

This document was produced  
by scanning the original publication.

Ce document est le produit d'une  
numérisation par balayage  
de la publication originale.

**Surficial Geology of the  
Abegweit Passage Area of  
Northumberland Strait, Gulf of St. Lawrence**

**GSC Open File #2087**

**by**

**Gordon B.J. Fader and Shawn Pecore**

OPEN FILE  
DOSSIER PUBLIC

**2087**

GEOLOGICAL SURVEY  
COMMISSION GEOLOGIQUE  
OTTAWA

# Surficial Geology of the Abegweit Passage Area of Northumberland Strait, Gulf of St. Lawrence

by

Gorden B.J. Fader  
Atlantic Geoscience Centre  
Geological Survey of Canada  
Bedford Institute of Oceanography  
Box 1006,  
Dartmouth, Nova Scotia  
B2Y 4A2

and

Shawn S. Pecore  
Department of Earth Sciences  
University of Waterloo  
Waterloo, Ontario  
N2L 3G1

## Introduction

In 1988 the Atlantic Geoscience Centre conducted marine geological-geophysical survey aboard the M.V. Navicula (Fader, 1988) in the Abegweit Passage area of the Northumberland Strait. The survey, centred on the proposed fixed link crossing between Jourimain Island, New Brunswick and Borden Point, Prince Edward Island, has identified the presence of dynamic seabed conditions and other seabed features not previously known. Earlier regional marine geological surveys in the 1970's identified the major surficial formations (Krank, 1971) but did not address the dynamics of seabed sediments. This study, however, was undertaken with high resolution seismic reflection profilers together with a 100 kHz sidescan sonar system and seabed samplers. The data indicate the presence of sand ribbons, sand waves, 2 and 3-dimensional megaripples, comet marks, and areas of boulders and outcropping bedrock. In the nearshore, linear depressions may represent present day ice scouring of the seabed. The widespread presence of bedforms suggests

that the seabed of the Abegweit Passage of Northumberland Strait is much more dynamic than previously thought. Seismic reflection information clearly defines the unconformity at the bedrock surface and provides thicknesses for the overlying surficial formations. The regional distribution of control, bathymetry, bedforms, seabed features, and surficial geology, including a cross-section is presented in this open file. On enclosure 1 the dots on the track lines are fiducial marks.

### **Bedrock and Surficial Sediments**

The bedrock geology of Northumberland Strait consists of Carboniferous and Permian sedimentary rocks which dip at two to four degrees to the northeast (see cross-section). It is overlain by a glacial till formation, Pomquet Drift (Kranck, 1971), which ranges in thickness to 12.2 m. The surface of the till has been modified by a sea level transgression sea after glaciation and by strong present day currents which have developed the overlying Buctouche Sand and Gravel Formation. A modern sand deposit, Egmont Sand, consists of localized bodies of coarse to medium grained sand which is undergoing active transport and is developed into fields of sand waves and megaripples.

### **Bedforms**

At the site of the proposed fixed link crossing between Jourimain Island and Point Borden, the southern third of the seabed is covered with sand ribbons which are current-parallel, thin bedforms of sand overlying gravel. Sand ribbons are thought to be generated in short-lived periods of intense flow. Associated with sand ribbons are comet marks (Werner

et al., 1980) which are boulder-induced, linear erosional scours common to current swept seabeds. The "tails" (as shown by the symbol on Enclosure 4) of the comet marks shows a regional sediment transport from west to east.

Areas of subdued megaripples and/or gravel waves, which have no measureable relief, occur close to Jourimain Island. They appear degraded.

### **Boulders, Till, and Scallop Fishing Marks**

The presence of large boulders up to 3 m in diameter at the seabed suggests that they may be distributed throughout the subsurface till section. In the central part of the strait the seabed is covered with parallel sets of linear-curvilinear marks made by scallop fishing gear. An absence of boulders is characteristic of the same area and suggests that the boulders may have been removed by the fishing operation.

### **Ice Scour**

Shallow linear scour depressions occur in the nearshore of both sides of the Abegweit Passage in water depths up to 11 m. They suggest present day erosion of the shallow seabed from grounded moving ice pressure ridge keels.

### **Acknowledgment**

We thank the Captain and the crew of the M.V. Navicula, and the Program Support Division technicians of Atlantic Geoscience Centre for their

support during the cruise. We also thank the Canadian Hydrographic Service for providing bathymetric field sheets, and Earth and Ocean Research Ltd. for preparing the digitized maps. This open file was reviewed by R.D. Parrott and G. Sonnichsen.

## References

- Fader, G.B.J. 1988. Cruise Report 88-018(D) Phase 6/7 M.V. Navicula Northumberland Strait - July 8-23, 1988. Geological Survey of Canada Open File # 1971, 31p.
- Kranck, K. 1971. Surficial Geology of Northumberland Strait, Marine Science Paper 5. Geological Survey of Canada, Paper 71-53.
- Werner, G.U., Koopmann B., and Stefanon, A. 1980. Field observations and flume experiments on the nature of comet marks. Sediment Geology: v.26, pp. 233-262.