Stratigraphic subdivision of the Blind Fiord and Bjorne formations (Lower Triassic), Sverdrup Basin, Arctic Islands

Project 750083

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Abstract

The Blind Fiord Formation is a Lower Triassic shale/siltstone unit that occurs within the Sverdrup Basin. The formation is divisible into three members, formally named in ascending order: Confederation Point, Smith Creek, and Svartfjeld. Each member consists predominantly of shale in its lower portion and siltstone in its upper portion.

The Bjorne Formation is a sandstone-dominant unit that occurs on the basin margins, and is stratigraphically equivalent to the Blind Fiord Formation. Along the eastern and southeastern basin margins two shale/siltstone units occur within the formation, allowing five members to be recognized. The sandstone-dominant members are formally named in ascending order: Cape Butler, Pell Point and Cape O'Brien. The intervening shale/siltstone members are correlated with the Smith Creek and Svartfjeld members.

The stratigraphic nomenclature reflects the occurrence of three major transgressive-regressive cycles in the Lower Triassic of Sverdrup Basin.

Résumé

La formation de Blind Fiord est une unité de schiste argileux et aleurolite du Trias inférieur qui se trouve dans le bassin de Sverdrup. La formation se divise en trois membres qui portent les noms officiels suivants, donnés en ordre ascendant: Confederation Point, Smith Creek et Svartfjeld. La partie inférieure de chaque membre se compose surtout de schiste argileux et la partie supérieure, d'aleurolite.

La formation de Bjorne, composée surtout de grès, se trouve en bordure du bassin; elle est l'équivalent stratigraphique de la formation de Blind Fiord. La formation comprend deux unités de schiste argileux et aleurolite le long des marges est et sud-est du bassin, ce qui permet d'identifier cinq membres. Les noms officiels des membres, composés surtout de grès, sont donnés en ordre ascendant: Cape Butler, Pell Point et Cape O'Brien. Les membres intercalaires de schiste argileux et aleurolite sont mis en corrélation avec les membres de Smith Creek et de Svartfjeld.

La nomenclature stratigraphique traduit la présence de trois grands cycles de transgression-régression dans le Trias inférieur du bassin de Sverdrup.

Introduction

Lower Triassic strata are widespread in the Sverdrup Basin (Fig. 36.1) and are assigned to either the Bjorne or Blind Fiord formations (Tozer, 1961, 1963a, b). The Bjorne Formation consists predominantly of fine to medium grained sandstone and occurs along the southern and eastern margins of the basin, both in outcrop and the subsurface. The Blind Fiord Formation consists mainly of shale and siltstone with lesser amounts of very fine grained sandstone. The formation forms the basal portion of the Triassic succession on the basin margins where it underlies the Bjorne Formation and thickens basinward to comprise the entire Lower Triassic succession over much of the basin (Fig. 36.1). Outcrops of the formation are common on northern and western Axel Heiberg Island, and it occurs in the subsurface over the central and western Sverdrup Basin. Numerous surface and subsurface sections of these formations have been examined and form the basis for this paper (Fig. 36.1).

Outcrop studies of the Blind Fiord Formation on northern Ellesmere and Axel Heiberg islands have revealed that in those areas, the formation can be divided into three members. Each member, which is usually hundreds of metres thick, consists of a lower, shale-dominant portion and an upper, siltstone-dominant portion. These members are formally defined herein.

Subsurface and outcrop studies of the Bjorne Formation have led to the recognition of five, distinctive, lithologic units within the formation; three sandstone units and two shale/siltstone units. The sandstone units are formally defined as members herein and the intervening shale units are assigned member names that are defined for the Blind Fiord Formation.

Previous work

Tozer (1963a) defined the Blind Fiord Formation on the basis of fieldwork done during Operation Franklin in 1955. He established a type section north of Blind Fiord on southwestern Ellesmere Island. At this locality, the formation is about 1100 m thick and consists of green-grey shale, siltstone and very fine grained sandstone. During Operation Franklin, the formation was also examined by Souther (1963) at Buchanan Lake on east-central Axel Heiberg Island and McMillan (1963) on northwestern Axel Heiberg. Subsequent studies by R. Thorsteinsson and E.T. Tozer on Ellesmere and Axel Heiberg islands in the late fifties and early sixties established the presence of the formation on the northern portions of those islands (Tozer, 1963c). At all localities, the Blind Fiord Formation consists of interbedded shale and siltstone with minor, very fine grained sandstone. It overlies Permian strata and is overlain by black, phosphatic shale of the Murray Harbour Formation (Blaa Mountain Group). Paleontological studies of the Blind Fiord Formation (Tozer, 1961, 1965a, b, 1967) indicate that the entire Lower Triassic is represented in the formation, and Tozer (1965a, 1967) used the ammonite zonation established in the formation to erect four new stages for the Early Triassic.

