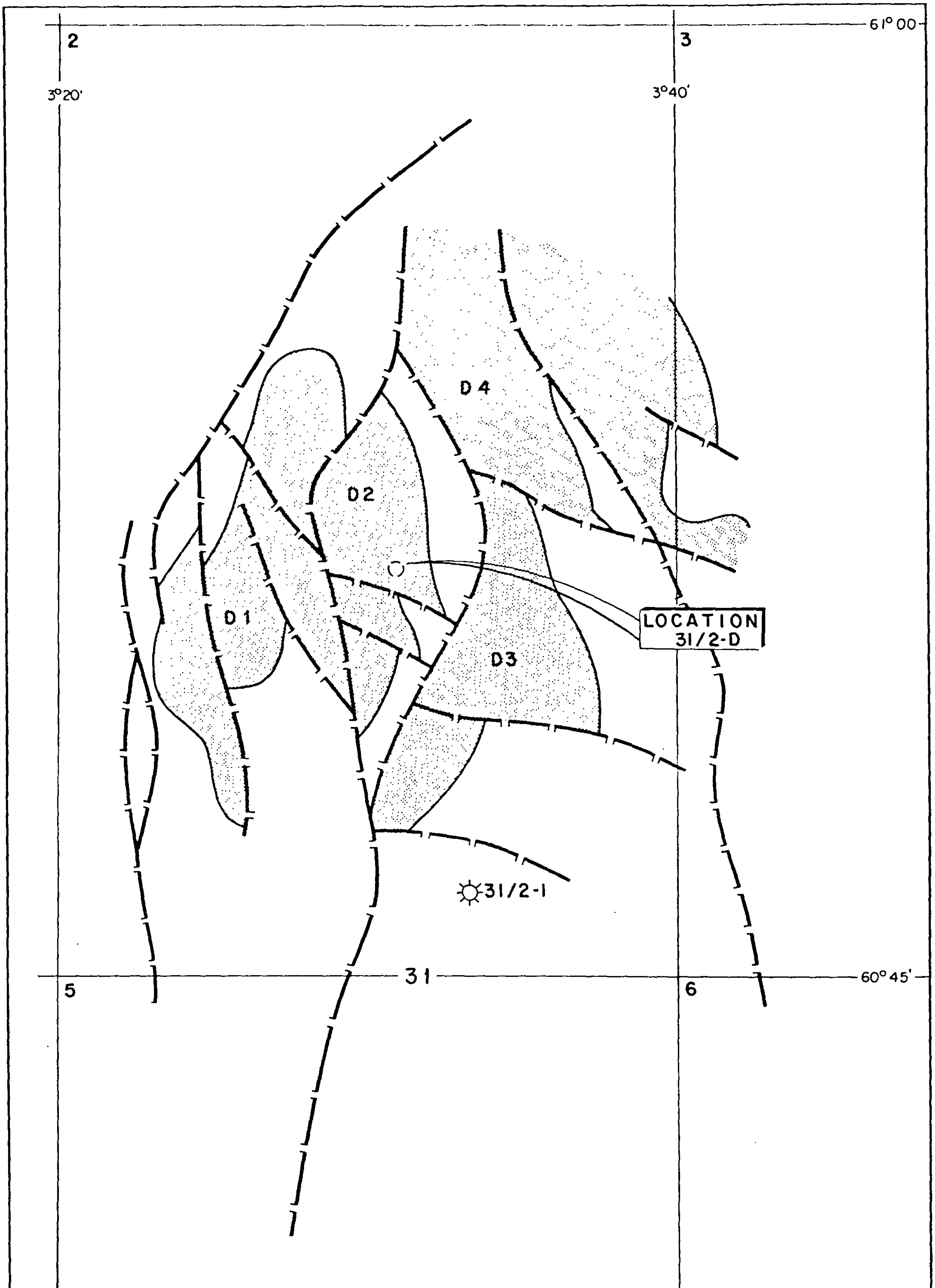
BLOCK 31/2

KEY TO FAULT BLOCK NOTATION

EPXT/12 FIG. 6 NOV. 1979
NSEP 79 589/13



a-s Norske Shell
EXPLORATION & PRODUCTION FORUS

BLOCK 31/2
KEY TO FAULT BLOCK
NOTATION
DEEP HORIZON

AUTHOR EPXT/12	FIG.	DATE JAN. 1980
REPORT NO NSEP 79	7	DRAW NO 589/14

bearing sand beneath Paleocene claystones. As a result the impedance contrast is either greatly reduced, or tuning effects virtually obliterate the reflection from a very thin bed of organic shale.

