CEFAS - World Class Science for the Marine and Freshwater Environment

XCHEM18R - Analysis of Sediment Contaminants in Milford Haven Waterway

Total Hydrocarbon (THC) and Polycyclic Aromatic Hydrocarbon (PAH) concentrations in sediments 2018

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1 Introduction

The Milford Haven Waterway Environmental Surveillance Group (MHWESG) is a collaborative group of industry, statutory authorities and others with an interest in the environmental quality of the Milford Haven Waterway (MHW). It is part of the Group's purpose to provide high quality environmental information to enable members of the Group, and other authorities and industry working in and adjacent to the Waterway, to contribute to the maintenance, enhancement and safeguard of the Waterway's rich and diverse marine environment. The Group contracts out project work to collect both field data and / or collate and analyse data, and to provide informative reports to the Group and its members.

In 2007, the MHWESG contracted a comprehensive review of sediment contaminants and transport which reported in 2009 (Little, 2009). One of the main conclusions from the review was that the majority of particle-associated contaminants gravitate to sedimentary sinks. A forensic analysis of extant hydrocarbon contaminants undertaken in 2010 (Fugro ERT 2012; Galperin & Little 2014) demonstrated that persistent contaminants have accumulated within intertidal and subtidal sediments.

The review also found that over the long history of sediment quality monitoring in the MHW, different analytical methods for both hydrocarbons and heavy metals had, inevitably, been used at different times, resulting from the various broad phases and leadership of surveys, especially those before and since the Sea Empress incident in 1996. These inconsistencies resulted in the partial or total incomparability of many contaminant datasets in the long-term.

In order to address this, the MHWESG commissioned a project in 2017 (Little, 2017) to establish the long-term trends in the sediment contaminants of the MHW by inter-calibrating and comparing the historical and more contemporary analytical methods that have been used. By using data converted so as to be comparable with the more contemporary methods, the aims of the project were to create a reliable baseline for future routine sediment surveillance, as well as Environmental Impact Assessment (EIA).

A consistent recommendation from commissioned research over the years is the need to reestablish surveillance of sediment contamination in the MHW as a core component of the Group's environmental quality surveillance. Having intercalibrated older and newer methods and duly considered the historical baseline and trends in sediment contaminants, the MHWESG initiated a programme of routine sediment contaminant surveillance in 2018. Sampling for this programme was mostly located at past sampling stations, to be repeated every three years.

1.1 Scope of Work

The scope of this work was to determine Total Hydrocarbon Concentration (THC) and Polycyclic Aromatic Hydrocarbon (PAH) concentrations in a total of 24 marine sediments from 12 stations in the Milford Haven Waterway, using the analytical methodologies of ultraviolet fluorescence (UVF) spectroscopy and gas chromatography-mass spectrometry

(GC-MS) respectively. Forties Blend crude oil was the calibrant used to determine THC. Identification and quantification of PAH concentrations encompassed the standard suite of United States Environmental Protection Agency (USEPA) PAHs plus further suites of PAHs including various alkyl groups. An aliquot of Forties Blend calibrant has been reserved and set aside for the sole use of MHWESG and any future use.