
Guidance on characterising, assessing and managing
risks associated with potentially contaminated
sediments

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May 2013

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This publication has been produced as a result of work carried out within the Technical Team of the EI, funded by the EI's Technical Partners. The EI's Technical Work Programme provides industry with cost-effective, value-adding knowledge on key current and future issues affecting those operating in the energy sector, both in the UK and internationally.

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The EI gratefully acknowledges the financial contributions towards the scientific and technical programme from the following companies

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| Centrica | Saudi Aramco |
| Chevron | Scottish Power |
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| Dong Energy | Shell U.K. Exploration and Production Ltd |
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| ENI | Statkraft |
| E. ON UK | Statoil |
| ExxonMobil International Ltd | Talisman Energy (UK) Ltd |
| International Power | Total E&P UK Limited |
| Kuwait Petroleum International Ltd | Total UK Limited |
| Maersk Oil North Sea UK Limited | Valero |
| Murco Petroleum Ltd | World Fuel Services |
| Nexen | Vattenfall |

However, it should be noted that the above organisations have not all been directly involved in the development of this publication, nor do they necessarily endorse its content.

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ISBN 978 085293 646 4

Issued by the Energy Institute

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CONTENTS

| | Page |
|---|-----------|
| Acknowledgements | 3 |
| Executive summary | 4 |
| 1 Introduction | 5 |
| 2 Contaminated sediments | 8 |
| 2.1 What are contaminated sediments? | 8 |
| 2.2 Sources of contaminated sediments | 9 |
| 2.3 Why are contaminants found in sediments? | 10 |
| 2.3.1 What are the risks from contaminated sediments? | 13 |
| 3 Regulations and guidance | 17 |
| 3.1 Introduction | 17 |
| 3.2 A history of sediment investigation, assessment and remediation | 17 |
| 3.3 Learning in Europe - experience from the Netherlands and Italy (Sicily) | 22 |
| 3.4 Legislation in EU Member States | 25 |
| 3.5 European regulatory frameworks for contaminated sediment management | 27 |
| 3.6 Dredging and dredged materials | 30 |
| 3.7 Offshore drilling | 31 |
| 4 Risk management of sediment sites affected by contamination | 34 |
| 4.1 A phased evaluation process | 34 |
| 4.2 Problem definition | 35 |
| 4.3 Tiered risk analysis | 35 |
| 4.3.1 Risk analysis step 1 - Conceptual site model development | 35 |
| 4.3.2 Risk analysis step 2 - Define next steps | 36 |
| 4.3.3 Risk analysis step 3 - Define assessment methodology | 36 |
| 4.3.4 Risk analysis step 4 - Assess data collection needs | 38 |
| 4.3.5 Risk analysis step 5 - Data collection (if needed) | 38 |
| 4.3.6 Risk analysis step 6 - Risk-based evaluation | 38 |
| 4.4 Assessing options and making decisions | 38 |
| 4.5 Implement strategy and evaluate results | 39 |
| 4.6 Assessment of larger-scale river basin and aquatic systems | 39 |
| 4.7 Exiting the assessment process | 40 |
| 5 Investigation of sediments | 41 |
| 5.1 Why undertake an investigation at a sediment site? | 41 |
| 5.2 Developing the investigation strategy | 41 |
| 5.3 Types of data to characterise a site | 46 |
| 5.4 Investigation and analysis techniques | 48 |
| 5.4.1 Desk-top techniques | 48 |
| 5.4.2 Non-intrusive survey methods | 50 |
| 5.4.3 Surficial sediment sampling | 51 |
| 5.4.4 Sub-surface sediment sampling | 55 |
| 5.4.5 Sediment pore water sampling | 59 |
| 5.4.6 <i>In situ</i> testing | 62 |
| 5.4.7 Field inventories | 64 |
| 5.4.8 Testing and analytical techniques | 65 |
| 5.5 Sampling other environmental media | 68 |

| | | |
|----------------|---|------------|
| 6 | Risk estimation and evaluation techniques | 69 |
| 6.1 | Introduction | 69 |
| 6.2 | Tier 0 - Qualitative risk assessment | 70 |
| 6.3 | Tier 1 - Chemical quantitative risk assessment | 72 |
| 6.4 | Tier 2 - Site-specific risk assessment | 75 |
| 6.4.1 | Collection of site data for a tier 2 risk assessment | 75 |
| 6.4.2 | Understanding the source - equilibrium partitioning | 76 |
| 6.4.3 | Modelling tools - Assessing risks to aquatic organisms | 77 |
| 6.4.4 | Modelling tools - Assessing risks to the water environment | 78 |
| 6.4.5 | Modelling tools - Assessing risks to human health | 80 |
| 6.5 | Tier 3 - Detailed cause-effect attribution | 81 |
| 6.5.1 | The Sediment Quality Triad approach | 82 |
| 6.6 | How should a sediment site be assessed? | 84 |
| 7 | Remediation of contaminated sediments | 86 |
| 7.1 | Remediation methods | 86 |
| 7.2 | Challenges associated with remediation of contaminated sediments | 86 |
| 7.3 | Source management | 87 |
| 7.3.1 | Source control | 87 |
| 7.3.2 | Monitored natural recovery (MNR) | 87 |
| 7.3.3 | Sediment removal and disposal/placement | 88 |
| 7.3.4 | Sediment treatment | 92 |
| 7.4 | Pathway management | 98 |
| 7.4.1 | Capping | 98 |
| 7.4.2 | Reactive capping | 99 |
| 7.4.3 | Confined disposal facilities | 100 |
| 7.5 | Receptor management | 103 |
| 7.6 | Remediation in practice: Global examples | 104 |
| 8 | References and Bibliography | 117 |
| 8.1 | References | 117 |
| 8.2 | Bibliography | 131 |
| Annexes | | |
| Annex A | Definition of a sediment and contaminated sediment | 132 |
| Annex B | Overview of legislation and regulatory frameworks in select EU Member States and Norway | 136 |

ACKNOWLEDGEMENTS

This project was commissioned by the EI's Soil Waste and Groundwater Group.