The location is of great importance as it will provide a seismic tie to verify the interpretation in the important A (iv) block.

A map of a deeper reflection has been generated (Encl. 3) referred to as the 'D' horizon. An index map for reference to different fault blocks has been included, figure 7.

The map is based on correlation of a tenous seismic event and incorporates dip indications. Examples of typical seismic lines close to the location are shown in Enclosures 4 to 8. An uninterpreted version of each section is included for comparison.

The isochrone interval has been kept coarse at 50 msec because of the mixed data quality.

The interpretation has been generated using the following conceptual model. A North-South trending primary fault system evolved during the early Triassic with the onset of the early Kimmerian phase rifting, through the Late Kimmerian phase in Upper Jurassic. As a result, eastwards rotation of the primary fault blocks has caused secondary fault systems to evolve.

The seismic data are compatible with this model. Major North-South faults bound the western margins of the D1 and D2 fault blocks (Fig. 7). The fault separating D2 from D3 is of lesser importance, and a clear correlation can be made demonstrating that the highest point of the D2 block is some 30 msecs higher than the highest point of the D3 block.

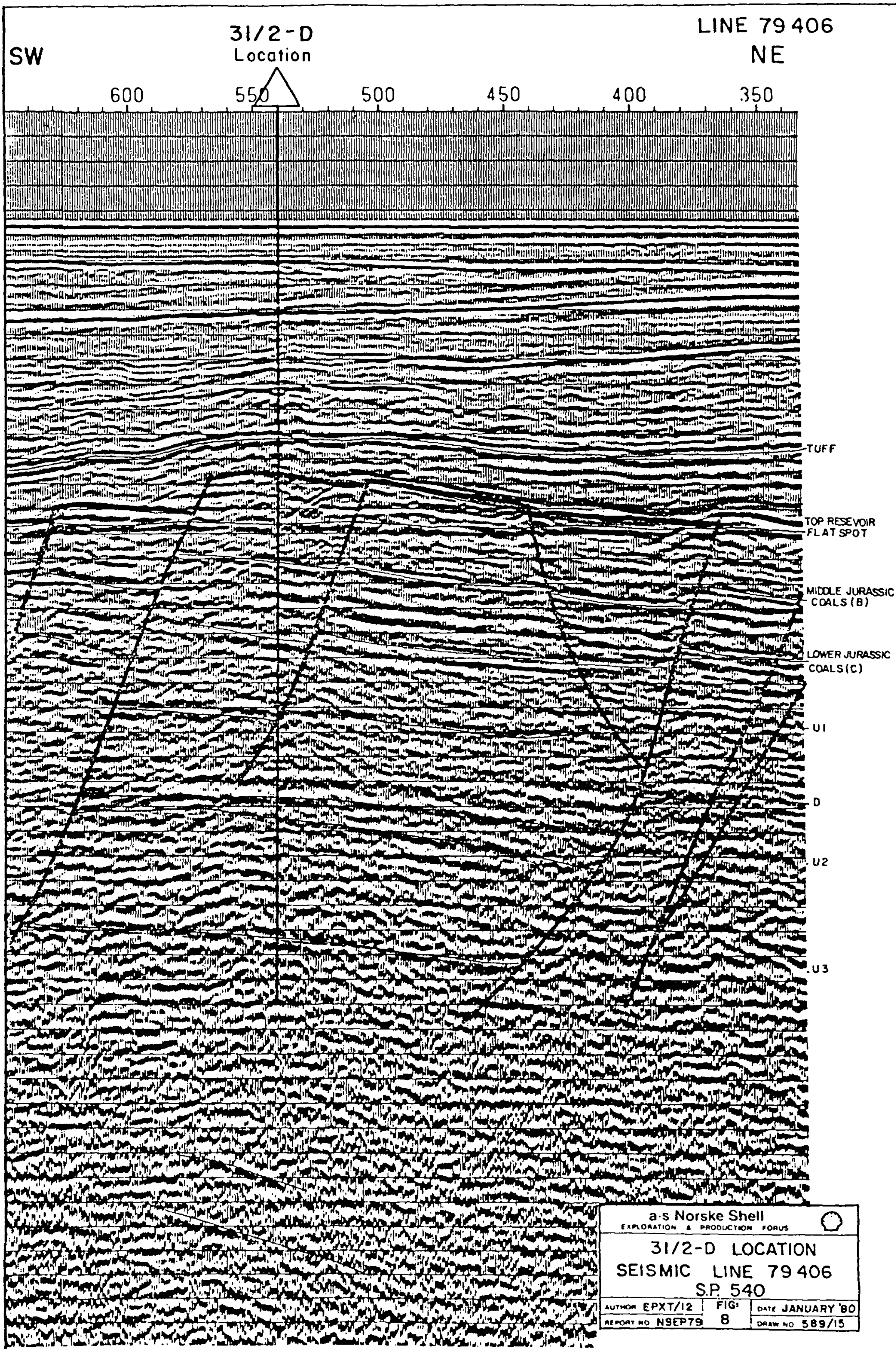
Strong regional dips to the north and east suggest a critical spill point to the south. A closing time contour of 2800 msecs is used for evaluating potential closure, but areal closures could be substantially greater.

