

## Lithology and stratigraphy of the upper part of the Dixon Island Formation in the DXCL Drilling.

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The 3.2 Ga Dixon Island Formation of the Cleaverville Group in the coastal Pilbara terrane, Western Australia, is one of the most complete and best preserved examples of middle Archean sedimentary sequence that contains submarine hydrothermal system. In order to reconstruct such submarine environment and understand how early life flourished, we conducted scientific drilling at the Cleaverville beach, west Pilbara, in July 2007. Here we describe detailed lithology and stratigraphy of the drillcore DX that covers the upper part of the Dixon Island Formation.

The DX core is mainly formed of two types of lithology; lamination type (L) and massive type (M). L type is mainly composed of alternations of black shale, gray chert and pyrite layer. There develop a few mm to cm thick laminations. The black shale contains some carbonates. There are no terrigenous matters in this core. L type is subdivided into three subtypes by abundance of pyrite. L-1 subtype consists of alternation of laminated black shale and laminated gray chert that lack pyrite layers. L-2 subtype consists of several mm-thick alternation of black shale, pyrite layer, and gray chert. There are two kinds of pyrite layers in this subtype; graded bed pyrite and euhedral pyrite. In black shales, very fine grains of pyrite are concentrated toward the top within 1cm thick bed. L-3 subtype resembles the L-2 subtype. Each pyrite layer is 1~10cm in thickness. M type is composed of massive black shale with pyrite layers. Each black shale bed of this subtype has 10~20cm thickness. Pyrite layers resemble with thin layer or boudinage pyrite of L-3 subtype (2~5cm in thickness).

The Dixon Island Formation in the DX core is approximately 60m thick, and divided into four units; units 1, 2, 3 and 4 in ascending order. Unit 1 (3.4m in thickness) consists of L-3 subtype, and contains abundant pyrite layers. Unit 2 (6.8m in thickness) consists mostly of M type, Unit 3 (36.9m in thickness) consists of L-2 subtype. Its stratigraphically lower part is enriched in the graded pyrite, and the upper part is enriched in the boudinage pyrite. Unit 4 (13.4m in thickness), the stratigraphically uppermost part of the Dixon Island Formation, consists of L-1 subtype. Laminated gray chert represents more than 80% (in volume) of this unit.

The upper part of the Dixon Island Formation from the DX core is divided four units. This core contains following characters; existence of very fine laminated structure, many well-laminated pyrite layers in sedimentary rocks and absence of terrigenous matters. These observations suggest that the sedimentary environment of the Dixon Island Formation was very calm, reducing, and pelagic.