Guidance on the identification and assessment of contaminants of emerging concern in soil and groundwater at industrial sites

energy institute

GUIDANCE ON THE IDENTIFICATION AND ASSESSMENT OF CONTAMINANTS OF EMERGING CONCERN IN SOIL AND GROUNDWATER AT INDUSTRIAL SITES

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FOREWORD

Contaminants of emerging concern (CECs) in soil or groundwater beneath a facility often represent a number of challenges which are not present for contaminants encountered more routinely, such as petroleum hydrocarbons, or metals. These challenges include poor, or spare, data regarding their physicochemical and toxicological properties, through to uncertainty regarding remediation options. This can lead to CEC risk management strategies which are costly, non-proportionate, or even ineffective.

This guidance was commissioned by the Energy Institute (EI) to provide a practical and risk-based framework for investigating and assessing the need for action if CEC are encountered at a facility in soil or groundwater. Alongside a review of different perspectives on what constitutes a CEC, this guidance builds on, and complements, existing procedures for land contamination assessment, while also highlighting key additional factors to consider when CEC are present or suspected. A number of case studies are presented which demonstrate how different elements of the framework can be applied in practice. It also includes an overview of the state of knowledge related to a number of contaminants of concern, or groups of contaminants, which are of emerging concern to the energy sector: asbestos; AdBlue®; biocides; corrosion inhibitors; per- and polyfluoroalkyl substances (PFAS; shale gas fluids, and sulfolane.

The aim of this guidance is to mitigate against the default adoption of risk conservatism within land contamination assessments in the absence of knowledge. While targeted at the energy sector, the framework presented within this guidance is applicable for other sectors.

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1 INTRODUCTION

1.1 DOCUMENT AIM

The aim of this guidance is to promote a risk-based and pragmatic approach to identification and management of CEC at industrial sites, which still complies with legal requirements dependent on the country or region where the site is located. The guidance provides advice to the reader at all stages in the assessment and management process, and includes topics such as the role of risk perception on management of CEC, and development of risk management strategies. It is intended to be in alignment with the ethos of continuous improvement and preplanning, as promoted both by the EI and other organisations, such as the Health and Safety Executive (HSE).

The concept of CEC, sometimes known as emerging contaminants (ECs), is not new to industry (e.g. Sauvé and Desrosiers, *A review of what is an emerging contaminant*). Many people, including within the general population, are aware of the health effects of exposure to asbestos, or the environmental impact which occurred as a result of the use of dichlorodiphenyltrichloroethane (DDT), which was discovered as science progressed and data became available, providing empirical evidence of the harm taking place. Whilst the introduction of regulations for the production and use of chemicals has led to significant improvements in understanding the potential impact of constituents on human health or the environment, there is a growing, or emerging list of historical constituents where advances in scientific study have raised their risk profile. In some cases, even, the constituents are relatively recent introductions, but are now classed as CEC as the evidence base related to their behaviour and impact has increased. As the lists of CECs have grown, so has concern with how best to manage the associated potential risks.

Ultimately, the goal is to help demystify the topic of CECs, including by demonstrating that in many cases, the approach to risk management should be no different to that adopted for any other contaminant type, and to help address some of the risk perception challenges which still influence stakeholder decision making.

1.2 INTENDED AUDIENCE

This technical guidance document has been developed to assist a wide range of stakeholders, including those listed in Figure 1. It is not expected that the reader is experienced in contaminant risk management; for example, fate and transport modelling or remediation design, but the guidance does assume at least a basic awareness of key tools and techniques associated with contaminant risk management.

Intended audience for the guidance
– Industrial site operators
– Health, Safety and Environmental managers
– Regulatory authorities
– Environmental and non-governmental organisations
– Consultants

Figure 1: Intended audience for the guidance

1.3 STRUCTURE OF THE GUIDANCE

The guidance is split into three sections:

- Section 2 is aimed at the reader who wishes to understand more about CECs: global definitions of the term; challenges with managing potential risks associated with these contaminants, and identifying those which may be pertinent to the energy sector.
- Section 3 is designed to walk the reader through a risk-based framework for assessing CECs at a site, from prioritisation of which contaminants to test for at a site, to key parameters required for completing a quantitative risk assessment.
- Having outlined the framework in section 3, section 4 provides a detailed review of the following CECs, or groups of CECs, which have been identified as a particular concern for the energy sector (note: not all are classed as CECs in international classification lists, but are considered of potential emerging concern for the energy sector):
  - asbestos (see 4.2);
  - AdBlue® (see 4.3);
  - biocides (see 4.4);
  - corrosion inhibitors (see 4.5);
  - PFAS (see 4.6);
  - shale gas fluids (see 4.7), and
  - sulfolane (see 4.8).

Figure 2 is a flowchart to help the reader navigate this guidance, dependent on level of awareness of the topic and type of support required.

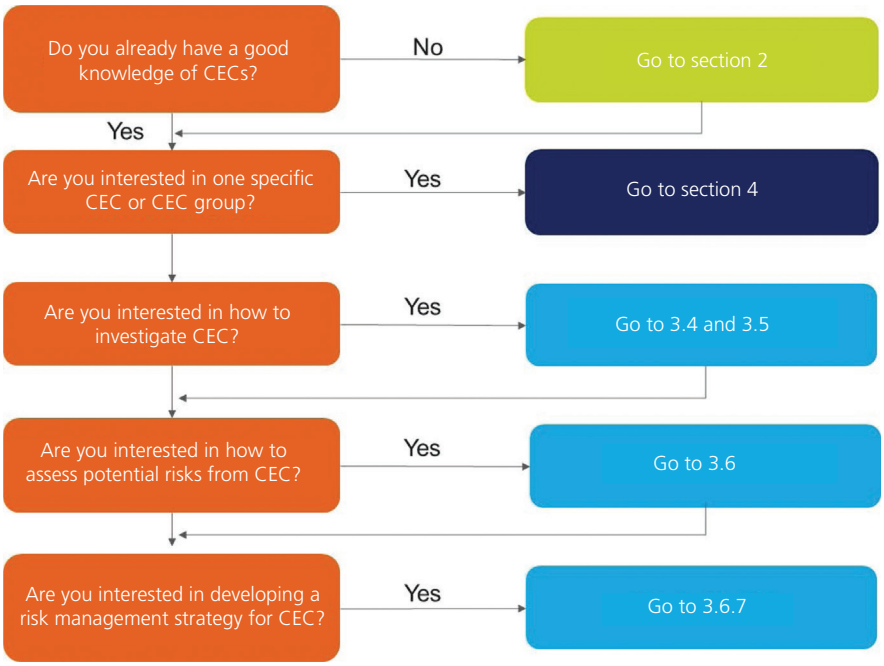

Figure 2: Flowchart to aid navigation of the guidance