NERC Centre for Doctoral Training in Oil & Gas (2017 start)

Project Title: **A rapid assessment toolkit for screening the ecological impact of spilled oil**
Host institution: University of Exeter, College of Life and Environmental Sciences

Supervisor 1: Prof. Tamara Galloway (University of Exeter)

Supervisor 2: TBC

Project description: The marine environment is increasingly threatened by pollution. Extraction and transport of crude oil is one such activity, which in 2015 released over 7000 tonnes of oil into the sea. Oil spill response is hampered by a lack of knowledge of how rapid biological assessment tools can be used to predict damage to marine animals and ecosystems. In this project, the student will test the hypothesis that the toxicity of spilled oil to organisms can be predicted from the results of in-vitro toxicity tests and the measured concentration of dissolved oil hydrocarbons in the water column. The student will learn how to design laboratory experiments to mimic different spill situations, incorporating the latest passive sampling technologies which measure the fraction of oil that is biologically available to organisms. They will apply novel methods for calculating critical body burdens and new extraction methods designed as surrogate measures of the bioavailable components of the oil. They will study the responses of larval fish and bivalves to different oils and dispersants and construct energy budgets to predict impacts of oil components on the metabolism of individual organisms. This will allow them to calibrate the sensitivity of diagnostic tests with a view to replacing traditional, time consuming and costly in-vivo toxicity test endpoints.

CDT Research theme(s):

This project is falls directly within the theme of Environmental Monitoring, Impact Assessment and Regulation. Oil spills are emergency events requiring specialist scientific knowledge and expertise to assist in reducing the potential for environmental impact. Spilled oil can rapidly move across the sea surface, with the potential to cause catastrophic ecological damage. Management decisions following a spill need to be made quickly, combining a co-ordinated emergency planning response from the many agencies involved, with powerful diagnostic tools to determine the toxic impact of the oil and to guide clean-up efforts. The studentship will provide the global spill response community with a crucial tool to aid in the critical decision-making process on choosing appropriate response techniques that will reduce long term sensitive ecosystem impacts.

Research context:

This project will be hosted within College of Life and Environmental Sciences at the Streatham Campus, Universtiy of Exeter. The student will join a vibrant community of scientists investigating toxicity in the natural environment and its amelioration with a particular focus on marine settings. The project is partnered by Oil Spill Response Ltd (OSRL), the largest international oil and gas industry funded cooperative which exists to respond to oil spills wherever in the world they may occur.

Research costs:

The project receives backing by a consortium of project partners from amongst OSRL's membership. This includes Shell, Chevron and ExxonMobil, and national (CEFAS) and international (CONCAWE) organisations specialising in oil spill response. To support travel and consumables, Oil Spill Response Ltd. will provide £1,000 pa and Concawe will provide £5,000 pa. Research costs fall within the standard RTSG limit.

Career routes:

The student will be trained in a variety of diagnostic environmental techniques and transferrable skills important in the energy and environment industry. The student will also gain skills allowing them to pursue postdoctoral research or a further academic career in a broad range of disciplines across the environmental sciences.