Ministry of Defence

JSP 317

JOINT SERVICE SAFETY REGULATIONS FOR THE STORAGE AND HANDLING OF FUELS & LUBRICANTS

(Fifth EDITION)

(Amendment 1) (Sept 12)

Sponsored for use in
Defence
by
Director Defence Safety and Environment Authority

FOREWORD TO JSP 317 FIFTH EDITION

The Secretary of State for Defence (SofS) through his Safety & Environmental Protection (S&EP) Policy Statement requires Top Level Budget Holders and Trading Fund Chief Executives to conduct defence activities with high standards of S&EP. They are expected to achieve this by implementing robust, comprehensive Safety & Environment Management Systems.

As Director of the Defence Safety and Environment Authority (DSEA), I am responsible for providing MOD regulatory regimes for S&EP in the Land, Maritime, Nuclear and Ordnance domains where there are exemptions, derogations or dis-applications from legislation. The regulations set out in this JSP are mandatory and full compliance is required. It is the responsibility of commanders and line managers at all levels to ensure that personnel, including contractors, involved in the management, supervision and conduct of defence activities are fully aware of their responsibilities.

The Defence Land Safety Regulator is empowered to enforce these regulations.

D Applegate

D Applegate
Director
Defence Safety and Environment Authority

ACKNOWLEDGEMENT

Diagrams reproduced from *Guidance for the design, construction, modification and maintenance of petrol filling stations*, with kind permission of the Energy Institute (EI) and the Association for Petroleum and Explosives Administration (APEA). ISBN 0 85293 217 0. For more information, visit www.petroleum.co.uk or e-mail ip@petroleum.co.uk

This JSP has been Equality and Diversity Impact Assessed in accordance with the department's Equality and Diversity Impact Assessment Tool against:

Part 1 - Assessment only (no diversity impact found).

The policy is due for review on 1st September 2014.

JSP 317 (5 Edition)

AMENDMENT SHEET

Amendment		Incorporated By		Date
No	Date	Name	Signature	
1	**03/07/12**	**WO1 (SSM) PJ Eversfield**	*PJ Eversfield*	**03/07/12**

ABBREVIATIONS

A

American, British, Canadian, Australian	ABCA
Air Portable Fuel Container	APFC
Airfield and Bulk Fuels Group	ABFG
Allied Command Europe	ACE
ACE Rapid Reaction Corps	ARRC
Army Equipment Support Publication	AESP
Army HQ Command	Army HQ
Amendment List	AL
American Petroleum Institute	API
Ammunition Technical Officer	ATO
Army Air Corps	AAC
Authorising Engineer	AE
Authorised Person (Petroleum)	AP (Pet)
Automated Fuel Dispense System	AFDS
Automatic Tank Gauging	ATG
Auxiliary Power Unit	APU
Aviation Fuel for Carrier Based Aircraft	AVCAT
Aviation Gasoline	AVGAS
Aviation Turbine Fuel	AVTUR

B

Base Level Budget	BLB
Battlefield Bulk Fuel Installation	BBFI
Battle Field Utilities Project Team	BFU PT
BFCV Sub-Committee	BFCVSC
Boiling Liquid Expanding, Vapour Explosion	BLEVE
British Standards Institute	BSI
Bulk Fuel Carrying Vehicle	BFCV
Bulk Fuel Installation	BFI

C

Central Europe Pipeline System	CEPS
Central Health and Safety Project	CHASP
Certificate of Fitness for Purpose	CFFP
Chief Environmental Safety Officer	CESO
Chief of Defence Materiel	CDM
Chief of Fleet Support	CFS
Commander in Chief Fleet	CINCFLEET
Competent Petroleum Trained Personnel	CPTP
Control of Industrial Major Hazard	CIMAH
Control of Major Accident Hazards	COMAH
Close Support Tanker	CST
Control of Substances Hazardous to Health	COSHH
Customer Supplier Agreement	CSA

D

De-certification Board	DB
Defence Estates	DE
Defence Equipment & Support	DE&S
Defence Fuels Operation Centre	DFOC
Defence Research Agency (Fighting Vehicles & Systems)	DRA(FV&S)
Deployed Permanent Installation	DPI
Defence Petroleum School	DPS
Defence School of Transport	DST
Defence Standard	Def Stan
Defence Transport and Movement Agency	DTMA
Defence Works Advisor	DWA
Defence Storage and Distribution Agency	DSDA
Deployable Supply Group	DSG
Deployable Bulk Fuel Installation	DBFI
DF&LC, Environment, Safety & Trg Sub Committee	DF&LC,ES & TSC
Diesel Fuel General Purpose	DIESO UK
Diesel Fuel Motor Transport (on Public Roads)	DIESO MT F-54
Diesel Fuel Naval Distillate	DIESO F-76
Directly Administered Units	DAU
Director Base Depots	DBD
Director Defence Health & Safety	D Def H&S
Director General Defence Supply Chain	DG Def SC
Director MOD Fire Services	D MOD FS
Director Supply Chain Operations	Dir SC Ops
DE&S Management Board	DE&S MB
Dangerous Substances and Explosive Atmospheres Regulations 2002	DSEAR