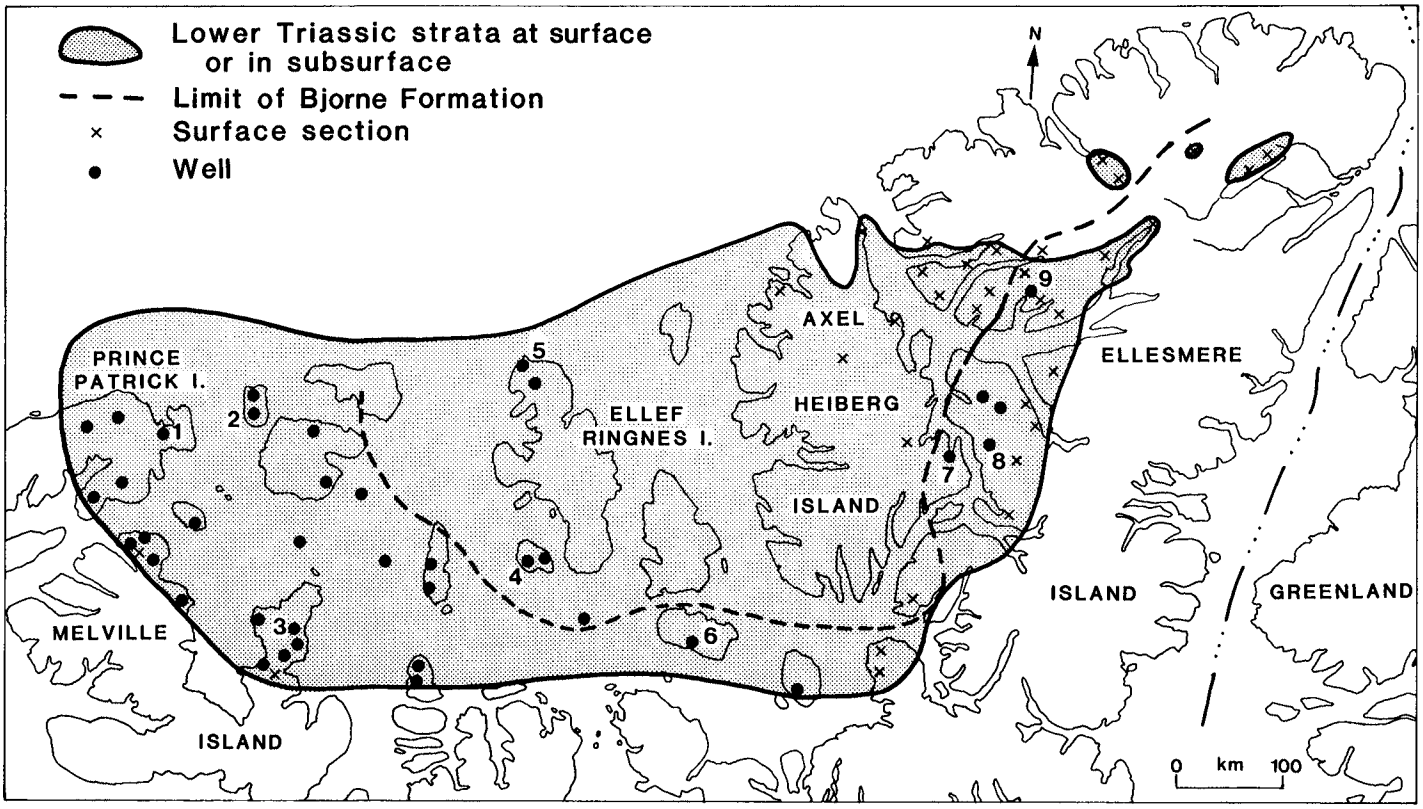

Figure 36.1. Distribution of Lower Triassic strata and control points. Key to wells listed in Appendix:

1. Satellite F-68
2. Brock C-50
3. Drake Point D-68
4. Sutherland O-23
5. Isachsen J-37
6. Cornwall O-30
7. Depot Point L-24
8. Fosheim N-27
9. Neil O-15

Moore (1981) briefly described the Blind Fiord Formation at three localities on northern Ellesmere Island and noted that sandstone content increased toward the east.

The only published subsurface description of the Blind Fiord Formation is by Balkwill and Roy (1977) of a partial section drilled in the King Christian N-06 well on King Christian Island.

None of the above authors attempted to stratigraphically subdivide the Blind Fiord Formation. However, Tozer (1963c) noted that black shale is a component of the upper part of the Blind Fiord Formation at Smith Creek on northwestern Ellesmere Island. At other localities Tozer (1963c, 1965a) assigned black shales stratigraphically equivalent to those at Smith Creek to the overlying Blaa Mountain Formation. In this paper, these shales are placed in the Blind Fiord Formation.

Tozer (1963b) also defined the Bjorne Formation from studies completed during Operation Franklin. He established a type section on Bjorne Peninsula, southwestern Ellesmere Island, where the formation is 500 m thick and consists mainly of fine to medium grained sandstone. Tozer also examined the Bjorne Formation at Trold Fiord (Tozer, 1963d) and Cameron Island (Tozer, 1963e) during Operation Franklin. Subsequent fieldwork by Tozer and Thorsteinsson established the presence of the formation on Table Island (Tozer, 1961), central and northern Ellesmere Island (Tozer, 1963c) and northern Melville Island (Tozer and Thorsteinsson, 1964). A detailed study of the Bjorne Formation on Melville Island was completed by Trettin and Hills (1966) as a result of the interest in the tar sands that occur in the formation in that area.

Nassichuk and Christie (1968) described the formation in the Tanquary Fiord area of northern Ellesmere Island. Roy (1972) briefly summarizes his studies of the Bjorne Formation on southern and central Ellesmere Island. Roy's field notes also contain much valuable data on the Bjorne and Blind Fiord formations on Ellesmere Island. These data have been incorporated into this study.

Subsurface occurrences of the Bjorne Formation in the Skybattle Bay C-15 well on Lougheed Island have been briefly described by Balkwill et al. (1982), and, in the western Sverdrup by Henao-Londono (1977).

Present work

Tozer (1970) summarized the Lower Triassic stratigraphy of the Sverdrup Basin and demonstrated that the sand-rich Bjorne Formation of the southern and eastern basin margins passes basinward into the argillaceous Blind Fiord Formation. My studies have confirmed this, and it has been found that a thin unit of Blind Fiord Formation occurs at the base of the Lower Triassic succession on the basin margins.

Numerous stratigraphic sections have been measured through the Blind Fiord Formation on northern Ellesmere Island and Axel Heiberg Island (Fig. 36.1). Three members are recognizable in the formation. Each member consists of shale in the lower portion with siltstone dominant in the upper portion (Fig. 36.2, 36.3). These three members are formalized in this paper and are named, in ascending order: Confederation Point, Smith Creek, and Svartfjeld members of the Blind Fiord Formation.

