Code of practice for petroleum road tanker vapour collection systems and equipment used in unloading operations

CODE OF PRACTICE FOR PETROLEUM ROAD TANKER VAPOUR COLLECTION SYSTEMS AND EQUIPMENT USED IN UNLOADING OPERATIONS

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FOREWORD

This publication has been prepared by Robert Harris, Amber Engineering Consultancy Ltd, at the request of the Energy Institute's (EI's) Distribution and Marketing Committee and the UK Health & Safety Executive (HSE).

This code provides recommendations for the design and operation of vapour transfer equipment and control systems on petroleum road tankers used during the unloading of petrol at filling stations. It is particularly applicable to the designs of tankers operated in the UK.

At the time of publication, vapour collection has been practised for some 15 years in the UK. During that period, experience has been gained in system designs and operation and road tanker equipment has evolved. This publication draws on those experiences to document good practice.

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Suggested revisions are invited and should be submitted to the Technical Department, Energy Institute, 61 New Cavendish Street, London, W1G 7AR.

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Project co-ordination and technical editing was undertaken by Andrew Sykes (EI).

1 INTRODUCTION

EU Directive 94/63/EC made vapour recovery a requirement from 31 December 1998 for existing distribution terminals loading more than 150 000 tonnes of petrol per annum, and for filling stations handling more than 1 000 m^3 of petrol per annum[1]. These thresholds were reduced to 25 000 tonnes and 500 m^3 respectively from 31 December 2001 and were further reduced to 10 000 tonnes and 100 m^3 respectively from 31 December 2004.

The principles of vapour collection are very simple[2]. When bottom loading a road tanker, incoming fuel (driven by the terminal/refinery pumps) forces gases (including petrol vapour) from the tanker compartments into the tanker's vapour manifold, down the vapour transfer line to the loading gantry connection and from there to the terminal vapour recovery unit, where the petrol vapour is returned to the liquid state before being pumped back to storage.

When unloading at a filling station the process is reversed. Petroleum product leaving the road tanker flows under gravity to the site's underground storage tank(s)[3], driving vapour from the filling station's storage tanks into its vapour manifold, through the vapour transfer hose and back into the tanker (figure 1).

Despite the apparent simplicity of the process, experience has shown that a number of factors can exacerbate latent problems in a system that has poor design, installation, or maintenance. The pressures and vacuums involved with the transfer of thousands of litres of vapour per minute are modest and inevitably the vapour does not necessarily flow as anticipated, particularly if restrictions or leaks exist anywhere in the system. Information relating to potential hazards during deliveries is given in annex A.

Process safety considerations (including those required by, for example, the Dangerous Substances and Explosive Atmosphere Regulations 2002) and potential effects on health and the environment when handling petroleum products and their vapour, have led to a reassessment of the equipment, control systems and procedures for stage 1b vapour collection.

In developing this code, consideration has been given to a number of tanker system designs used in service, general process safety recommendations and the specific legal requirements on road tanker operators to operate tankers that have vapour collection systems[4].

The guidance in this code is primarily intended for new road tanker vapour collection systems. However, as modifications to a tanker control system are not onerous, operators may wish to consider adopting its recommendations retrospectively.

[1] European Parliament and Council Directive 94/63/EC of 20 December 1994 *on the control of volatile organic compound (VOC) emissions resulting from the storage of petrol and its distribution from terminals to service stations*.

[2] EI *Guidelines for the design and operation of gasoline vapour emission controls at distribution terminals*, 3rd edition.

[3] A very small number of filling stations have above-ground storage of petrol requiring pumped deliveries; this does not alter the recommendations given in this publication.

[4] As detailed in HSE L93 Approved Tank Requirements: *The provisions for bottom loading and vapour recovery systems of mobile containers carrying petrol*.

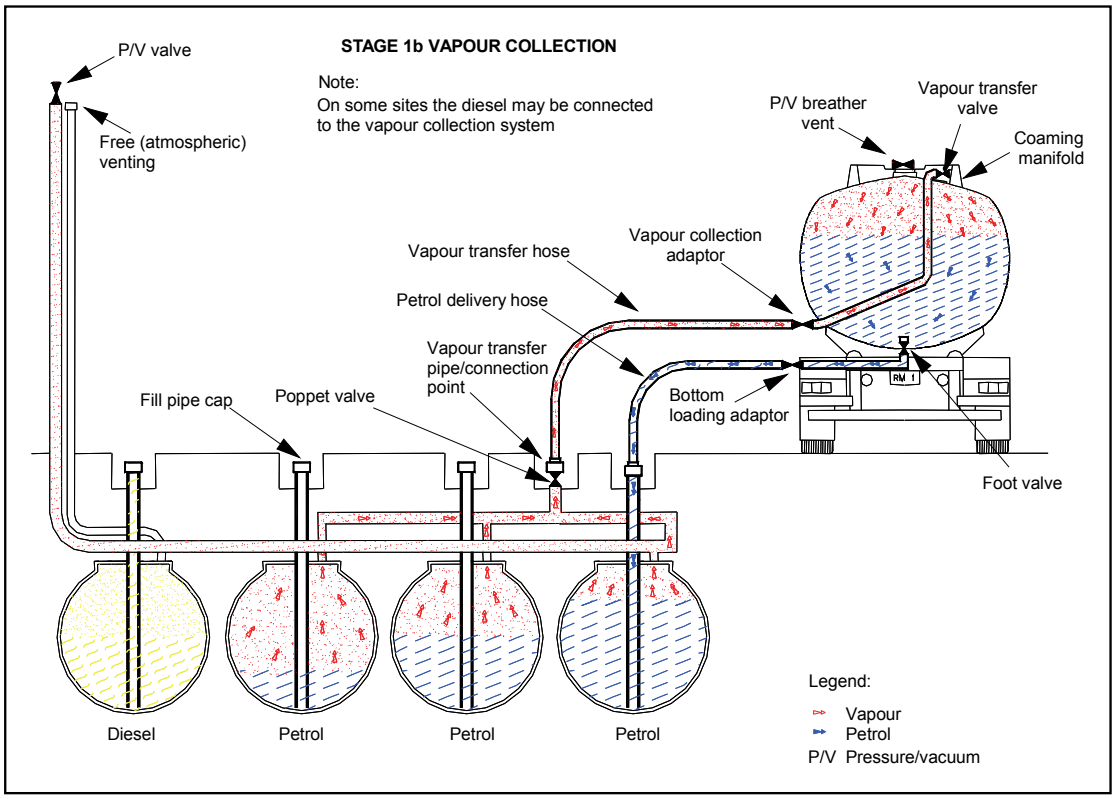

Figure 1: Stage 1b vapour collection