E

Environment Agency	EA
Emergency Pollution Response Spillage	EPRS
Equipment Sub Committee	ESC
Equipment Support	ES
Expeditionary Logistics Wing	ELW

F

Fuel and Gas Safety Regulator Stake holder Committee	FGSRSC
Fuel and Gas Safety Regulator	FGSR
F&L Working Party	F&LWP
Filter Water Separator	FWS
Focal Point	FP
Front Line Command	FLC
Fuels Dispensing Rack	FDR
Fuels Safety Incident Investigating Officer	FSIIO
Fuel System Icing Inhibitor	FSII

Fuel (NATO pipeline & Installations) Damage Report	FUELDAMREP
Fuel Consumption Unit	FCU
Fuels & Lubricants	F&L
Furnace Fuel Oil	FFO

G

General Support Tanker	GST
Glass Reinforced Plastic	GRP
Government Pipelines and Storage System	GPSS
Ground Fuels Working Party	GFWP
Ground Power Unit	GPU

H

Hazardous Material	HAZMAT
Health & Safety at Work Act	H&SWA
Health & Safety Executive	HSE
Health & Safety Guidance Note	HS(G)
Higher Explosive Limit	HEL
Higher Level Budget	HLB
HQ Air Command	HQ Air
HQ UK Support Command	HQ UKSC

I

Institute of Petroleum[1]	IP
Inspectorate of Engineer Resources	IER
International Civil Aviation Authority	ICAO
International Maritime Dangerous Goods Code	IMDG Code
International Maritime Organisation	IMO
International Safety Guide for Oil Tankers & Terminals	ISGOTT
International Standards Organisation	ISO

J

Joint Air Publication	JAP
Joint Force Headquarters	JFHQ
Joint Force Logistic Component	JF Log C
Joint Helicopter Command	JHC
Joint Operational Fuels System	JOFS
Joint Service Publication	JSP

K

Kerosene Military	KERO

1 The IP is now known as the Energy Institute (EI)

L

Land Systems Fuels & Lubricants Sub-Committee	LSF&LPSC
Land Systems Operational Requirements	LSOR
Liquefied Petroleum Gas	LPG
Logistic Support Inspections	LSI
Logistic Support Services	Log Sp Svcs
Logistic Support Technical Inspections	LSTI
Logistic Support	Log Sp
Long Term Costing	LTC
Lower Explosive Limit	LEL

M

Maintenance Management Organisation	MMO
Major Accident Control Regulations	MACR
Management of Joint Deployed Inventory	MJDI
Marine Fuels Manager	MFM
Marine Gas Oil	MGO
Maximum Explosive Limit	MEL
Mechanical Transport Fuelling Installation	MTFI
Military Agency for Standardisation	MAS
Ministry of Defence	MoD
Mobile Pipeline Repair Team	MPRT
Motor Transport	MT
Multi Product Resupply Tanker	MPRT

N

NATO Military Standards and Terminology	NMST
NATO Pipeline Committee	NPC
NATO Pipeline System	NPS
NATO POL Depots	NPD
NATO Standardisation Agreement	STANAG
North Atlantic Treaty Organisation	NATO
North Europe Pipeline System	NEPS

O

Operating Authority	OA
Oil Fuel Depots	OFD
Oil Industry Emergency Committee	OIEC
Oil Mineral Detergent	OMD
Oil Mineral	OM
Oils (miscellaneous)	OX

P

Personal Protective Equipment	PPE
Petrol, Oils & Lubricants	POL
Petroleum Handling Equipment	PHE
Petroleum Licensing Authority	PLA
Petroleum Supply Depot	PSD
PHE Sub-Committee	PHESC
PHE Working Party	PHEWP
Pollution Control Sorbents	PCS
Pollution Control Equipment	PCE
Pollution Control Officer	PCO
(Marine) Pollution Report	POLREP
Pressure Reducing Valve	PRV
Products Sub Committee	PSC
Professional Technical Service	PTS
Property Manager	PROM

Q

Quality Assurance	QA
Quality Control	QC
Quality Surveillance	QS

R

Rail Tank Cars	RTC
Replenishment at Sea	RAS
Reporting of Injuries, Diseases and Dangerous Occurrences Regs	RIDDOR
Respiratory Protective Equipment	RPE
Royal Air Force	RAF
Royal Engineers	RE
Royal Fleet Auxiliary	RFA
Royal Logistic Corps	RLC
Royal Navy	RN
Royal School of Mechanical Engineering	RSME

S

Safety, Health, Environment & Fire Management Board	SHEFB
Secretary of State	S of S
Service Focal Point	SFP
Ship to Shore Pipeline System	SSPS
Single Fuel Policy	SFP
Single Point Mooring	SPM
Siting Board	SB
Site Estate Authority Team	SEAT
Site Estate Team Leader	SETL
South Europe Pipeline system	SEPS
Specialist Team Royal Engineers (Bulk Petroleum)	STRE(BP)