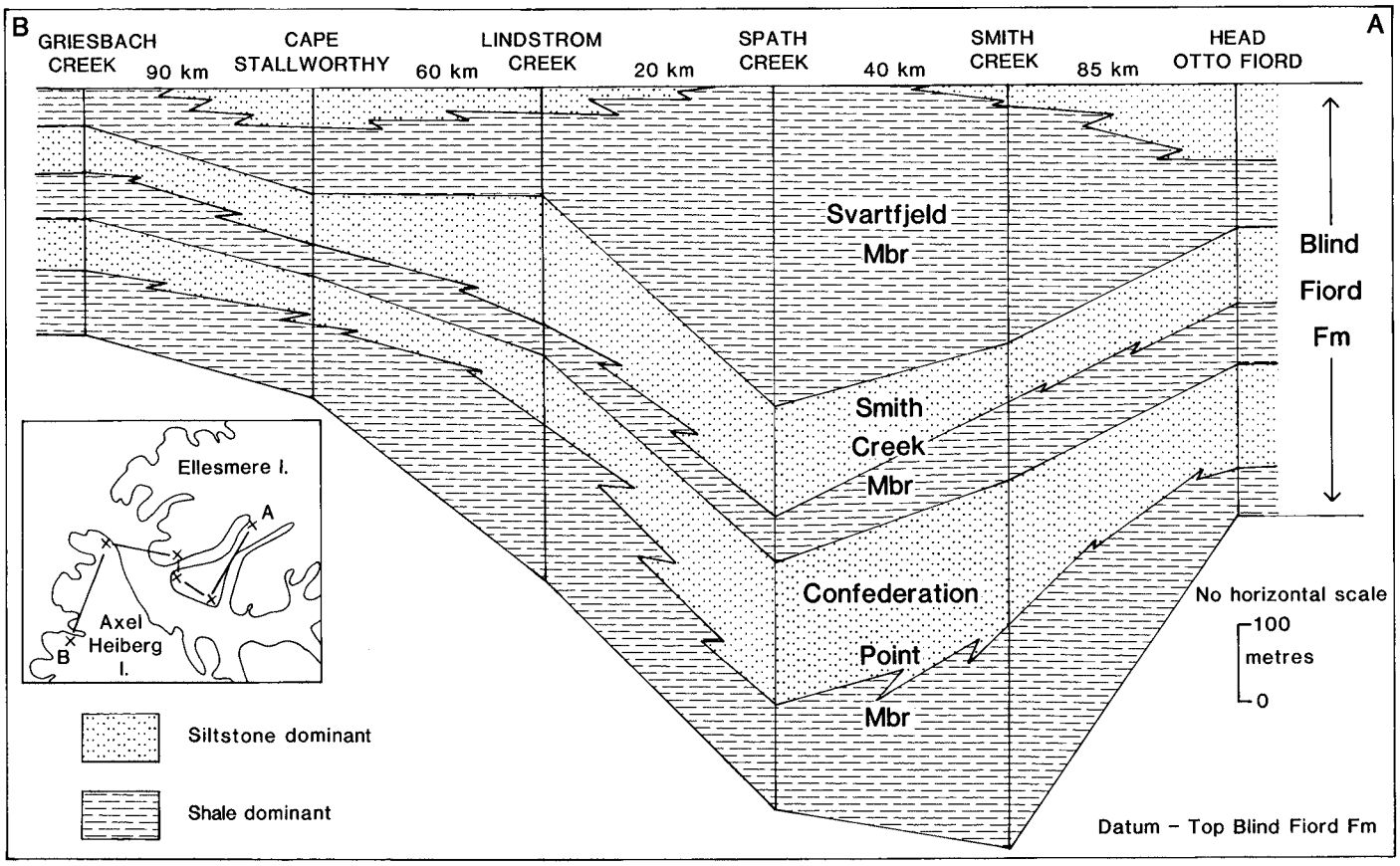

Figure 36.2. Stratigraphic cross-section, Blind Fiord Formation, northeastern Sverdrup Basin.

Figure 36.3. Blind Fiord Formation at head of Otto Fiord, northern Ellesmere Island.

1. Confederation Point Member
2. Smith Creek Member
3. Svartfjeld Member
4. Murray Harbour Formation

On the basin margins, the thin unit of Blind Fiord Formation at the base of the Lower Triassic succession is assigned to the Confederation Point Member and it is overlain by the Bjorne Formation. In many surface and subsurface sections of the Bjorne Formation, two shale/siltstone units occur within the formation, allowing it to be divided into five subdivisions (Fig. 36.4, 36.5). The three sandstone-dominant units are formally recognized herein as members of the Bjorne Formation and are named, in ascending order: Cape Butler, Pell Point and Cape O'Brien. The intervening shale units, which represent tongues of the Blind Fiord Formation, are assigned member names defined for the Blind Fiord Formation: Smith Creek and Svartfjeld (Fig. 36.6). However, it is important to note that in this case the Smith Creek and Svartfjeld members are part of the Bjorne Formation.

The tops for the new members from selected wells in the Sverdrup Basin are listed in the Appendix. Well cuttings taken at three metre intervals from the type sections of the new members of the Bjorne Formation can be examined at the Institute of Sedimentary and Petroleum Geology, Calgary, Alberta.

Confederation Point Member, Blind Fiord Formation

Definition

The Confederation Point Member consists of medium to dark grey, silty shale with interbeds of argillaceous siltstone that become more common upward. The type section is in an unnamed creek 2 km north of Smith Creek on Svartfjeld Peninsula, northwestern Ellesmere Island (80°37'30"N; 87°39'W) (Fig. 36.7). The member is named for Confederation Point, which is 4 km to the southeast of the type section.

Boundaries

The Confederation Point Member abruptly overlies various Permian strata, including glauconitic sandstone of the Trold Fiord Formation, bioclastic limestone of the Degerbols Formation and argillaceous chert of the Van Hauen Formation. The soft grey shale of the Confederation Point contrasts sharply with the Permian rock types and the contact is placed at the base of the first unit of soft, medium to dark grey shale. The contact is unconformable on the basin margins and becomes conformable within the basin. In the basin, the Confederation Point Member is conformably overlain by the Smith Creek Member of the Blind Fiord Formation, and the contact is placed at the top of the highest siltstone unit above which soft shale is the predominant rock type. On the basin margins the member is conformably overlain by the Bjorne Formation (usually Cape Butler Member) and the contact is placed at the base of the first sandstone above which sandstone is predominant.

