General information

Lithostrat. unit	BJARMELAND GP
NPDID lithostrat. unit	12
Level	GROUP

Level below

Lithostrat. unit
ISBJØRN FM
POLARREV FM
ULV FM

Description

Bjarmeland Group

Name

Bjarmeland was used by the Vikings to describe the area immediately south of the Barents Sea. The area was visited and described by the Norwegian Viking, Ottar, in the 9th century. The name was more recently used to name a structural element on the Barents Shelf: the Bjarmeland Platform (Gabrielsen et al. 1990). The group was introduced and briefly reviewed by Dallmann et al. (1999) in the knowledge of the ongoing more detailed work presented herein.

Type area

The Bjarmeland Platform in the southern Norwegian Barents Sea is here defined as type area for the group since the offshore successions are best displayed in wells from this area, including the eastern flanks of the Loppa High (Fig 9.38). Three wells show typical developments of the group: 7124/3-1 (4271 m to 3900 m), 7226/11-1 (4334 m to 4103 m) and 7121/1-1 R (3990 m to 3502 m): the base of the group is defined by the basal stratotype of the biohermal Polarrev Formation in well 7229/11-1 on the northern Finnmark Platform.

Reference areas

Well 7228/9-1 S (4361 m to 4065 m) (Fig 9.38). located on the Finnmark Platform's northern margins towards the Nordkapp Basin illustrates the group's development in a deeper water basinal setting. The Finnmark Platform itself is an important reference area since the group has been drilled in a variety of settings from the outer platform areas to the north (7229/11-1, 4282 m to 3970 m, (Fig 9.38). across the central platform (7128/4-1, 1820 m to 1704 m) and 7128/6-1, 1835 m to 1745 m) to the southern updip areas represented by core 7128/12-U-01, 569.2 m to 557.5 m). The succession assigned to the group in 7128/4-1 and 7128/6-1 corresponds to lithological unit L-8 of Ehrenberg et al. (1998a). Hambergfjellet on the southern mountain massif of Bjørnøya is designated as an onshore reference area. Hambergfjellet is the type area of the Hambergfjellet Formation, the only onshore unit to be assigned to the Bjarmeland Group at the present time.

Thickness

The group attains a maximum thickness of 488 m in well 7121/1-1 R at the eastern flank of the Loppa High. It is thinner, 233-371 m, in wells 7226/11-1 and 7124/3-1 on the Bjarmeland Platform (Fig 9.38). On the Finnmark Platform the group thins from 312 m in well 7229/11-1 to 116-89 m in wells 7128/4-1 and 7128/6-1 central on the platform and less than 50 m in the IKU cores further updip. The Hambergfjellet Formation on the

southern cliffs of Bjørnøya shows a similar thickness of up to 60 m, but this unit wedges out and disappears northwards on the island.

Lithology

The group is dominated by white to light grey bioclastic limestones containing a typical cool-water fauna of crinoids, bryozoans, brachiopods and siliceous sponges. Silty, dark grey to black, locally bituminous limestones characterise the deeper-water succession. Minor cherts occur, especially in the uppermost part. Siliciclastics are rare, except on the Polheim Subplatform where the group is unusually developed and dominated by fine-grained siliciclastics and marls (well 7120/1-1 R2). The Hambergfjellet Formation on Bjørnøya consists of basal sandstones which onlap all older units from basement to Gipsdalen Group, passing up into sandy bioclastic limestones with a fauna dominated by crinoids, bryozoans and brachiopods (Worsley et al. 2001).

Lateral extent and variation

The group is most thickly developed at the eastern flanks of the Loppa High and eastward across the Bjarmeland Platform. The thickest development is in outer platform settings north and south of the Nordkapp Basin where thick bryozoan-dominated buildups occur as isolated mounds or merge to form elongated complexes (Gerard & Buhrig 1990; Nilsen et al. 1993). Intermound and basinal areas are dominated by more fine-grained and thinly bedded limestones, which in well 7120/1-1 R2 are interbedded with siliciclastic shales. The platform areas of the eastern Finnmark Platform are characterised by relatively uniform successions of bedded crinoid- and bryozoan-dominated packstones and grainstones.
The group is seen to onlap palaeohighs and the margins of the depositional basin such as the eastern flank and crestal areas of the Loppa High and the southern parts of the Finnmark Platform. It is missing in wells 7120/12-2 and 7120/12-4 from the southern Hammerfest Basin – western Finnmark Platform and onshore it is only known from the Hambergfjellet Formation on Bjørnøya, - although future work may well demonstrate that the uppermost Gipsfjorden Formation and the Vøringen Member (Kapp Starostin Formation) of the Tempelfjorden Group both age- and facies-wise represent lateral equivalents of parts of the group on Spitsbergen.