Spillage Report	SPILLREP
Spillage Response Plan	SRP
Standardisation Agreement (ABCA)	STANAG
Statement of Requirement	SOR
Statement of User Requirement	SUR
Status of Forces Agreement	SOFA
Statutory Instrument	SI
Support Helicopter	SH
Suitably Qualified and Experienced Personnel	SQEP

T

Tactical Aircraft Refueller	TAR
Tactical Fuel Handling Equipment	TFHE
Tactical Supply Wing	TSW
Take over Board	TB
Tank Fabric Collapsible	TFC
TAR (Trailer)	TAR(T)
Temporary Bulk Fuel Installation	TBFI
TFHE Sub-Committee	TFHESC
Top Level Budget	TLB
Towed Flexible Barge	TFB
Training Working Party	Trg WP

U

Unit Bulk Refuelling Equipment	UBRE
United Kingdom	UK
United Nations	UN
Unleaded Gasoline Military	ULGAS
Unit Support Tanker	UST

V

Vapour Recovery	VR
Vice Chief Defence Staff	VCDS

W

Warship Support Agency	WSA
Wet Stock Management	WSM
Working Party	WP

CONTENTS

Part 1

Chapter 1 (Sponsor FGSR)

INTRODUCTION

SECTION 1 – GENERAL

1.1.01. **Scope**. This manual lays down the standards of practice to be observed within MOD installations for the bulk storage and handling of fuels & lubricants (F&L) and associated products as defined in Part 1, Chapter 3, Section 2. The 'End to End' remit of this legislation is from receipt of the fuel or lubricant into the military storage system, through its safe handling and processing to the point of issue to the operating platform. Fuel tanks that are integral parts of equipments / platforms, which are used to supply fuel directly to power engines, are not within the remit of this Joint Service Publication (JSP).

1.1.02. **Sources**. The regulations contained in JSP 317 are derived from international and national legislation, international, NATO and national standards, professional Codes of Practice and Guidance Notes.

1.1.03. **Authority**. JSP 317 is managed by the MOD Fuel & Gas Safety Regulator (FGSR) SO1 under the Terms of Reference for the Fuels & Gas Safety Regulator Stakeholder Committee (FGSRSC) as defined in JSP 815. Under the authority of the Chairman it is produced and maintained by the FGSR.

SECTION 2 – APPLICABILITY

1.1.04. The Secretary of State for Defence issues a policy statement on safety, health, environmental protection and sustainable development in the MOD, which sets out the strategic principles, duties and governance to be applied throughout the MOD. This policy statement is published in JSP 815. Compliance with JSP 815 ensures consistent implementation of the Secretary of State's policy.

1.1.05. JSP 317 is a level 3 publication which acts in support of the MOD Environment and Safety Management system detailed in JSP 815.

1.1.06. JSP 317 regulations shall be applied to the bulk storage & handling of F&L products by the Top Level Budgets (TLBs) and Trading Fund Agencies (TFA). The Regulations shall also apply to contractors and their personnel, and to non-public activities such as flying clubs, operating on the MOD estate.

1.1.07. **Outside UK**. Where the MOD operates F&L bulk storage installations in countries outside of the UK, the standards specified in this manual shall be applied unless the host nation requires a higher standard in which case that standard must be applied. In Germany, where the Status of Forces Agreement (SOFA) has precedence, all facilities must be constructed and decommissioned to German Standards irrespective of the standards specified in this manual.

1.1.08. **Specific Procedures**. The main sections of JSP 317 will detail the generic procedures to be used for the storage and handling of F&L and associated products within Defence and associated users. However, where procedures are not common across the

Services at this stage, they will be detailed in annexes or references covering the Land, Marine and Aviation environments. Where single-Service issues require the production of clarifying or complementary statements, policies or orders, these shall be based on the detail of this publication, but should not repeat its contents. JSP 317 shall have primacy over any such clarifying or complementary statements, policies or orders.

1.1.09. **Operational Conditions**. Some relaxation of the procedures detailed in JSP 317 may be necessary under operational circumstances. However, as many of the regulations and procedures contained within the JSP are derived directly from civil legislation, exemption from the regulations may require the approval of the Secretary of State for Defence. Requests for exemption due to operational circumstances must be sought from the FGSR through the Chain of Command i.e. Front Line Command (FLC), through the Joint Force Headquarters.

SECTION 3 – EXCEPTIONS

1.1.10. These regulations do not cover the use or storage of fuel and lubricants once issued to the service operating platform. The internal handling of F&L products aboard ships or vessels, or in aircraft operated by the Services or specialist contractors or agencies, or the repair of MT vehicles or aircraft is dealt with by the relevant platform JSP or by the application special regulations through the associated Stakeholder Committees (Land Systems Safety Regulator Stakeholder Committee (LSSR SC), Maritime Stakeholder Safety and Environment Committee (MSSEC) and the Military Aviation Authority (MAA)). Similarly, where the Services need to operate at locations, such as civil oil terminals, which require specific standards higher than those contained in this manual, then the higher standard shall be applied.