Lithology

At the type section, the lower 300 m consists of medium grey, silty shale with thin, widely spaced siltstone interbeds. In the upper 175 m of the member, siltstone units, which are parallel laminated to burrowed and up to 50 m thick, occur interbedded with the grey shale. This description applies to the member over the northern Ellesmere-Axel Heiberg area; interbeds of very fine grained sandstone increase to the southeast.

Thickness and distribution

The Confederation Point Member occurs on northern Ellesmere and Axel Heiberg islands, where it is up to 525 m thick. The member comprises the entire Blind Fiord Formation on the eastern and southern basin margins, where it underlies the Bjorne Formation. Thicknesses in these areas are usually less than 100 m. The member has also been tentatively recognized in wells in the western Sverdrup Basin.

Age

The Confederation Point Member is dated as Griesbachian and Dienerian on the basis of ammonites collected from the member on northern Ellesmere and Axel Heiberg islands (Tozer, 1965a). On the basin margins, the member is probably only Griesbachian.

Environment of deposition

The argillaceous lithologies, marine fauna, and sedimentary structures all suggest an outer shelf to marine slope environment of deposition for the member.

Smith Creek Member, Blind Fiord Formation

Definition

The Smith Creek Member consists of medium to dark grey silty shale with argillaceous siltstone interbeds common in the upper portion. The type section is at the head of an unnamed stream 2 km north of Smith Creek on northwestern Ellesmere Island and is 180 m thick (Fig. 36.7). The name is taken from the nearby Smith Creek.

Boundaries

Within the basin, the Smith Creek Member conformably overlies the Confederation Point Member as previously described. On the basin margins, it conformably overlies the Cape Butler Member of the Bjorne Formation, and the contact is placed at the base of the lowest shale/siltstone unit above which shale and siltstone are predominant.

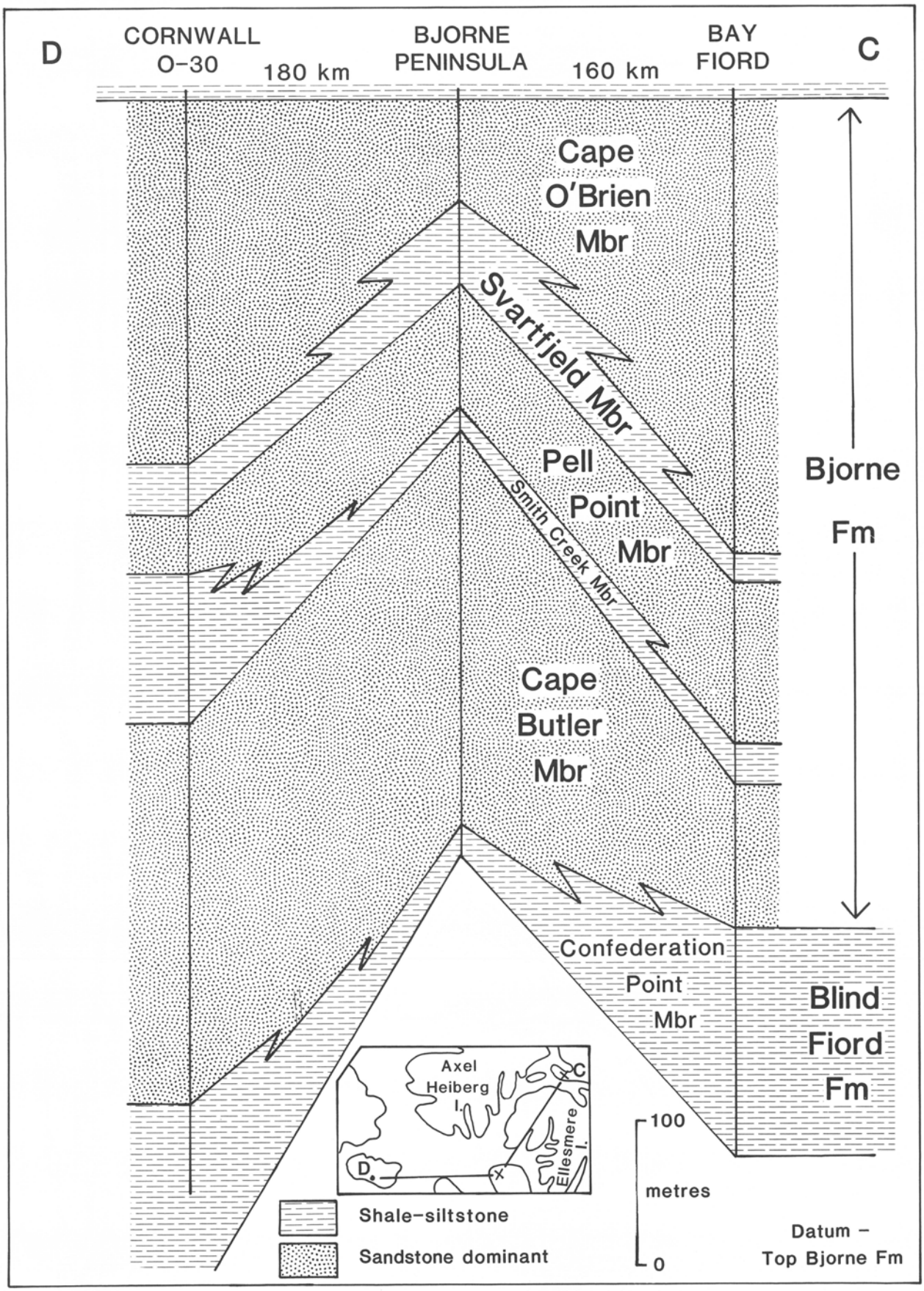

Figure 36.4. Stratigraphic cross-section, Bjorne Formation, southeastern Sverdrup Basin.

The Smith Creek Member in the basin is overlain by the Svartfjeld Member. The contact is placed at the top of the highest siltstone unit above which shale is predominant. Marginward, it is overlain by the Pell Point Member of the Bjorne Formation and the contact is placed at the top of the highest shale/siltstone unit above which sandstone is the predominant lithology.