The Energy Institute wishes to record its appreciation of the work carried out by ARCADIS EC Harris, UK.

The production of these guidelines has been steered within a cooperative EI and CONCAWE approach with respective representatives on the steering boards. The EI wishes to record its gratitude for the valuable contributions made by members of the Soil Waste and Groundwater Group and members of the CONCAWE Water, Soil & Waste Management Group (WSWMG - STF/34) during development of this document.

| | |
|-------------------|-------------|
| Martyn Lambson | BP |
| Klaas den Haan | CONCAWE |
| Beate Hildenbrand | EI |
| Martyn Dunk | Exxon Mobil |
| Ruth Chippendale | Shell |
| Jonathan W. Smith | Shell |
| Paola Franchi | Rontec |

In particular the EI would like to acknowledge Katy Baker, Philip Spadaro, Simon Hay and Cecilia MacLeod (ARCADIS) as the principal authors and express its thanks to them.

The EI and the authors are also grateful to Brent Brinkman, Haayo Spoelstra, Vito Schifano, Chris Day, Paul Doody, Stuart Messur, Bob Romagnoli, Magdalena Pachocka, Jürgen Thomas and Joseph Germano for their contributions.

EXECUTIVE SUMMARY

This publication draws together experience and learning from more than twenty years of investigation, assessment and remediation of sediment sites affected by contamination from across the globe, with a focus on the European Union (EU). The aim of the document is to provide an introduction to sediments, why contaminants may be present in sediments and the potential risks contaminated sediments can pose to human receptors, aquatic organisms and the wider water environment. The publication is split into sections providing: information and advice on the legislative and regulatory frameworks governing the assessment of sediment sites affected by contamination; an overview of a tiered assessment process which can be adopted; design of investigation strategies including selection of investigation tools; risk assessment tools, and remediation solutions. The publication builds upon existing guidance documents, including those developed by individual EU member states and those developed in other countries such as the United States of America.

Underpinning the publication is a recommended definition for contaminated sediment, developed on the basis that a risk-based approach should be used to identify sites where contaminants present in sediment are causing, or are likely to cause, lasting environmental damage or harm. This mirrors the approach commonly adopted by the land contamination community, where the presence of a contaminant in an environmental medium does not constitute a contaminated site unless a significant source-pathway-receptor linkage can be identified.

Recommendations are made throughout the publication to aid the reader in reaching a conclusion as to the most suitable methods for investigation, risk assessment and remediation on a site-by-site basis. The final section in the publication focuses on remediation solutions designed to manage the source, pathway or receptor, highlights the importance of considering source control as part of the remediation strategy, and documents key points of learning from a review of global experience in the risk management of contaminated sediment sites.

1 INTRODUCTION

Contaminated sediments are becoming more widely considered throughout the world. As recently as one decade ago, the countries with regulatory systems directly applicable to the management of contaminated sediments were minimal. Now, at least 35 countries have some type of regulatory framework or guidance for dealing with contaminated sediments (Spadaro, 2010). In a number of countries, including those in the EU, efforts to better understand and manage the risks from contaminated sediments are underway; although it is recognised that both inland and coastal water quality in many member states has increased over the past 30 years, and continues to increase, in part due to improvements to pollution prevention control and monitoring (e.g. European Environment Agency, 2010).

Much of the regulatory effort and some of the actual risk mitigation and remediation strategies associated with contaminated sediment management lack rigorous scientific underpinning. This can lead to remediation being implemented where a more robust assessment of risks would result in the conclusion that remediation is not warranted. Further, while in a limited number of locations there is evidence for degradation in water quality or bioaccumulation of contaminants within the aquatic food chain which may be attributable to contaminants in sediments, for many other locations there is limited or no evidence of lasting damage to the aquatic environment due to the presence of contaminants in sediments.

At waterfront sites, sediment contamination can represent a reasonably small-scale issue; for example, contamination present in sediments proximate to a site as a result of contaminated groundwater discharge. At the other end of the extreme, sediment contamination can represent a large-scale issue, where an entire river system has been affected as a result of discharge or waterway management activities. The sediment system is a dynamic environment which is ever-changing and any investigation approach needs to account for this dynamism in order to allow for appropriate data interpretation, risk assessment and remediation. This makes the robust assessment as to the actual risks presented critical to ensure that decision-making is based on sound principles and takes into account the sustainability of implementing a remediation strategy.

Key issues regarding the investigation, assessment and remediation of sediment sites affected by contamination are shown on Figure 1.1, helping to explain why the management of these sites is a complex area requiring multi-disciplinary input.