1.1.11. **Material Handling Equipment (MHE)**. This JSP no longer provides details for design and operation of MHE. Power operated vehicles, MHE, and cranes can present a risk of fire and explosion. Under the provisions of the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR), it is the responsibility of operators, with advice from Front Line Commands to identify and risk assess the hazardous zones where MHE will operate, including operational theatres. Tri-Service Material Service Contracts Branch are responsible for ensuring that suitable, intrinsically safe MHE, based on operator risk assessments, is available and the Service Provider must to ensure that appropriate, intrinsically safe and serviceable MHE is supplied to the operator. Guidance for MHE regulation and training can be found at JSP 800 Vol 5 Part 3 Chapter 2 (3.2.141).

1.1.12. Advice / guidance for the operation & use of the Tri-Service Material Handling Service PFI Contract can be obtained from:-

TSMH CMT
SP PT GSG
MOD Abbey Wood
Neighbourhood 4, Elm 3a, #4328
Mil Tel: 9352 39017
Civ Tel: 0117 91 39017

1.1.13. **NATO Bulk Fuel Infrastructure**. This JSP no longer provides details for logistics reporting and damage to NATO Bulk Fuel Infrastructure. Damage to NATO fuels infrastructure is in accordance with the Duty Holders procedures. Policy for signal communications can be found at Communications Instructions General ACP 121(H), and Communications Instructions – Introduction to Signal Messages for Originators ACP 121UK SUPP-2. Incident and spillage reporting has been transferred to JSP 317 Part 5 Chapter 5 (Inland), and JSP 317 Part 5 Chapter 6 (Maritime).

1.1.14. **F&L Accounting**. F&L accounting (Bulk and Packed stock) can be found at JSP 886, Volume 6 Part 2.

SECTION 4 – FORMAT

1.1.15. **Parts**. JSP 317 consists of 5 main parts: General; Safety Management Principles for F&L; Permanent Installations; Deployed/Semi-Permanent Installations and; Environmental Protection.

1.1.16. **Chapters**. Each part is divided into a number of chapters covering specific aspects of F&L storage and handling and, where possible, are based on prime source documents, which are sign-posted.

1.1.17.**Sections**. Each chapter is, in turn, divided into several sections, the first of which will cover the scope of the chapter, provide any exceptions, list the contents of the section and list the prime sources of information as a bibliography at the end.

1.1.18. **Paragraphs**. To ease identification and cross-referencing of paragraphs, each paragraph is numbered so as to indicate its precise relation in the publication, eg paragraph 1.2.34 is in Part 1, Chapter 2, as the thirty-fourth paragraph.

1.1.19. **Figures and Tables**. Figures and tables are identified with their position in this publication, e.g. Table 1.4.3 is in Part 1 Chap 4 as the third table.

SECTION 5 – EDITORIAL

1.1.20. JSP 317 is published by the Fuel and Gas Safety Regulator Stakeholder Committee (FGSR SC) – see paragraph 1.2.07 – as the MOD functional safety lead for F&L Storage and Handling. SO1 FGSR in the DLSR, DSEA is responsible, as Chairman of the FGSR SC JSP 317 Editorial Committee for the content of this publication.

1.1.21. **Editorial Committee**. An editorial working group is responsible for reviewing the content of JSP 317, see Table 1.1.1.

Organisation	Members
Defence Safety & Environment Authority	DLSR-SO1 FGSR - Chairman
	FGSR SO2
	FGSR Hazard
	FGSR Sc
	FGSR Insp 1
	FGSR Insp 2 – RAF Desk
	FGSR FI - Secretary
	MTSR - SO2 DG Pol
Defence Equipment & Support (DE&S)	DF&FS
	DI PT - Team Leader DI PT
	GSV-HLV-Fuel
	MPS PT - MPS 216
	QinetiQ - Project Manager F&L

Royal Navy	FLEET N7- SO2 FGR POL
	HQ RM - SO2 Sup
	FLEET HQ - AFSUP CAP TANKER SO2
Army	Army HQ - SO2 Cbt Fuels - Log Sp
	Team Leader IER
	170 (Infra Sp) Engr Gp - 64 Wks Gp RE, STRE(BP)
	Defence Petroleum School – OC
Royal Air Force	HQ Air - SO2 A4 Ops Spt 1(Fuels)
	RAF Halton - OC Fuels Trg
Defence Infrastructure organisation (DIO)	Hd Mechanical Professional Technical Infrastructure
DFRMO	Fire Prevention Officer
CESO	Navy
	Army
	RAF
	DE&S
	JFC

Table 1.1.1 – Composition of JSP 317 Editorial Working Group

1.1.22. **Amendments**. Formal amendment of JSP 317 will normally take place on a 12 monthly basis to reflect changes in legislation, source documents or changes to operating procedures and following ratification by the JSP 317 Editorial Committee. Proposed amendments to the JSP should be submitted through existing staff channels to the respective member of the Editorial Committee (see paragraph 1.1.21). A Performa requesting an amendment change to the JSP is at Annex A.

1.1.23. **Interim Amendments**. Should there be a requirement for urgent interim amendments, these will be made on authority of the Editorial Committee Chairman and communicated by FGSR Notice. These will be published on the JSP 317 Intranet site pending the next JSP 317 WG. They will additionally be sent directly to TLB WG members for information and dissemination. FGSR Notices will usually be for the purpose of communicating legislative changes or safety information.

