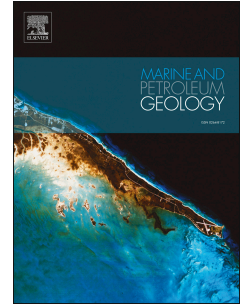


Accepted Manuscript

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PII: S0264-8172(17)30240-4

DOI: [10.1016/j.marpetgeo.2017.06.033](https://doi.org/10.1016/j.marpetgeo.2017.06.033)

Reference: JMPG 2967

To appear in: *Marine and Petroleum Geology*

Received Date: 23 March 2017

Revised Date: 19 June 2017

Accepted Date: 21 June 2017

Please cite this article as: Hennissen, J.A.I., Hough, E., Vane, C.H., Leng, M.J., Kemp, S.J., Stephenson, M.H., The prospectivity of a potential shale gas play: An example from the southern Pennine Basin (central England, UK), *Marine and Petroleum Geology* (2017), doi: 10.1016/j.marpetgeo.2017.06.033.

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The prospectivity of a potential shale gas play: an example from the southern Pennine Basin (central England, UK)

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Abstract

During the Serpukhovian (late Mississippian) Stage, the Pennine Basin, now underlying much of northern England, consisted of a series of interlinked sub-basins that developed in response to the crustal extension north of the Hercynic orogenic zone. For the current study, mudstone samples of the Morridge Formation from two sub-basins located in the south-eastern part of the Pennine Basin were collected from the Carsington Dam Reconstruction C3 Borehole (Widmerpool Gulf sub-basin) and the Karenight 1 Borehole (Edale Gulf sub-basin). Detailed palynological analyses indicate that aside from the dominant (often 90% or more) heterogeneous amorphous organic matter (AOM), variable abundances of homogeneous AOM and phytoclasts are present. To complement the palynological dataset, a suite of geochemical and mineralogical techniques were applied to evaluate the prospectivity of these potentially important source rocks. Changes in the carbon isotope composition of the bulk organic fraction ($\delta^{13}\text{C}_{\text{OM}}$) suggest that the lower part (Biozone E_{2a}) of Carsington DR C3 is

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