Lithology

At the type section, the lower 85 m consists of medium to dark grey shale with a few resistant, parallel laminated siltstone units in the upper portion. A distinctive, grey, bioclastic limestone unit 0.5 m thick with a rich ammonite fauna caps the lower portion of the member. The upper 95 m consists of dark grey shale with medium grey siltstone units increasing in thickness and frequency upwards. In other sections, siltstone is more common and usually dominates the upper one half to two thirds of the member. Interbeds of very fine grained sandstone also occur in these sections. Sedimentary structures in the coarser rock types include parallel lamination, ripple crosslamination and a variety of trace fossils.

Figure 36.5. Portion of Bjorne Formation at the Canyon Fiord locality with shale and siltstone of the Smith Creek Member overlying sandstone of the Cape Butler Member and underlying sandstone of the Pell Point Member.

Thickness and distribution

The Smith Creek Member is recognized in the outcrop of Blind Fiord Formation on northern Axel Heiberg and Ellesmere islands, where it is up to 320 m thick. The member also occurs along the eastern and southeastern basin margins. It has been tentatively recognized in wells in the western Sverdrup.

Age

Ammonites collected on Ellesmere and Axel Heiberg islands indicate a latest Dienerian to Smithian age for the member (Tozer, 1965a).

Environment of deposition

An outer shelf to marine slope environment of deposition is suggested by the argillaceous lithologies and marine fauna.

Svartfjeld Member, Blind Fiord Formation

Definition

The Svartfjeld Member consists of medium grey to black shale with interbeds of siltstone in the upper portion of the member. The type section is on Smith Creek in northwestern Ellesmere Island (80°38'N; 87°37'W) where the

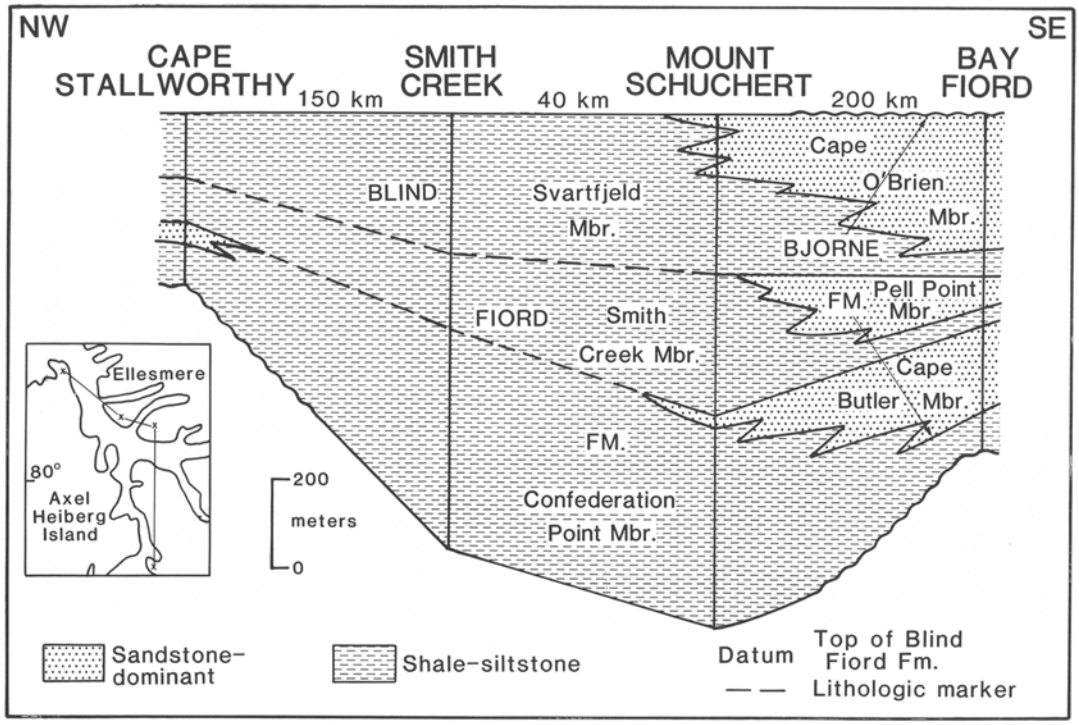

Figure 36.6. Stratigraphic cross-section of Lower Triassic strata, northeastern Sverdrup Basin. Note that Smith Creek and Svartfjeld are members of the Blind Fiord Formation in the north and become members of the Bjorne Formation to the south.