SECTION 6 – LEGISLATION

1.1.24. The Secretary of State for Defence has made a statement covering the need for all employees to conform with Legal Requirements and Accepted Codes of Practice, regarding their, and others' health safety and welfare, where it is reasonably practical to do so, regardless of the MOD being exempt or otherwise. This statement is produced in JSP 815, Chapter 2, *Defence Environment and Safety Management.*

1.1.25. **DSEAR**. All F&L *bulk storage*[1] installations must be assessed for their applicability to the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR). This manual provides policy and guidance for the safe bulk storage of flammable liquids with a flashpoint of 55°C or below. This includes all flammable F&L including waste F&L, which has the potential to cause an explosive atmosphere as defined in DSEAR. This guidance is also relevant to liquids with a flashpoint above 55°C which are stored at temperatures above their flashpoint. Irrespective of storage temperature, installations where F&L can escape as a mist or spray have the potential to produce an explosive atmosphere and must be risk assessed by the Duty Holder, (see Part 2 Chapter 1). Advice

[1] For the purposes of this JSP; *bulk storage* is defined as the storage of F&L in static containers greater than 200 litres capacity; or permanent fixed containers identified as part of infrastructure, irrespective of capacity.

and guidance for DSEAR risk assessments can be found at JSP 317 Part 2 Chapters 1-3, and JSP 375 Leaflet 56.

1.1.26. **Licensable Installations**. In line with changes to legislation, not all F&L installations require a licence to operate. All petroleum spirit and petroleum mixtures as defined in the Petroleum (Consolidation) Act 1928 (Class I petroleum products with a flashpoint less than 21°C) stored in permanent / semi-permanent bulk storage installations that supply petroleum directly to the ready use tank of an internal combustion engines are defined as Licensable Petroleum Installations. The Fuel and Gas Safety Regulator (FGSR) is responsible to the Secretary of State for the issue of a Certificate for Continued Operation (CCO) to operate Licensable Petroleum Installations on the MOD estate. This focal point status is recognised by the Petroleum Enforcement Liaison Group (PELG) and obviates the need for civilian Petroleum Licensing Authorities (PLA) to inspect units directly. However, it places upon FGSR an obligation to act as the MOD PLA and to make available records for HSE scrutiny.

REPORTING AMENDMENTS IN JSP 317

PURPOSE

1. The purpose of this annex is to provide users at all levels with means of reporting unsatisfactory features in the JSP 317 and proposing an amendment. Reports are to be submitted in the format shown at page 1-1-A-2.

ORIGINATOR OF REPORT

2. Originators of reports are to raise one copy of the report. Once satisfied that the report contains all relevant detail, it is to be forwarded to the Service Focal Point (SFP), see table 1.1.1. There is no requirement to provide a covering letter or additional correspondence with the report, unless the originator believes amplification of the report is necessary to assist the SFP.

ACTION BY SERVICE FOCAL POINT

3. On receipt of the report, the SFP is to investigate the content of the report and, if necessary, initiate amendment action through the Editor of the JSP 317, Field Investigator (FI), FGSR, Elm 1c #4136, MOD Abbey Wood, BRISTOL BS34 8JH. Finally the SFP is to append his comments on the back of the report, page 1-1-A-3, retain a copy for file, issue one copy to the Editor and then return the original to the originator.

REPORTING AMENDMENTS IN JSP 317

TO THE SERVICE FOCAL POINT (SFP)

Originator:					
			File Reference:		
			Date:		
SFP:			**Telephone No:**		
1. JSP 317 Details					
Part:	Chapter:	Title:			
Section:	Annex:	Page:	AL No:	Paragraph:	Line No:
2. Unsatisfactory Feature (See copy attached)*					
3. Proposed Amendment (See continuation sheets)*					

4. Reporting Chain

Action Addressee	Signature	Name	Rank	Appt	Tel Ext	Date
Originator						
SFP						

***Note**: (See SFP's comments overleaf)

SFP's comments:	
Name:	Signature:
Appointment:	Date:

Part 1

Chapter 2 (Sponsor SO2-FGSR)

ASSURANCE, CERTIFICATION, COMMISSIONING, LICENSING AND DECOMMISSIONING

SECTION 1 – INTRODUCTION

1.2.01. The procedures to ensure the correct siting, construction, maintenance, management and operation of petroleum installations on the Defence Estate, and licensing of semi-permanent fuel installations in operational theatres, include the following:

a. **Siting**. Checking the site to ensure that any hazards associated with the petroleum installation do not increase the hazards of other military installations, and that other military installations or equipment (i.e. armed aircraft safe headings) do not impose additional risks on the petroleum installation.

b. **Fitness for purpose**. Formally ensuring that new, or modified installations are fit for purpose and that existing installations are maintained and continue to be fit for purpose.

c. **Operation**. Confirmation that installation are correctly managed and operated, taking into consideration training, safety and fuel quality factors. This is achieved through the fuel safety quality assurance process, see Section 4. The FLCs will continue to provide their CinCs' with details of risks posed and hazards identified by Unit's F&L installations and stores. The fuel safety assurance process is currently restricted to the following installations:

(1) Permanent and semi-permanent bulk fuel installations (BFI) (aviation and ground).