The map therefore demonstrates

i) A reliable fault dependent closure of some 25 sq.km with approximately 110 msecs two way time closure in fault block D2 seperated from a similar closure of some 30 sq.km and 80 msec two way time closure in the D3 block. The highest point in the D2 block is some 30 msec above the D3 block.

ii) A fault dissected roll over of some 35 to 40 sq.km areal closure and two way time closure of 100 msec in the D1 block, the absolute level of which cannot be reliable determined with respect to the D2 block.

iii) Potential closures to the north-east in Block D4, but these coincide with a poorer quality data area.



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EXPLORATION & PRODUCTION FORUS

31/2-D LOCATION
SEISMIC LINE 79 406
S.P. 540

AUTHOR EPXT/12	FIG.	DATE JANUARY '80
REPORT NO NSEP79	8	DRAW NO 589/15

Depth conversion of this time map has not been attempted because of uncertainties about the reliability of velocity determinations beneath the Jurassic section in the presence of residual multiple energy. For depth estimations at the proposed location an interval velocity of 3500 msec has been used between the Top Triassic and the D reflection. Error estimates for the deeper part of the hole reflect the rapidly increasing uncertainty with depth.

In addition to the mapped event several local reflections are seen on different seismic lines both above and below the D horizons.

In particular, close to the well location, an Intra-Triassic reflection is noted (U1). U2 and U3 are deeper events which are illustrated on the section through the well, enclosure 4. These events dip steeply towards the east; as major faults are crossed on regional lines this seismic character occurs progressively higher to the east on the upthrown side of each major fault. The D Horizon appears to be close to a major unconformity between these steeply dipping beds and the overlying reflections which are all essentially sub parrallel to the Jurassic.

It is suggested that the 'D' Horizon is close to the base of the Triassic and the character of the deeper section would be compatible with the strongly deformed Palaeozoic Strata.

5. HYDROCARBON POTENTIAL

The presence of gas in the Jurassic reservoir, as found in 31/2-1 is considered extremely likely in this well, due to the structurally higher position of the reservoir, and the existance of the seismic flatspot.

The Gas-Fluid contact should, in this well, occur in the moderate quality reservoir of interval 3 below the highly impermeable zone found in 31/2-1 at 1573 m - 1595 m. A gross gas column of 215 m is expected at this location. If the oil shows encountered in 31/2-1 occur, they will also be in the better quality reservoir beds of interval 3.

The hydrocarbons are thought to have migrated through fault planes from the mature Kimmeridge Clay in the Viking Graben kitchen area.

The Palaeocene claystones will form an adequate seal over the structure in the event of the entire Cretaceous sequence being absent.

The Statfjord sandstones were found to be water bearing in 31/2-1 but the possibility of the sands being hydrocarbon bearing in the slightly higher structural position at this location cannot be excluded. The Dunlin claystones would then form a seal.

