Guidance on reducing human failure in petroleum product distribution loading and unloading operations

GUIDANCE ON REDUCING HUMAN FAILURE IN PETROLEUM PRODUCT DISTRIBUTION LOADING AND UNLOADING OPERATIONS

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CONTENTS

FOREWORD

Factors present during petroleum product loading and unloading operations can result in incidents occurring e.g. product crossovers (requiring uplift and re-blending), loss of containment due to the overfilling of storage tanks, etc. To reduce the probability of an incident occurring, operators have implemented a variety of engineering and management systems; however, the probability of an incident occurring is further reduced by minimising human failure during the operations.

This publication aims to provide practical guidance on reducing human failure that may occur during petroleum road tanker loading and unloading operations. It is based on an earlier EI study[1] that included an analysis of incidents, direct observation of specific loading and unloading tasks, and in-depth discussions with those active in petroleum product distribution in numerous workshops. Workshop participants included road tanker drivers, driver trainers, Safety, Health and Environment (SHE) managers and others with insights into petroleum product distribution. Human and organisational factors specialists were also present in order to record and analyse the findings.

The guidance is supported by a training package and a guide to conducting workshops similar to those used to generate data for this study.

The information contained in this publication is provided as guidance only, and while every reasonable care has been taken to ensure the accuracy of its contents, the Energy Institute cannot accept any responsibility for any action taken, or not taken, on the basis of this information. The Energy Institute shall not be liable to any person for any loss or damage which may arise from the use of any of the information contained in any of its publications.

Suggested revisions are invited and should be submitted to the Technical Department, Energy Institute, 61 New Cavendish Street, London, W1G 7AR, e: **technical@energyinst.org**

[1] Findings are contained in EI Research report *Investigating human failure in petroleum product distribution loading and unloading operations.*

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Alec O'Beirne	PTF Training Ltd (Chairperson)
David Athersmith	Consultant
Dr Hugh Bray	Tank Storage Association
Linda Dixon	Chevron
Mark Jolliffe	Total UK Ltd
Neil Leyshon	BP Oil UK Ltd
James Maxwell	ExxonMobil
Paul Nightingale	Shell U.K. Oil Products Limited
Michael Ong	Federation of Petroleum Suppliers
Ken Palmer	Consultant
Dr Mark Scanlon	Energy Institute
Andrew Sykes	Energy Institute

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John Hazeldean	Health & Safety Executive
Phil Monger	PRA/PEIMF

Technical editing and project coordination was carried out by Andrew Sykes (EI).

1 INTRODUCTION AND SCOPE

This publication aims to provide practical guidance on reducing human failure during petroleum road tanker loading and unloading operations, which may result in crossover and loss of containment incidents. Key findings from which the guidance was developed are contained in an earlier EI Research report: *Investigating human failure in petroleum product distribution loading and unloading operations*. This research comprised:

– A review of incident and accident reports – to identify actual task failures and their causes.
– An assessment of human reliability – to identify possible task failures and their causes.

The guidance contained in this publication is intended to assist those who are involved in road tanker loading and unloading operations. Further background information on some of the concepts and terminology contained in this publication can be found in Annex C.

The publication is divided into four sections:

Section 1 Describes the research study underpinning the guidance.

Section 2 Presents findings from the review of incident reports with:
  – Comments on the human failures reported,
  – Comments on problems with the incident analyses themselves.

Section 3 Describes the results of the study of human reliability in road tanker loading and unloading.

Section 4 Provides checklists to allow the user to assess loading and unloading tasks and conditions, and solution sheets suggesting possible improvement actions.

Whilst the guidance contained in this publication is intended for use in mainland and distributor petroleum product distribution, companies involved in other forms of product distribution by road tanker (e.g. loading and unloading aviation re-fuellers at airports) may also wish to adopt pertinent parts of the guidance.

2 RESEARCH STUDY SCOPE AND APPROACH

The research study preceding this publication comprised three main elements:

1. A review of incident reports featuring crossovers or losses of containment.
2. A human reliability analysis of a range of loading and unloading tasks based on:
   - observation of the tasks;
   - interviews with those involved;
   - a review of written procedures, and
   - four workshops representing a wide cross section of those involved in road tanker loading and unloading operations to closely explore how tasks are carried out and controlled.
3. Development of suggested human and organisational factors improvements for use by petroleum distribution companies and haulage contractors.

The purpose of reviewing incident reports was to:

- Support the human reliability analysis/provide insights into possible human failures from incident experience.
- Comment on the incident reporting systems themselves, especially their ability to identify relevant human and organisational factors issues.

The purpose of conducting the human reliability analysis was to:

- Identify possible errors or violations that could occur during loading and unloading operations which may result in a crossover or loss of containment.
- Identify factors that could contribute to such incidents.
- Generate evidence for recommending strategies to reduce the frequency of these incidents.