(2) Mechanical Fuel Transport Installations (MTFI)

(3) Oil Fuel Depots (OFDs)

(4) Uninstalled Engine Test Facilities (UETF)

(5) Contractor storage tanks

(6) Gliding and Flying Schools and Clubs on MOD Land

(7) Bulk Fuel Carrying Vehicle (BFCV) Parks

(8) Waste Compounds

(9) Gas storage areas, oil, lubricants and packed stock storage and management (RAF and AAC Units only)

1.2.02. The regulations in the following paragraphs apply to all permanent and semi-permanent fuel installations. Regulations for installations constructed from TFHE/JOFS or other in Service fuel handling equipment are set down in Part 4, Chapter 1.

1.2.03. Where the installation has been constructed to store Class I fuel, the Fuel and Gas Safety Regulator (FGSR) will carry out an annual assurance audit of the installation and, should it meet the required standards, issue a Certificate of Continued Operation (CCO), see Section 4, example at Annex A. Class II or III installations will also undergo an assurance audit by FGSR, Army HQ Inspectorate or a nominated delegate prior to commissioning but no license or CCO will be issued. The procedures to ensure the correct siting, construction, maintenance, management and operation of petroleum installations, are implemented by a number of actions described below:

a. **Siting Board**. The conduct of a properly constituted siting board in accordance with Paragraph 1.2.05, prior to the placing of Project Management or construction contracts.

b. **Certificate of Fitness for Purpose**. The formal confirmation by the Project Manager that the newly constructed or modified facility is fit for purpose before first fill or use. Where works commissioning actions follow first fill, the formal confirmation is repeated by the Project Manager that the facility is fit for purpose and use after the completion of the commissioning works. This forms one of a number of requirements which must be fulfilled to enable the FGSR or nominated delegate to give permission for the installation to be operated. In addition, the Site Estate Team Leader is responsible for ensuring that the MMO conducts a professional inspection of fuel installations and flammable dangerous goods stores on an annual basis and, where appropriate, issue the Certificate of Fitness for Continued Use. The facilities to be inspected include the following:

(1) Bulk storage for flammable liquids or aviation fuel including slops and buffer tanks.

(2) Fuel transfer facilities (e.g. cross-base pipelines and naval fuel jetties) including pigging facilities where appropriate.

(3) Aviation fuel hydrant systems.

(4) Mechanical transport fuelling facilities.

(5) Flammable dangerous goods stores.

(6) Specialist facilities for example; semi permanent installations, jerry can filling plants.

(7) Major bulk storage facilities for plant diesel and fuel oil.

(8) Ancillary installations; including small plant diesel, fuel oil and waste oil installations.

c. FGSR or nominated delegate is responsible for providing SME advice to the Head of Establishment and respective FLC on management, operation and fuel quality requirements of a new installation. Periodic audits of all installations will take place to ensure that standards are maintained.

SECTION 2 – GENERAL

1.2.04. Before any permanent or semi-permanent fuel installation can be brought into operation, it will be necessary for it to be certified and commissioned. FGSR must be informed in all cases. Similarly, before a fuel installation can be declared redundant, it will be necessary for it to be de-commissioned and FGSR notified. This chapter explains the procedures to be followed in each case.

SECTION 3 – SITING, CERTIFICATION AND COMMISSIONING

1.2.05. A permanent or semi-permanent fuel installation cannot be brought into use until the installation has been sited to the agreement of the interested parties, certified as fit for purpose, commissioned, and taken over for use and maintenance. The process is defined below:

a. **General**. Before a Siting Board (SB) can be convened, a Statement of User Requirement (SUR) or Statement of Requirement (SOR) must have been prepared. All permanent and semi-permanent F&L facilities are to be subject to a SB. A Land Quality Assessment (LQA) should be conducted either before the SB, or just afterwards, before construction commences. This will ascertain what level of contamination, or pollution may already exist at the site. LQAs are conducted by (170 (Infra Sp) Engr Gp). The siting of F&L storage lockers does not warrant the convening of a formal Siting Board. It is sufficient that the Operating Authority consult at a unit level with the H&S and Fire Safety advisor to determine a suitable and safe location.

b. **Siting Board**. The SB is a mandatory requirement and it is the responsibility of the User and/or the Site Estate Team Leader (SETL) to arrange for it to be held. The SB will take into account the siting and layout of the installation, primarily based on safety, efficiency and economy, having regard to the proximity of associated military installations such as explosive stores, aircraft and aprons, and HM Ships and their associated instruments (e.g. radio, radar and lasers), in some cases the Local Authority Planning Permission is also required. The amenity value and environmental aspects of the site and its surroundings must be taken into account. Installations must be sited, wherever possible on level, well drained, open and ventilated areas, as far from explosive stores, airfield runways and buildings as is practicable and, in any case outside the prescribed safety distances for such installations or areas. Consideration must be given to the most efficient traffic flow and proximity to utilities such as water, power and fire fighting facilities. When the SB is satisfied that all conditions have been met, it will be empowered to issue the appropriate service document that will authorise the siting of the installation. SBs for all other infrastructure proposals are to ensure that the safety, efficiency and economy, with regard to the proximity of associated F&L installations, is fully taken into account.

c. The SB is to comprise of representatives of the following as appropriate:

(1) A qualified fuel officer/SNCO/WO from FLC, Army HQ Pet Insp., FGSR etc. Appropriate sections of the FSAA should be used.