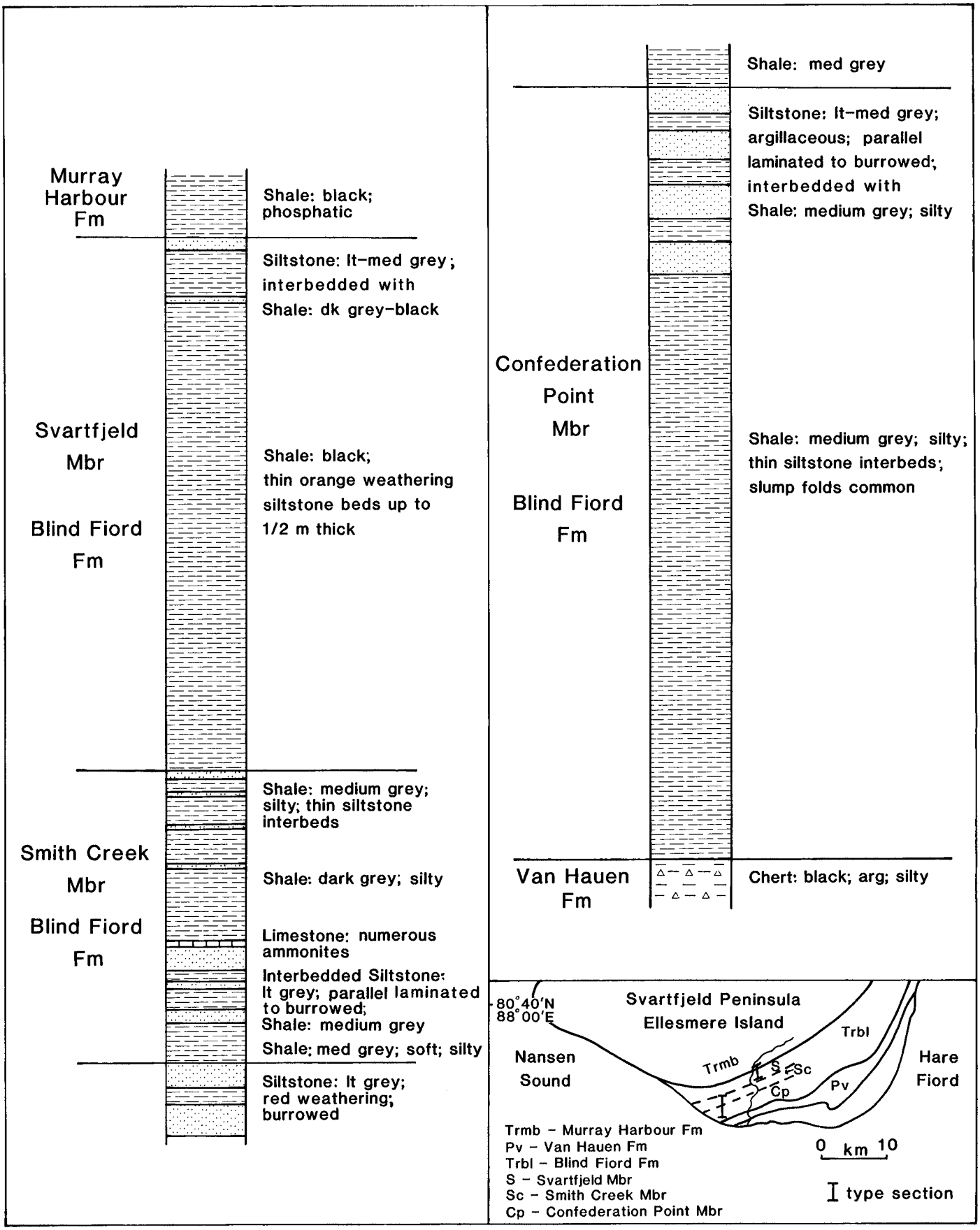

Figure 36.7. Stratigraphic section for the type sections of the Confederation Point, Smith Creek and Svartfjeld members of the Blind Fiord Formation. Accompanying map shows the locations of the type sections.

member is 327 m thick (Fig. 36.7). The member is named after Svartfjeld Peninsula, on which the type section is located.

Boundaries

Within the basin, the member conformably overlies the Smith Creek Member as has been previously described and is conformably overlain by the Murray Harbour Formation of the Blaa Mountain Group (Embry, 1984). The upper contact is placed at the top of the uppermost siltstone unit, which is abruptly overlain by black, calcareous shale with numerous phosphatic concretions.

On the basin margins, the Svartfjeld Member conformably overlies the Pell Point Member of the Bjorne Formation and the contact is placed at the top of the highest sandstone unit above which shale and siltstone are predominant. The upper contact of the Svartfjeld Member is with the Cape O'Brien Member of the Bjorne Formation and is placed at the top of the highest shale/siltstone unit above which sandstone is the main rock type.

Lithology

At the type section, which lies near the axis of the Sverdrup Basin, most of the member consists of black, silty shale with thin, orange weathering beds of calcareous siltstone. The siltstone beds are usually 20 cm thick, massive, and occur about every 10 m. In the uppermost portion of the formation, the siltstone units become thicker and more common. Toward the margins of the basin the shale becomes lighter in colour – mainly medium to dark grey – and siltstone content increases, especially in the upper half of the member. Interbeds of very fine grained sandstone also begin to appear within the upper portion of the member in marginal sections. Sedimentary structures within the siltstone and sandstone units are mainly parallel lamination and ripple crosslamination.

Thickness and distribution

The member is recognized mainly in the eastern and southeastern portions of the Sverdrup Basin and has also been identified in wells in the western portion of the basin. It ranges from a few metres thick in marginal sections to up to 400 m thick within the basin.

Age

Ammonites and pelecypods collected from the member on northern Ellesmere and Axel Heiberg islands indicate that it ranges in age from latest Smithian to Spathian (Tozer, 1965a; unpublished paleontological reports).

Environment of deposition

The argillaceous lithologies and the marine fauna suggest an outer shelf to slope environment of deposition. The presence of black shales within the basinal sections indicate that the bottom waters were oxygen deficient in this area.

Cape Butler Member, Bjorne Formation

Definition

The Cape Butler Member consists predominantly of fine to medium grained sandstone with interbeds of red, green or grey shale and siltstone. The type section is in the Mobil Cornwall O-30 well (77°29'47"N, 94°38'58"W; spudded June 5, 1979; abandoned October 14, 1979; T.D. 3584 m; K.B. 29.8 m) between 1203 m and 1430 m, and is 227 m thick (Fig. 36.8). The name is taken from Cape Butler on Cornwall Island, which is 28 km from the type well.

Boundaries

The member conformably overlies the Confederation Point Member of the Blind Fiord Formation as previously described and is overlain by the Smith Creek Member. This contact is placed at the top of the highest sandstone above which shale and siltstone become predominant (Fig. 36.8).

Lithology

At the type section, the member consists mainly of fine to medium grained sandstone in units up to 20 m thick. Interbeds of red, green or grey, silty shale and siltstone usually 2 m or less in thickness occur throughout the member. Coarsening-upward cycles occur in lowermost portion of the member and fining-upward cycles are common throughout the remainder of the member. In outcrops on the basin margin, the predominant sedimentary structures are trough and planar crossbeds up to 1 m thick. Ripple crosslamination, horizontal bedding and mudcracks also occur. Mud chip conglomerates are present at the base and within sandstone units. In more basinward sections of the member, burrows are common in association with horizontal bedding and ripple crosslamination.

Thickness and distribution

The member occurs along the southern and eastern basin margins except in the Melville Island area where the Bjorne Formation is undivided. It ranges in thickness from a few metres near its shale-out edge to a maximum of 375 m on Fosheim Peninsula, Ellesmere Island.

Age

The member is dated as Griesbachian to Dienerian on the basis of the established ages of underlying and overlying shale/siltstone units.

