# <u>Appendix 2</u>

# Heat Bar drillcore, Båtsfjordfjellet: brief descriptions of thin-sections of rocks from the core

Eighteen thin-sections have been examined with the main focus on the following objectives:

- 1. Mineral composition.
- 2. Textures (primarily grain size and sorting) and microstructure.
- 3. Correlation of the results of (1) and (2) with the measurements of thermal conductivity.

#### Brief descriptions of the thin-sections (downwards in the core).

For precise locations of the core samples taken for thin-sections (numbers BA 005 to BA 126) from the drillcore, see Appendix 1.

## Båtsfjord Formation, Skovika Member

- BA 005 Fine-grained (c. 0.1 0.2 mm), well-sorted quartz sandstone composed of subangular to subrounded grains of quartz and some feldspar. Sericite is the main component of the cement, which also contains some tiny grains of red jasper and hematite dust. Several of the quartz grains have clearly visible quartz overgrowths, whilst dentate contacts between some other quartz grains suggest the presence of overgrowths but with no visible boundary between the clastic grain and the authigenic overgrowth.
- BA 006 (a) Very fine-grained quartz sandstone and siltstone (c. 0.05 0.1 mm), moderately sorted, grains subangular. Subordinate feldspar. Cement: carbonate (dolomite). Specks of an opaque, Fe-oxide mineral common, (b) dolomicrite laminae with sporadic chlorite flakes. Features indicative of compaction can be seen in some layers.
- BA 010 Hematite-rich mudstone with scattered sand-sized grains of quartz, angular to subrounded. There are also sand-sized fragments of disrupted (dolo)micritic laminae. Subordinate feldspar.
- BA 012 Hematite-rich mudstone (0.05 0.1 mm) with very fine sand + silt, subangular, with some c. 0.2 mm grains = fine sand. The hematite-rich laminae alternate with sericite laminae containing little or no hematite. Subordinate feldspar grains. A compactional fabric can be detected in some layers (laminae folia flattened around quartz-rich lenses).
- BA 015 Alternating laminae of dolomicrite and laminae consisting of very fine sand- and silt-sized quartz grains (0.04 0.1 mm), subangular to angular, in

an abundant carbonate + sericite cement. Traces of a spaced cleavage oriented at c. 10-15° to the lamination can be seen in some layers.

- BA 023 Laminated sandy mudstone, 0.05 0.35 mm = silt, with medium-grained quartz sand grains, subangular to subrounded, rich in (authigenic) hematite. Subordinate feldspar, rare (classic) chlorite. Cement: dolomite forming c. 0.05 mm rhombohedra. Clayey laminae consist of sericite and hematite. A weak spaced cleavage is present in some layers.
- BA 033 (a) Fine-grained (0.15 0.2 mm) well-sorted, grain-supported feldspathic sandstone, sericite-cemented. Some chlorite and (Fe) sulphide concentrations. Sporadic c. 0.5 mm sand grains (wind blown).
  (b) Mudstone, clay (sericite)-rich with subangular to subrounded quartz grains. Scattered subrounded quartz grains c. 0.6 1 mm (coarse to very coarse, interpreted as wind blown). Faint spaced cleavage and grain orientation at c. 10° to layering.
- BA 035 Dolomicrite (<0.01 0.02 mm), homogeneous, with some c. 1 mm-thick laminae of quartz siltstone ( $\leq 0.05$  mm) and very fine-grained sandstone. Subordinate laminae of quartz silt+sericite. Voids and cracks are sealed with carbonate. Subordinate feldspar, chlorite and opaque minerals (?FeS) in small scattered concentrations (spots). Weak spaced cleavage detectable.

#### (fault contact)

## Løkviksfjellet Group, Sandfjorden Formation

- BA 040 Quartz sandstone, grain-supported, coarse- to very coarse-grained (c. 0.5 1.3 mm), grains rounded to well-rounded; subordinate grains of feldspar, chert and quartzite. The majority of the quartz grains are markedly strained. The quartzite grains are tightly packed, and there are some intergranular pockets filled with fine grains of quartz. Quartz overgrowths are discernible in only a few places. Thin rims of sericite + ?chlorite cement.
- BA 041 Quartz sandstone, grain-supported, coarse- to very coarse-grained (c. 0.4 1.0 mm) with some granules (2 4 mm). The quartz grains are rounded to well-rounded, and there are many strained grains. A few grains exhibit quartz overgrowths (probably the majority of overgrowth rims are not visible because of the clean surfaces of the clastic grains). Feldspar and chert grains are subordinate. Pockets of quartz silt and sericite (?clastic or ?crushed or ?weathered feldspar). The negligible cement consists of sericite and chlorite. One 5 mm quartz pebble is present in this thin-section.
- BA 042 Quartz sandstone, grain-supported, very coarse-grained, gritty with granules. The grains are rounded to well-rounded and tightly packed. Some are strained. There are granules of quartzite, chert and red jasper. Also present are small intergranular pockets filled with equigranular quartz silt (?) = ?crushed larger grains or ?weathered feldspar.

BA 047 Quartz sandstone, coarse- to very coarse-grained, gritty, with granules and small pebbles of quartz, quartzite and chert. Large subrounded grains may be wind blown. There are distinct quartz overgrowths on several quartz grains, and dentate contacts between quartz grains are suggestive of overgrowths on clean surfaces of clastic grains. Pockets between the coarse grains are filled with 0.1 - 0.2 mm quartz sand. Feldspar grains are few and weathered. Thin (c. 0.02 mm) rims of cement consist of sericite and chlorite. Also present are some round opaque grains c. 0.1 - 0.3 mm in diameter.

#### (unconformity)

#### Båtsfjord Formation, Skovika Member:

- BA 086 Laminated mudstone with lamination-parallel cracks and lenticular voids filled with dolomite, and several mm-thick veinlets of coarse dolomite. The mudstone shows a faintly developed cleavage oriented at c. 20° to the lamination. Quartz grains show nice dissolution features where they are in contact with cleavage folia, and beards or tails within the inter-cleavage domains.
- BA 087 Laminated, dolomitic claystone/mudstone and muddy fine-crystalline dolomite. Synsedimentary voids and cracks are filled with dolomite and fibrous ?gypsum. Traces of a spaced cleavage can be seen in the finer-grained layers.
- BA 088 Dolomicrite, laminated, with some laminae enriched in quartz sand and silt.Voids, cracks and minute pores are filled with fibrous (?)gypsum + dolomite + quartz. In places, the fibrous (?)gypsum appears to be replaced by carbonate (dolomite). Mud-enriched parts are poorly sorted and clearly enriched in hematite dust and tiny quartz grains. A faint spaced cleavage is present in some layers.
- BA 107 Laminated, clayey (sericitic) dolomicrite (0.01 0.02 mm) and dolomitic claystone, and fine-grained (0.02 0.05 mm) dolomite. The laminae contain scattered quartz grains mostly <1 mm in size. A compactional fabric is detectable. Some small syn-sedimentary faults offset laminae at right-angles and then curve and die out along the layering.
- BA 115 Laminated dolomicrite (< 0.01 mm) and dolomitic mudstone. Abundant cracks and voids in dolomicrite are filled with dolomite and (?)gypsum. A crude spaced cleavage is present in some finer-grained layers, and can also be detected in quartz-rich, carbonate-cemented layers.
- BA 126 Laminated dolomicrite and dolomitic mudstone. Fractures c. 0.25 mm wide are sealed with a carbonate mineral. These veinlets transect the layering at 50-55°. They also cut across a weak spaced cleavage but are themselves displaced along these same cleavage surfaces.