A practical evaluation of 21st century microbiological techniques for the upstream oil and gas industry

A PRACTICAL EVALUATION OF 21ST CENTURY MICROBIOLOGICAL TECHNIQUES FOR THE UPSTREAM OIL AND GAS INDUSTRY

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CONTENTS

FOREWORD

Despite the repeatedly demonstrated financial and operational risk from the activity of microorganisms, the oil and gas industry has largely depended upon the development of microbiological monitoring and identification techniques intended for other commercial sectors and adapted these for its own needs. This is still true in the 21st century, but the rapidly increasing dependence upon molecular microbiological methods (MMM) in fields such as clinical diagnostics and the food industry, is only slowly being embraced by the oil and gas industry. One of the reasons for this is the relative lack of knowledge of the strengths and weaknesses of MMM in relation to microbiological problems in oilfield, refinery and pipeline situations. Therefore, in general there is an inability to take full advantage of the power of molecular biology to help understand and solve the wide variety of microbiological problems which may occur in both the upstream and downstream sectors of the oil industry.

The aim of this report is to compare traditional oil industry microbiological monitoring techniques with MMM. A total of 10 samples were collected from three oil production platforms in the North Sea, including water from a seawater injection system, produced water from oil separators, pigging debris, and surface solids from an oil export spool section. Each sample was analysed using a suite of traditional microbiological techniques and MMM. The strengths and weaknesses of each technique were assessed in relation to oil industry requirements. The intention was not to recommend the 'best applicable' technique but rather to discuss the results from the various techniques in terms of the underlying science. By understanding the underpinning technology of each technique, the reader will be better equipped to specify techniques appropriate for the elucidation of a particular problem and also to make reasoned interpretations of the results from the chosen techniques.

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