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Guidance on risk assessment and conceptual design of tertiary containment systems for bulk storage of petroleum, petroleum products, or other fuels

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GUIDANCE ON RISK ASSESSMENT AND CONCEPTUAL DESIGN OF TERTIARY CONTAINMENT SYSTEMS FOR BULK STORAGE OF PETROLEUM, PETROLEUM PRODUCTS, OR OTHER FUELS

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FOREWORD

The Great Britain (GB) *Control of major accident hazards (COMAH) competent authority (CA)* '*containment policy*' (*Policy on containment of bulk hazardous liquids at COMAH establishments*), which promotes increased standards for containment systems of bulk storage of hazardous liquids, requires that a risk assessment should be carried out to determine the extent of the requirements for tertiary containment. Previously not much information was available on how to address this issue, and nor was there adequate information on the conceptual design criteria for tertiary containment systems: this publication addresses both issues.

This publication is intended primarily for use by process safety specialists, environment risk assessment specialists, designers and operators and owners of installations holding bulk stores of petroleum, petroleum products, or other fuels. The information provided in this publication aims to assist in the decision making process for tertiary containment, so as to meet the requirements of the GB *COMAH regulations*. The risk assessment aims to assist with the installation-specific identification of tertiary containment needs. A decision making tree is also included to help in this process. Information is provided covering how those needs may be achieved on a conceptual design basis. This publication is not site-specific.

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1 INTRODUCTION

1.1 INTRODUCTION

This publication is intended to provide clarification for the bulk storage sector and its regulators on the requirements for tertiary containment systems for bulk hazardous liquid storage installations, so as to enable operating companies to assess the need for, and conceptual design of, such systems, as part of a site's overall containment strategy.

Users of this publication should note that other guidance is available from the Environment Agency (EA), Scottish Environment Protection Agency (SEPA), Health and Safety Executive (HSE), etc.; however, these do not provide as much detail on tertiary containment systems as is provided here. Further information on these sources of guidance is presented in Tables B.1 and B.2. Of these publications, the key ones are:

– COMAH CA *Containment of bulk hazardous liquids at COMAH establishments – Containment policy: Supporting guidance for secondary and tertiary containment ('Containment policy supporting guidance')*. The COMAH CA's primary guidance, establishing the requirements for primary, secondary and tertiary containment.
– HSE *Process Safety Leadership Group, final report: Safety and environmental standards for fuel storage sites ('PSLG final report')*. Specifies the minimum standards of controls that should be in place at all sites storing large volumes of gasoline.

Further information may also be found in EI *Environmental risk assessment of bulk storage facilities: A screening tool*. This Microsoft Access-based tool provides a simple qualitative assessment of the risk to the environment of above-ground storage tanks (ASTs).

It should be noted that containment systems also may need to comply with several other legislative frameworks, in addition to the GB *COMAH regulations* (e.g. *Environmental permitting (England and Wales) regulations*). It is for operating companies to demonstrate compliance with the requirements of pertinent legislation.

1.2 SCOPE

This publication is intended primarily for use by process safety specialists, environment risk assessment specialists, designers, and operators and owners of installations holding bulk stores of petroleum, petroleum products, or other fuels. It may also be applicable to facilities that contain other products within the scope of the COMAH CA *Containment policy*. Bulk stores are considered to be storage tanks, rather than drums or intermediate bulk containers (IBCs).

Whilst the focus of this publication is bulk storage facilities, the information provided here may also provide a useful reference to sites holding smaller quantities of such products. In applying the guidance to these smaller sites, different emphasis may need to be placed on some of the issues considered in the risk assessment process.

The objectives of this publication are to provide readers with practical good practice information and guidance on:

– Risk assessment of liquid containment to determine tertiary containment needs – reviewing the containment provided by existing secondary and tertiary systems, to identify the need for tertiary containment, by using a decision tree.
– Conceptual design of tertiary containment measures – covering how the tertiary containment requirements identified by the risk assessment may be achieved.

Here, 'liquid' refers to product (as held within the primary containment), firewater or rainwater.

Whilst the intent of this publication is to better protect environmental receptors from losses of containment of liquids from storage tanks and containment systems, the risk assessment also considers impacts to people, e.g. offsite populations. However, this publication purposefully does not provide a methodology for human health risk assessment (HHRA).

The publication purposefully does not provide information on detailed designs and layout of containment systems, or specific construction methods and materials. These are driven typically by site-specific considerations, which differ between sites as a consequence of variation in site layout and environmental setting.

1.3 APPLICATION

In line with recent UK, European and international legislation, this publication is not intended to be prescriptive in terms of what tertiary containment should or should not be applied at an individual site. The publication has been developed to give site operators a process through which they can review their site's containment requirements, identify the need for tertiary containment, and understand the good practice options available for their bulk storage installation.

There is no absolute requirement for any particular tertiary containment component. Selection should meet the containment requirements of the individual site as determined by the risk assessment (see section 2), and the good practice criteria (see 3.3).

'*Tertiary containment is as much about risk assessment as it is about properly designed containment*' (COMAH CA – *Containment policy supporting guidance)*.

In applying this publication the following general points should be noted:

– The objective of the tertiary containment system is to prevent or minimise effects to the environment from a release of product or firewater that occurs as a result of a loss of primary or secondary containment.
– The tertiary containment system forms part of a site's integrated containment system and pollution prevention measures (PPM).
– There is no set requirement for the composition or layout of the tertiary containment system: this should be determined by risk assessment.
– The objective of the risk assessment is to identify the tertiary containment system that is appropriate for the considered site.

This publication is based primarily on GB legislation, publications and good practice; however, in developing it account also has been taken of international legislation, publications and good practice. The guidance in this publication should be universally applicable provided it is read, interpreted and applied in conjunction with relevant national and local statutory legislation and publications. Where the requirements differ, the more stringent should be applied.

1.4 KEY CONCEPTS

1.4.1 Risk assessment

Risk assessment describes the process to determine the level of risk posed by a hazard: here risk assessment focuses on the risk of bulk storage of liquids on the surrounding environment.