Age

Fusulinids suggest a mid-Sakmarian to late Artinskian age in 7128/6-1 (Ehrenberg et al. 2000). The base of the group is thought to be highly diachronous, oldest in the more distal settings and youngest on the platforms (Fig 9.4). The Hambergfjellet Formation on Bjørnøya is dated as late Artinskian based on fusulinids and conodonts (Nakrem 1991; Nakrem et al. 1992). Fusulinids indicate a similar age in cores 7128/12-U-01 and 7129/10-U-01 (Bugge et al. 1995; Ehrenberg et al. 2000).

Correlation

The lower, Sakmarian to early Artinskian, part of the group may correlate to the uppermost Gipsfjorden Formation of Spitsbergen. The upper, late Artinskian, part - including the Hambergfjellet Formation of Bjørnøya - perhaps should be correlated to the transgressive Vøringen Member of the Kapp Starostin Formation on Spitsbergen (Dallmann et al. 1999; Worsley et al. 2001).

Depositional environments

The group is characterised by deposition of carbonates dominated by crinoids, bryozoans, brachiopods and siliceous sponges. The fauna is markedly different from the foraminifer-dominated warm-water fauna of the underlying Gipsdalen Group and is believed to reflect deposition in more temperate cool-water environments (Stemmerik 1997). Deposition took place in a variety of cool-water carbonate environments and deposits range from shallow inner shelf bioclastic grainstones to outer shelf bryozoan-dominated buildups and thinly bedded bioclastic wackestones and packstones. Siliciclastic input to the basin was limited - except locally in the west where deeper water shales are interbedded with resedimented carbonates in 7120/1-1 R2; sand input was

also significant on Bjørnøya, immediately adjacent to the subaerially exposed parts of the Stappen High. The bryozoan-dominated carbonate buildups formed along the margins of the Nordkapp Basin on the outer part of the platforms. They are often located above older buildups. Distally to the trend of build-ups more marly sediments have been recorded in well 7228/9-1 S.

Formations assigned to the group

The Bjarmeland Group is represented by three formations in the offshore areas of the southern Norwegian Barents Sea. The formations are formally described herein and named after predators common to Arctic Norway. The Polarrev and Ulv formations show an interfingering of the carbonate buildups of the former and the inter-buildup lithofacies of the latter formation. The Ulv Formation was also developed in the outer platform and basinal areas throughout deposition of the group, while the uppermost Isbjørn Formation in inner shelf areas overlies earlier buildups but does not extend into deeper waters characteristic of the Ulv Formation. The Hambergfjellet Formation of Bjørnøya, defined by Worsley & Edwards (1976) is included in the group, as it appears to represent a lithologically similar but highly condensed (<60 m thick) development of the Isbjørn Formation.

Source

- Larssen, G. B., Elvebakk, G., Henriksen, L. B., Kristensen, S. E., Nilsson, I., Samuelsberg, T. J., Svånå, T. A., Stemmerik, L. and Worsley, D. 2002: Upper Palaeozoic lithostratigraphy of the Southern Norwegian Barents Sea. NPD-Bulletin No. 9, 69 pp.

Wellbores penetrating

Wellbore name	Wellbore completion date	Top depth [m]	Bottom depth [m]
7120/1-1 R2	21.07.1986	2997	3220
7121/1-1 R	23.08.1986	3502	3990
7124/3-1	20.10.1987	3900	4271
7128/4-1	26.02.1994	1704	1820
7128/6-1	08.11.1991	1745	1834
7130/4-1	08.01.2016	2231	2320
7220/6-3	05.10.2017	750	795
7225/3-1	25.09.2011	3931	4150
7226/11-1	11.04.1988	4103	5137
7228/9-1 S	07.05.1990	4065	4361
7229/11-1	15.12.1993	3970	4282
7234/6-1	19.07.2021	3880	3908
7322/6-1 S	28.05.2021	3094	3454

Wellbores with cores

Wellbore name	Wellbore completion date	Core length [m]
7120/1-1 R2	21.07.1986	9
7121/1-1 R	23.08.1986	3

7128/4-1	26.02.1994	6
7128/6-1	08.11.1991	86
7220/6-3	05.10.2017	40
7225/3-1	25.09.2011	0
7226/11-1	11.04.1988	27
7228/9-1 S	07.05.1990	19
7229/11-1	15.12.1993	159