The presence and quality of deeper reservoir is unknown and a seal has to be assumed. If hydrocarbon bearing Palaeozoic sandstones are present below the 'D' reflector they could not be expected to have porosities of greater than 10%. The porosity of Triassic reservoir sandstones at that depth may be slightly higher.

Hydrocarbon migration from the Kimmeridge Clay source rocks in the Viking Graben poses a difficulty, but speculative deeper source intervals (eg. Carboniferous) could be mature much closer to the potential reservoir.

6. CHOICE OF LOCATION

Well 31/2-D has two main objectives

a) to test presence of hydrocarbons in Paleozoic formations, and

b) to test the Jurassic gas accumulation

In order to get an optimal location for both objectives, shot point 540 on seismic line 79-406 has been chosen.

It is recognized that this location is some 50 msec downdip from the mapped crest of the D-horizon, but if a location at the very crest should be proposed, it would be necessary to drill on the downthrown side of fault block A(iv) at the Jurassic level (Fig. 6), and through the major fault plane. By this alternative the possibility for a good Jurassic test would be lost. The well will penetrate a minor fault in the Upper Triassic sequence (Encl. 4) but both the Jurassic and the deep objective sequences will be penetrated in unfaulted and well defined locations.

A well location at shot point 540 on line 79-406 should therefore

- test presence of hydrocarbons in Paleozoic formations
- test reservoirs, seals and source rocks of pre-Jurassic age
- determine the age of the mapped D-horizon for a better understanding of the regonal geological setting
- drill in a location with no major faults
- test Jurassic gas at a location of nearby maximum gross hydrocarbon column
- test lateral variations in Jurassic reservoir characteristics
- test the level that oil shows were observed in 31/2-1 in a potentially better reservoir section (stratigraphically lower because the location 31/2-D is overall structurally higher than 31/2-1).

7. PROGNOSIS NB. All depths subsea (Encl. 9)

Seabed	335 m	
335 m -	1170 m (± 30m)	Quaternary to Eocene: Clays, claystones with thin sands
1170 m -	1200 m	Eocene; Balder Formation: Tuffaceous claystones
1170 m -	1330 m (± 20m)	Palaeocene: Silty claystones
	1330 m (± 20m)	LATE KIMMERIAN UNCONFORMITY
1330 m -	1335 m	Lower Cretaceous: organic shale
1335 m -	ca.1880 m	JURASSIC SANDSTONE GROUP
1335 m -	ca.1400 m	Interval 4: Coarse, unconsolidated sandstones
ca.1400 m -	ca.1635 m	Interval 3: fine-medium, micaceous sandstones with thin calcareous cemented beds.
	1550 m	GAS FLUID CONTACT
	1562 m	SEISMIC FLATPSOT
ca.1635 m -	1785 m (± 50m)	Interval 2: fine-coarse, clean massive sands with thin calcarous cemented bands
1785 m -	ca.1880 m	Interval 1: paralic sands, marls, claystones and coals
ca.1880 m -	ca.2070 m	Dunlin Unit Equivalent: Claystones with thin sandstones and siltstones
ca.2070 m -	ca.2280 m	Statfjord Formation Equivalent: Fine-medium sandstones with thin claystones. Coals to base
2230 m (± 50m)	Horizon C:	STATFJORD COALS
2230 m -	3400 m (± 150m)	Triassic Red Beds: claystones thin sandstones
3400 m -	5000 m	? Palaeozoic
At 3400 m		? Devonian: Old Red Sandstones
5000 m/Palaeozoic		TD.

B. Unmappable Horizons at 2750 m (± 100m) U1
3600 m (± 175m) U2
4500 m (± 250m) U3

probably also represent lithology changes

APPENDIX I

DRILLING PROPOSAL 31/2-D

1. **WELL** — Statoil/Norske Shell/Conoco/Superior Oil/Norsk Hydro in Production Licence 054

2. **LOCATION** — Co-ordinates : Lat: 60° 51' 23.5"N; Long: 03° 30' 45.6"E

   On seismic line 79-406 at SP 540. Water depth 335 m.

3. **RIG** — West Venture

4. **OBJECTIVES**
   1. To test the Jurassic sandstones proved hydrocarbon bearing by 31/2-1.
   2. To reach the Palaeozoic or the deepest beds reached by a penetration of 5000 m.