(2) Site Estate Team Leader (SETL).

(3) Maintenance Management Organisation (MMO).

(4) AP(Pet).

(5) Project Manager.

(6) Contractor.

(7) DFRMO Officer.

(8) Unit/Station Environmental Officer.

(9) Ammunition Technical Officer (ATO) (or Service equivalent).

(10) Communications Officer/Radiation Hazard Officer.

(11) Proposed Operator.

d. **Certificate of Fitness for Purpose**. When complete, but prior to commissioning, the SETL must obtain to his satisfaction a Certificate of Fitness for Purpose (CFFP) for the new or modified installation. The Project Manger, the contractor or the MMO may issue this certificate. The certificate must state that the installation has been constructed, or modified, in conformance with the approved design and that it is fit for its intended purpose. The certificate must be counter-signed by:

(1) Project Manager.

(2) AP (Pet).

(3) DFRMO Officer.

e. **Commissioning**. Commissioning of an installation is a contractor's responsibility. To commission an installation, the appropriate live product(s) must be used. Prior to receiving live product, a CFFP must be issued and approved by the SETL. The AP (Pet) is to approve the commissioning procedure adopted by the contractor. F&L facilities that are used for the bulk storage and movement of product require Commissioning, examples of which are as follows:

(1) Bulk Storage of Class 1.

(2) Aviation Fuel Storage (on base facilities - including Uninstalled Engine Test Facilities).

(3) Hydrant Refuelling Systems.

(4) Pipelines.

(5) BFCV Parking Areas.

(6) BFCV Workshops.

(7) Waste Oil and Fuel Recovery systems.

(8) MTFIs.

f. **Take-over**. Once an installation has been commissioned and is considered ready for take-over by the Services, the original SB is to re-convene as a Take-over Board (TB). The TB is to ensure that the installation has been constructed in accordance with all safety and legislative requirements, has been correctly commissioned and is in a fit and proper state for take-over by the User. When the TB is satisfied that all conditions have been met, it is empowered to issue the appropriate Service document that will authorise take-over of the installation. This document is to be signed by all members of the TB and, in particular, is to accept the installation for the following reasons:

For use:	by the Operating Authority (OA).
For maintenance:	by the Maintenance Management Organisation (MMO).

g. **Training**. As part of the take-over process, the PROM is to arrange for any necessary installation specific familiarisation training required by the AP(Petroleum), the maintainer, and the operators of the installation. An appropriate record of those personnel who have received training is to be maintained by the OA.

1.2.06. Part 3, Chapter 2 of the *Defence Works Functional Standard, Design And Maintenance Guide 03 (DMG 03)* include the storage arrangements for packed stock and packed dangerous goods to meet the requirements of Health and Safety Guidance. The SB members are required to check proposed storage arrangements for packed product stores or storage areas for compliance with the standards. This includes stores intended for TFHE/JOFS containing residual fuel.

SECTION 4 – FUEL SAFETY QUALITY ASSURANCE

1.2.07. DIO F&L Facilities are not subject to Civilian Local Authority Petroleum Licensing but it should be noted that the HSE and EA have the authority to visit and inspect any MOD facility and they hold Powers of Prosecution and Crown Censure. The MOD currently provides independent self-regulation through the application of the Fuel Safety Quality Assurance process by FGSR. The purpose of this assurance process is to ultimately provide fuel and gas safety assurance to the Secretary of State for Defence and to ensure that fuel safety across the Defence Estate is not compromised. Fuel safety quality assurance covers:

a. The end to end[1] process of fuel and gas handling and storage operations at MOD sites.

b. Compliance with current legislation/regulation.

c. Competence of all personnel with fuel and gas safety responsibilities

1.2.08. The FGSR evolved from the DFG Inspectorate with an enhanced main effort to provide fuel safety assurance. The primary purpose of the FGSR is to monitor fuel and gas safety assurance and provide SME advice and guidance to Head of Establishments and FLCs where necessary. This is achieved through:

a. Internal Quality Assessments.

b. External Quality Assurance.

Internal Quality Assessment[2]

1.2.09. In order to comply with policy, Units will be required to complete an annual Fuel Safety Assurance Assessment (FSAA). The FSAAs are check sheets with comprehensive guidance on completion and will provide information to FGSR and the FLCs on areas of non-compliance, risk and on any identified failings in the end to end process. Upon receipt of the FSAA the appropriate section/department must contact the FGSR. Units will have a 6 week period to complete the FSAA and return it to FGSR.

