



General information

Lithostrat. unit	TEMPELFJORDEN GP
NPDID lithostrat. unit	167
Level	GROUP

Level below

Lithostrat. unit
RØYE FM
ØRRET FM

Description

Tempelfjorden Group

Name

Cutbill & Challinor (1965) introduced the term Tempelfjorden Group for a suite of spiculites, spiculitic chert, silicified limestones and fine-grained siliciclastics of mid- to late Permian age. The type area is in the innermost part of Isfjorden in central Spitsbergen. The Tempelfjorden Group is a well-established lithostratigraphic unit; its overall facies development and depositional evolution have been described by Steel & Worsley (1984) and Ezaki et al. (1994).

Offshore reference areas

The southern Loppa High – Hammerfest Basin, the Bjarmeland Platform and the eastern Finnmark Platform illustrate the quite significant variations in the group's development offshore ([Fig 9.51](#)). The group is thickly developed along the southern margins of the Loppa High where it has been penetrated by wells [7121/1-1 R](#) and [7120/1-1 R2](#). The upper parts of the group were penetrated by [7120/9-2](#) (from 4956 m to TD at 5072.6 m, [Fig 9.52](#)), in the central Hammerfest Basin, while thickest – but sedimentologically atypical - developments are seen in wells [7120/12-2](#) (4558-3657 m) and [7120/12-4](#) (2118-1366 m) on the basin's southern margins ([Fig 9.51](#)).

Thickness

The group thickens from 509 m in well [7121/1-1 R](#) and 591 m in well [7120/1-1 R2](#) on the southern Loppa High, to 752 m in well [7120/12-4](#) and 901 m in well [7120/12-2](#) along the southern margins of the Hammerfest Basin ([Fig 9.51](#)). This is appreciably thicker than the maximum of 460 m observed on land areas of Svalbard. Thinner developments are seen eastwards on the Bjarmeland Platform - 425 m in well [7124/3-1](#) and 226 m in well [7226/11-1](#) along the southern margins of the platform. On the eastern Finnmark Platform it forms a distinctive wedge-shaped unit thinning from approximately 180 m in well [7228/9-1 S](#) ([Fig 9.51](#)), on the northern shelf margins to 135 m in wells [7128/4-1](#) and [7128/6-1](#) and to less than 30 m further updip in the subcrop areas demonstrated by IKU shallow cores.

The Tempelfjorden Group usually thins over local structural highs - exposures on Bjørnøya on the Stappen High show an extremely condensed (115 m thick) development of the group and highly condensed exposures on the margins of the Sørkapp-Hornsund High are only a few metres thick, thinning to zero over the crest of the structure (Hellem & Worsley 1978). It is not certain whether the group was initially deposited over the crest of the Loppa High, but the succession also thins and is then truncated upflank there, reflecting repeated uplift in the Permian to early Triassic; a roughly similar situation is seen in the inner parts of the Finnmark Platform, although thinning there reflects maximum onlap of the adjacent craton rather than active tectonism.

Lithology

The Tempelfjorden Group is characterised by dark to light grey spiculites, spiculitic cherts, silicified skeletal limestones and fine-grained siliciclastics including marls, calcareous claystones, shales and silt/sandstones in the offshore areas. In the southwestern Hammerfest Basin ([7120/12-4](#) and [7120/12-2](#)) the group contains a significant proportion of coarse siliciclastics. Elsewhere in the Norwegian Barents Sea, spiculites and silicified skeletal carbonates dominate. The carbonates contain a fauna dominated by brachiopods, sponges, bryozoans and crinoids. The condensed development of the Miseryfjellet Formation on the Stappen High contains herringbone cross-bedded sandstones and highly condensed silicified skeletal limestones.