5. **TOTAL DEPTH** — 5000 m (in Palaeozoic)

6. **PROGNOSIS** NB. All depths subsea

Seabed		335 m	
335 m	-	1170 m (± 30m)	Quaternary to Eocene: Clays, claystones with thin sands
1170 m	-	1200 m	Eocene; Balder Formation: Tuffaceous claystones
1170 m	-	1330 m (± 20m)	Palaeocene: Silty claystones
		1330 m (± 20m)	LATE KIMMERIAN UNCONFORMITY
1330 m	-	1335 m	Lower Cretaceous: organic shale
1335 m	-	ca.1880 m	JURASSIC SANDSTONE GROUP
1335 m	-	ca.1400 m	Interval 4: Course, unconsolidated sandstones
ca.1400 m	-	ca.1635 m	Interval 3: fine-medium, micaceous sandstones with thin calcareous cemented beds.
		1550 m	GAS FLUID CONTACT

	1562 m	SEISMIC FLATPSOT
ca.1635 m	- 1785 m (± 50m)	Interval 2: fine-coarse, clean massive sands with thin calcarous cemented bands
1785 m	- ca.1880 m	Interval 1: paralic sands, marls, claystones and coals
ca.1880 m	- ca.2070 m	Dunlin Unit Equivalent: Claystones with thin sandstones and siltstones
ca.2070 m	- ca.2280 m	Statfjord Formation Equivalent: Fine-medium sandstones with thin claystones. Coals to base
2230 m (± 50m)	Horizon C:	STATFJORD COALS
2230 m	- 3400 m (± 150m)	Triassic Red Beds: claystones thin sandstones
3400 m	- 5000 m	? Palaeozoic
At 3400 m		? Devonian: Old Red Sandstones
5000 m/Palaeozoic		TD.

NB. Unmappable Horizons at 2750 m (± 100m) U1
3600 m (± 175m) U2
4500 m (± 250m) U3

probably also represent lithology changes

7. CUTTING SAMPLES

Ditch cuttings to be collected every 10 m below 30" casing, and very 3 m below 1170 m. Mud logging will be carried ou by a contractor.

8. CORING

For a detailed evaluation of the well the coring objectives ate two-fold:

i) Upper/Middle Jurassic reservoir section

Interval 1335 - ca.1600 m

Coring to commence in Upper Jurassic Shales immediately below the Late Kimmerian Unconformity and to continue to at least 30 m below the hdyrocarbon-water contact.

ii) 'Statfjord' reservoir

Interval ca.2070 m - ca.2250 m

At least one 20 m core to be taken on good cuttings indications of reservoir development regardless of shows. If the reservoir is hydrocarbon bearing, coring to continue until at least one core is taken in the water zone.

iii) Deeper Reservoir Intervals

Interval 2280 m - ?m

Coring to commence on occurence of good hydrocarbon shows and to continue into the water zone.

iv) One 20 m core to be taken at TD.

9. CASING PROGRAMME

To be specified in final drilling programme

10. LOGGING PROGRAMME

at 20" casing depth	GR/ISF/SONIC/SP FDC/CNL/GR/CAL
at 13 3/8" casing depth	GR/ISF/SONIC/SP FDC/CNL/GR/CAL SWS
at 9 5/8" casing depth	GR/ISF/SONIC/SP FDC/CNL/GR/CAL MSFL/DLL/CAL/SP/GR SWS HDT CBL (on 13 3/8" & 9 5/8" casing)
at T.D.	GR/ISF/SONIC/SP FDC/CNL/GR/CAL MSFL/DLL/CAL HDT SWS CBL (on 7" Liner if required) Velocity Survey

11. TESTING PROGRAMME

RFT's and/or production tests as required.

COLOUR CODE INDEX - SEISMIC SECTIONS (Enclosures 4 to 8)

————	TUFF REFLECTION
————	NEAR TOP CRETACEOUS (ONSET OF MARLS, LSTS)
————	LATE KIMMERIAN UNCONFORMITY
————	TOP JURASSIC RESERVOIR
- - - -	'B' REFLECTOR - MIDDLE JURASSIC COALS
- - - -	'C' REFLECTOR - STATFJORD COALS
————	'D' HORIZON
————	DIP INDICATIONS - DEEP EVENTS