


Division of Mines and Mineral Resources — Report 1990/25
A gas seep at Marion Bay
by P. W. Baillie
Abstract

Isotopic analyses suggest that gas seeping in the Marion Narrows is of bacterial (biogenic) origin.

INTRODUCTION

A naturally-occurring gas seep was discovered in the Marion Narrows on the end of The Long Spit, at the southern end of Marion Bay [EN720557], by Mr Malcolm Bendall in early 1990. The seep was subsequently visited by the author three times between April and June of that year.

The gas discharge consisted of persistent bubble trains over a relatively small area and occurring in shallow water of less than one metre depth at mean low tide. The seep occurred very close to the shore at the end of the spit, but within the narrow tidal channel joining Blackman and Marion bays. The substrate consisted of clean sand with large-scale bedforms resulting from the strong tidal currents which sweep through Marion Narrows. An H₂S odour was present in close proximity to the seep.

On the final visit to the seep on June 4, gas was discharging under some pressure through a single vent. A mound of slightly darker-coloured sand, about 100 mm in diameter, had formed where the gas entered the sea. During this visit, two samples were collected by water displacement into glass bottles, which were then crown-sealed and stored upside down at normal temperature without further treatment.

ANALYTICAL RESULTS

One sample was analysed by the Central Science Laboratory, University of Tasmania, and the other by the CSIRO Division of Exploration Geoscience, North Ryde (NSW) to determine whether the gas was thermogenic or biogenic in origin.

The principal components were determined by gas chromatography (fig. 1) to be methane (63%), carbon dioxide (36%) and hydrogen sulphide (1%). Subsequent analyses using gas chromatography and mass spectrometry (GC-MS) indicated the presence of SO₂, COS, and possibly traces of ethane and propane.

At North Ryde, the methane and carbon dioxide were separated and the component isotopes were analysed:

Methane	$\delta^{13}\text{C}$	-45.5 ‰ PDB
	δD	-348 ‰ SMOW
Carbon Dioxide	$\delta^{13}\text{C}$	-10.4 ‰ PDB
	$\delta^{18}\text{O}$	+27.0 ‰ SMOW

DISCUSSION

The relatively long period of time over which the seep was observed, and the presence of ethane and propane (albeit in trace amounts), initially suggested that the gas may be of thermogenic origin.

CSIRO concluded (D. Rigby, in letter dated 4 October 1990) that although the carbon and oxygen isotopic data is inconclusive, the deuterium depletion strongly suggests a biogenic origin for the methane — the "lightest" δD measurement for Australian thermogenic natural gas is -239 ‰ SMOW.

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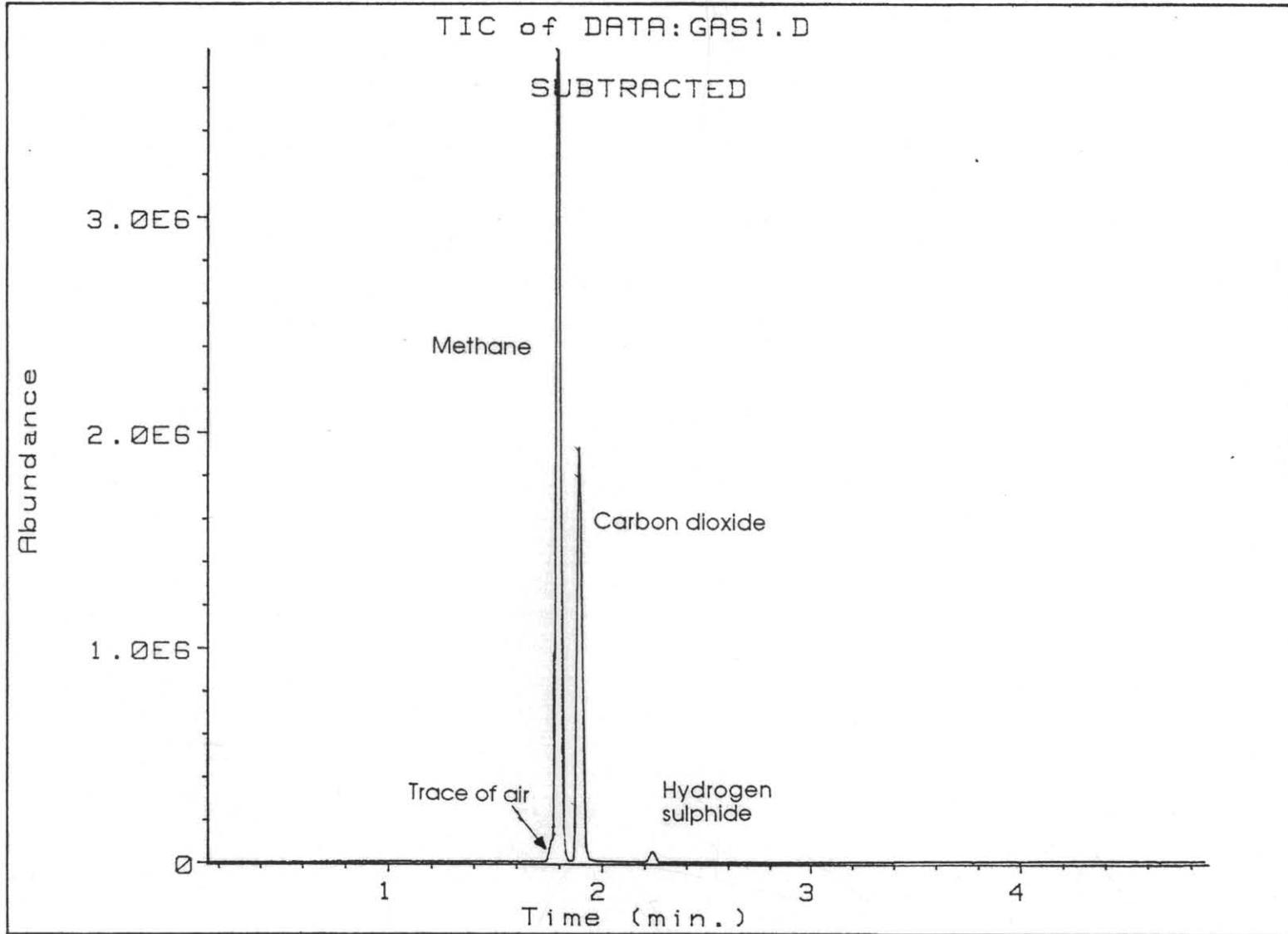


Figure 1. Gas chromatogram of gas sample.