Environment of deposition

The lithologies, cycles, and sedimentary structures indicate a spectrum of depositional environments from braided stream to shallow marine shelf. Fluvial strata dominate on the basin margin and are gradually replaced by shoreline to shallow marine strata basinward.

Pell Point Member, Bjorne Formation

Definition

The Pell Point Member consists mainly of fine to medium grained sandstone with interbeds of grey, green and red shale and siltstone. The type section of the formation is in the Mobil Cornwall O-30 well between 1077 m and 1117 m and is 40 m thick (Fig. 36.8). The name is taken from Pell Point on southern Cornwall Island.

Boundaries

The Pell Point Member conformably overlies the Smith Creek Member and is conformably overlain by the Svartfjeld Member as has been previously described.

Lithology

At the type section, the lower 22 m consists of interbedded, very fine to fine grained sandstone, siltstone and shale with individual units usually less than 2 m thick. In outcrop similar lithological associations occur and the sandstone units are sharp-based and have horizontal bedding, ripple crosslamination and burrows. Shale and siltstone units are mainly grey and green with occasional red intervals, and exhibit parallel lamination and bioturbation. The upper 18 m of the type section consist mainly of fine to medium grained sandstone with only thin siltstone interbeds. Outcrops of similar lithology are dominated by trough crossbedding and horizontal bedding with burrows associated with thin argillaceous beds.

Thickness and distribution

The Pell Point Member occurs along the southern and eastern basin margins except in the Melville Island area. It is thickest near the edge of the basin and the maximum

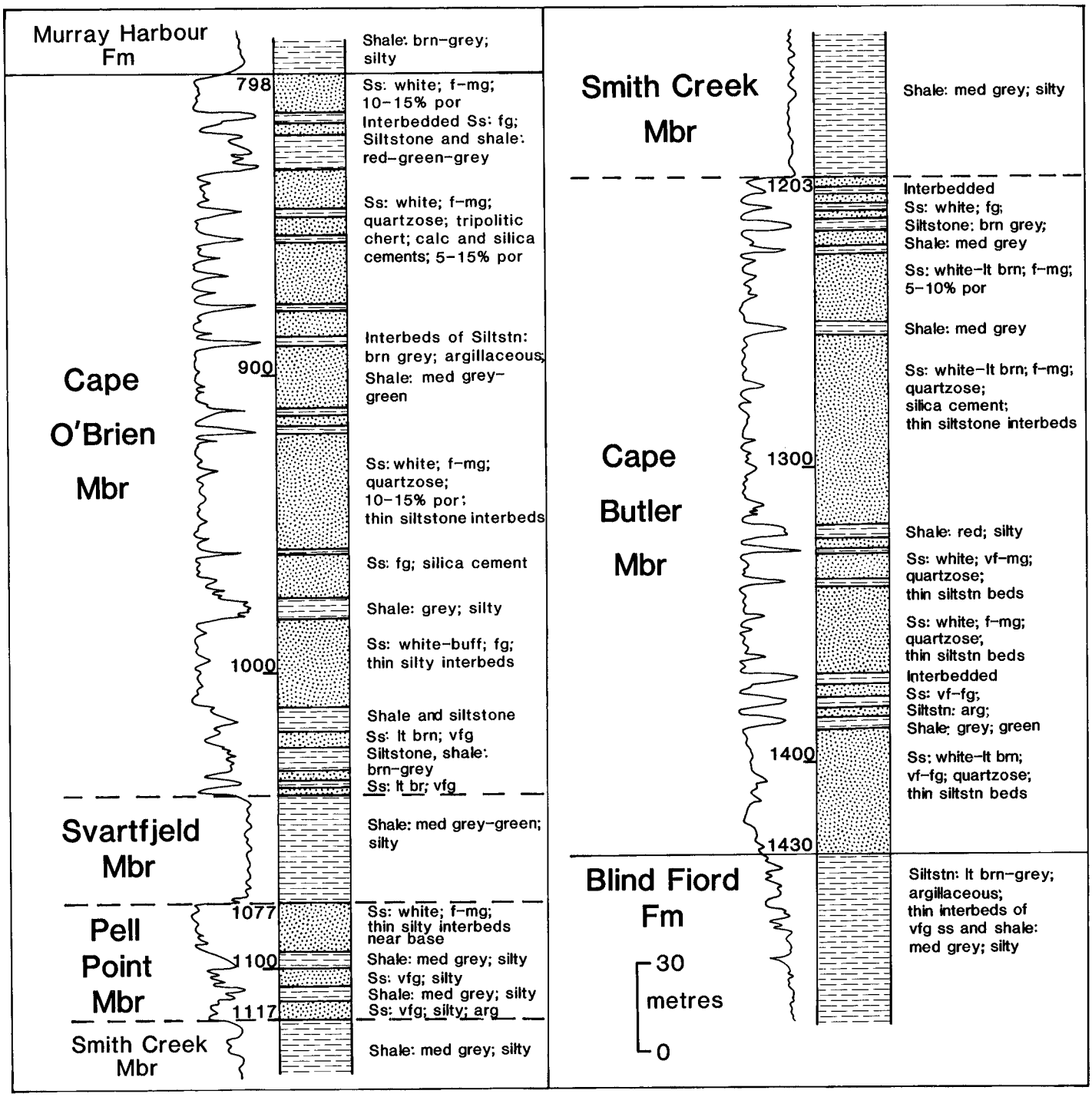

Figure 36.8. Lithology (from samples) and gamma ray curve for type sections of Cape Butler, Pell Point and Cape O'Brien members of the Bjorne Formation; Cornwall O-30 well.

recorded thickness is 555 m (Fosheim Peninsula). The member thins basinward due to facies change to shale and siltstone of the Smith Creek Member (Fig. 36.6) and eventually disappears.

Age

The Pell Point Member is dated as Smithian on the basis of the established ages of the enclosing shale units.

Environment of deposition

The portion of the member that consists of finely interbedded sandstone, siltstone and shale is of shallow shelf origin. The portion dominated by crossbedded sandstone is of shoreface to coastal plain origin, and in some areas includes thick braided stream deposits.