Lateral extent and variation

The group is thickest in the western part of the study area. It forms distinctive wedge-shaped units with maximum thickness in the basins. On the eastern Finnmark Platform, the lower part of the group onlaps the inner Finnmark Platform and subcrops the Quaternary further updip. Lithologies are uniform in the eastern part of the study area and are dominated by chert and chert-rich limestone, while coarse siliciclastic domination in the southern Hammerfest Basin suggests emergent local provenance areas. Sediments assigned to the Tempelfjorden Group generally overlie the [Bjarmeland Group](#) (except in wells [7120/12-2](#) and [7120/12-4](#) where they directly overlie the [Gipsdalen Group](#)). There is a sharp contact between Artinskian light grey, skeletal limestones below and the overlying dark-grey to black, silicified and spiculitic fine-grained deposits. The boundary represents a major drowning event in the Barents Sea region, and an ongoing change towards cooler climatic conditions (Stemmerik 1997).

Age

The Tempelfjorden Group is dated as late Artinskian to ?Tatarian in the onshore areas (Nakrem 1991; Mangerud 1994). Palynological data from cores 7128/12-U-01 and 7129/10-U-01 indicate a ?Kungurian to Kazanian (-?Tatarian) age for the group updip on the Finnmark Platform (Mangerud 1994; Bugge et al. 1995). Palynomorphs from exploration wells indicate a general mid- to late Permian age for the group without permitting a more detailed internal zonation.

Depositional environments

The Tempelfjorden Group represents deposition in cool-water, temperate shelf and basinal environments. The majority of the group was deposited in distal marine, low-energy (below wave base), moderate to deep shelf to basinal environments characterised by a rich siliceous sponge fauna. The group was deposited during an overall transgression accompanied by retrogradation of the coastline. The main accumulations of spiculites appear to be related to transgressive periods when favourable environmental conditions for sponges prevailed over most of the shelf. Cool-water, bryozoan carbonates formed along the margins and formed low-relief platforms during sea level highstand. Wells in the southernmost Hammerfest Basin are characterised by significant coarse siliciclastic influx from the nearby Baltic Shield.

Formations assigned to the group

Two new formations are assigned to the Tempelfjorden Group herein: their names are selected from fish common to the Barents Sea. The generally underlying [Røye Formation](#) is characterised by generally fine-grained highly silicified mudstones and limestones, while the generally overlying [Ørret Formation](#) comprises mudstones and some coarser siliciclastics, all of which show much less silicification than the sediments of the [Røye Formation](#). Some wells, especially on the southern margins of the Loppa High or the Hammerfest Basin's southern margins are interpreted to display either only [Røye Formation](#) ([7121/1-1 R](#)) or intercalations of both units ([7120/1-1 R2](#), [7120/12-2](#) & [7120/12-4](#), (Fig 9.51).

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	15.11.1985	2403	2569
7120/1-1 R	26.12.1985	2403	2610
7120/1-1 R2	21.07.1986	2403	2997
7120/1-3	07.10.2013	2281	2542
7120/1-4 S	03.08.2014	2314	2520
7120/1-5	07.05.2017	2242	2527
7120/9-2	20.10.1984	4956	5072
7120/12-2	11.09.1981	3657	4558
7120/12-4	16.04.1984	1366	2118
7121/1-1 R	23.08.1986	2993	3502
7122/7-3	08.01.2006	2595	2726
7124/3-1	20.10.1987	3475	3900
7128/4-1	26.02.1994	1569	1704
7128/6-1	08.11.1991	1623	1745
7130/4-1	08.01.2016	2055	2231
7132/2-2	07.04.2019	3405	3528
7221/4-1	01.12.2020	1565	1570
7222/1-1	02.08.2016	2195	2400
7225/3-1	25.09.2011	3666	3931
7226/11-1	11.04.1988	3877	4103
7228/9-1 S	07.05.1990	3884	4065
7229/11-1	15.12.1993	3879	3970
7234/6-1	19.07.2021	3711	3880
7321/8-1	03.09.1987	3398	3482
7322/6-1 S	28.05.2021	2519	3094

Wellbores with cores

Wellbore name	Wellbore completion date	Core length [m]
7120/1-3	07.10.2013	50
7120/1-4 S	03.08.2014	105
7120/1-5	07.05.2017	152
7120/12-2	11.09.1981	28



7120/12-4	16.04.1984	25
7121/1-1 R	23.08.1986	2
7128/4-1	26.02.1994	2
7128/6-1	08.11.1991	59
7130/4-1	08.01.2016	41
7321/8-1	03.09.1987	1