Cape O'Brien Member, Bjorne Formation

Definition

The Cape O'Brien Member consists mainly of fine to medium grained sandstone with thin interbeds of grey, green and red shale and siltstone. The type section is the Mobil Cornwall O-30 well between 798 m and 1042 m, and is 244 m thick. The name is taken from Cape O'Brien on southwest Cornwall Island.

Boundaries

The member conformably overlies the Svartfjeld Member as previously described and is overlain by the Murray Harbour Formation. This contact varies from conformable to unconformable and is placed either at an obvious unconformity or at the top of the highest sandstone above which shale and siltstone predominate.

Lithology

At the type section, the member consists mainly of fine to medium grained sandstone units up to 25 m thick. Coarsening-upward units are most common in the lower portion of the unit, and fining-upward cycles are present in the upper portion. Shale/siltstone units are usually less than 3 m thick and occur throughout the member. Colours range from grey through red and green. In outcrop, the thick sandstone units are dominated by trough crossbedding and horizontal bedding, with scour surfaces and mud chip conglomerates also common. Ripple crosslamination, horizontal bedding and burrows occur in the lower part of the member in basin margin sections and throughout it near its shale-out edge.

Thickness and distribution

The Cape O'Brien Member occurs along the extent of the Bjorne Formation except in the Melville Island area, where the Bjorne Formation is undivided. It is thickest (500 m) in the Fosheim Peninsula area. It thins basinward due to facies change to shale and siltstone (Svartfjeld Member) and eventually shales out.

Age

The member is dated as Spathian (possibly as old as Smithian) on the basis of its equivalence with the well dated Svartfjeld Member.

Environment of deposition

Interbedded sandstone, siltstone and shale arranged in coarsening-upward cycles and containing burrowed horizons are mainly of shallow shelf to strandline origin. The crossbedded sandstones, which are associated with red shale and siltstone, scour surfaces and fining-upward cycles, and which lack trace fossils are interpreted to be of fluvial origin.

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APPENDIX

Stratigraphic tops from selected wells, Blind Fiord and Bjorne formations. Location of wells shown in Figure 36.1.

BP Satellite F-68		
Bjorne Formation		
Cape O'Brien Member	1165 m	(3822 ft)
Svartfjeld Member	1189 m	(3900 ft)
Pell Point Member	1302 m	(4272 ft)
Smith Creek Member	1418 m	(4651 ft)
Cape Butler Member	1506 m	(4941 ft)
Blind Fiord Formation		
Confederation Point Member	1854 m	(6082 ft)
Trold Fiord Formation	1860 m	(6101 ft)
Panarctic Drake Point L-67		
Bjorne Formation	1561 m	(5123 ft)
Blind Fiord Formation		
Confederation Point Member	2874 m	(9428 ft)
Van Hauen Formation	3134 m	(10282 ft)
Panarctic Brock C-50		
Bjorne Formation		
Cape O'Brien Member	446 m	(1463 ft)
Blind Fiord Formation		
Svartfjeld Member	494 m	(1620 ft)
Smith Creek Member	795 m	(2608 ft)
Confederation Point Member	1062 m	(3485 ft)
Degerbols Formation	1658 m	(5438 ft)
Dome Sutherland O-23		
Blind Fiord Formation		
Svartfjeld Member	1917 m	(6290 ft)
Smith Creek Member	2831 m	(9287 ft)
Confederation Point Member ?		
Panarctic Isachsen J-37		
Blind Fiord Formation		
Svartfjeld Member	1477 m	(4846 ft)
Smith Creek Member	1796 m	(5891 ft)
Confederation Point Member	1984 m	(6510 ft)
Degerbols Formation	2530 m	(8301 ft)
Mobil Cornwall O-30		
Bjorne Formation		
Cape O'Brien Member	798 m	(2618 ft)
Svartfjeld Member	1042 m	(3419 ft)
Pell Point Member	1077 m	(3534 ft)
Smith Creek Member	1177 m	(3862 ft)
Cape Butler Member	1203 m	(3947 ft)
Blind Fiord Formation		
Confederation Point Member	1430 m	(4692 ft)
Van Hauen Formation	1638 m	(5374 ft)

Horn River Depot Point L-24		
Bjorne Formation	329 m	(1080 ft)
Blind Fiord Formation	621 m	(2039 ft)
Thrust fault ?	822 m	(2696 ft)
Bjorne Formation	822 m	(2696 ft)
Blind Fiord Formation	864 m	(2835 ft)
Thrust fault	1507 m	(4945 ft)
Bjorne Formation	1507 m	(4945 ft)
Blind Fiord Formation	1740 m	(5710 ft)
Thrust fault	1971 m	(6468 ft)
Bjorne Formation	1971 m	(6468 ft)
Blind Fiord Formation	2100 m	(6889 ft)
Van Hauen Formation	3608 m	(11837 ft)
Panarctic Fosheim N-27		
Bjorne Formation		
Cape O'Brien Member	688 m	(2257 ft)
Svartfjeld Member	1230 m	(4037 ft)
Pell Point Member	1244 m	(4082 ft)
Smith Creek Member	1835 m	(6021 ft)
Cape Butler Member	1997 m	(6551 ft)
Thrust fault	2132 m	(6995 ft)
Pell Point Member	2132 m	(6995 ft)
Smith Creek Member	2419 m	(7936 ft)
Cape Butler Member	2568 m	(8425 ft)
Blind Fiord Formation		
Confederation Point Member	3002 m	(9850 ft)
Van Hauen Formation	3608 m	(11837 ft)
Gulf Neil O-15		
Bjorne Formation		
Cape O'Brien Member	1098 m	(3601 ft)
Svartfjeld Member	1202 m	(3945 ft)
Pell Point Member	1255 m	(4117 ft)
Smith Creek Member	1490 m	(4887 ft)
Cape Butler Member	1508 m	(4946 ft)
Blind Fiord Formation		
Confederation Point Member	1579 m	(5180 ft)
Thrust fault	1964 m	(6442 ft)
Bjorne Formation		
Cape Butler Member	1964 m	(6442 ft)
Blind Fiord Formation		
Confederation Point Member	1990 m	(6530 ft)
Trold Fiord Formation	2353 m	(7720 ft)