1.2.10. The Head of Establishment shall appoint suitably qualified experienced personnel and delegate the management of the Unit specific FSAA in accordance with JSP 375 Vol 1. Any areas of non compliance or concern will be followed up by liaison with the Unit or a visit from FGSR. Risks and, where appropriate, mitigation methods, identified through the assurance process will be reported to Head of Establishments and FLCs.

1.2.11. **HQ Army and JHC Units**. As part of the Army HQ Logistic support inspection programme, Units will be required to provide the necessary evidence for the Army HQ Inspectorate to complete a Fuel Safety Assurance Assessment (FSAA) on behalf of the Unit. This will be conducted on an annual basis and the completed FSAA submitted to FGSR for analysis. The aim is to minimise disruption at Unit level. FGSR remain responsible for the production of the post FSAA report. The FSAA must be submitted to FGSR along with:

1 End to end is defined as 'the point when fuel is receipted from the delivery vessel into MOD infrastructure, through the storage process, until issue to the end platform'.
2 Internal Quality Assessments are only applicable to Class II and Class III installations.

a. The current Certificate of fitness for continued use (previously part of the Task 249), and the 2 previous reports for review.

b. A copy of the local Hazard Log.

1.2.12. Upon receipt of the completed FSAA all Units will receive a report from FGSR detailing areas of non-compliance, making recommendations and providing advise on possible mitigation/control measures of areas of risk. Copies of the report will be distributed to:

a. Unit.

b. FLC.

c. CESO (Army/RAF/Navy/PJHQ).

d. Stakeholders as required.

External Quality Assurance

1.2.13. The purpose of the external quality audit process is to confirm the robustness of the internal assurance process, measuring compliance and identifying risks. In order to retain independence, the internal quality assessment process will undergo an external quality audit by FGSR. Sites will be visited by FGSR for a FSAA:

a. On a 3 yearly basis (minimum).

b. If a serious fuel safety failing or unacceptable risk has been identified.

c. At Unit request.

1.2.14. The external quality audit will follow a similar process to the previous licensing regime but will 'deep-dive' into areas of concern and will include the requirement to review all fuel handling and quality assurance procedures. Recommendations will be made to the Head of Establishment and FLCs in the form of a comprehensive report. Copies of the report will be distributed to:

a. Unit.

b. FLC.

c. CESO (Army/RAF/Navy/PJHQ).

d. Stakeholders as required.

PJHQ and Installations Containing Class I Fuel

1.2.15. PJHQ installations[3] will be subject to the same quality assurance process as installations with Class I fuel, see 1.2.07 – 1.2.14.

1.2.16. All Installations which contain fuel with a FP ≤21°C will be subject to annual external assurance audits by FGSR. Should the Unit provide sufficient evidence the installation is safe to operate and the handling and storage procedures are in line with current policy, FGSR will issue a Certificate for Continued Operation (CCO). The in-date CCO must be displayed at the control point for all Class 1 installations. An example of a CCO is at Annex A.

1.2.17. A CCO will be issued for a 12 month period. Should there be insufficient evidence available; FGSR will not issue a CCO. This means that the Duty Holder and FLC must agree continued operation with SME input from FGSR as necessary. In these circumstances, continued operation will require the Duty Holder to establish their own risk assessed safe operating procedures for the areas of non-compliance identified by FGSR. As with the FSAA and external audits, a detailed report will be issued to the Head of Establishment and its corresponding FLC, detailing issues which require rectification, along with recommendations of how best to rectify areas of non-compliance. It is the Unit's responsibility to inform the FGSR when it is prepared for a follow-up audit.

1.2.18. The RAF has chosen to apply the ISO 9000 series of QA requirements to its Logistics (engineering and supply) activities and therefore, undertakes EQA activity on its Units.

1.2.19. FGSR personnel are available on the following numbers to provide advice and guidance on any issues surrounding the fuel safety assurance process -

a. Inspector 1 9679 83798

b. Inspector 2 9679 83800

c. Inspector 1a 9679 83799

d. Inspector 2a 9679 83801

SECTION 5 - FUEL HAZARD MANAGEMENT

1.2.20. In line with the FGSR Fuel Hazard Management System (FHMS), detailed in JSP 309, units are to establish and maintain a local hazard log. the correct template to use for a local hazard log is at Annex B. The hazard log should be filed and retained as a formal document.

1.2.21. Inclusions in the local Hazard Log should be fuel specific. Any fuel specific hazards/risks/areas of non-compliance identified which may affect other areas should be reported to the Unit Health and Safety Officer. Inclusion should include accident

3 This includes all PJOB installations not manned by appropriate SMEs however; CCOs will only be issued to those containing Class I fuel.

sequences and accidents which could conceivably happen, not only the ones which have been experienced. FGSR must be informed when any additions to the local Hazard Log are made. The purpose of the local Hazard Log is to provide a structured method of recording and managing activities and to eliminate or reduce the risk of the hazard to an acceptable level.

Note: It must be stressed to all personnel that the MOD does not operate a blame culture and individual performance reports will not be affected by a pro-active approach to fuel safety management and accurate reporting.

1.2.22. **Unit/Site Closure**. For units/sites that are closing, *Defence Infrastructure Organisation Functional Standard, Design and Maintenance Guide 12 - Site Closure Guide*, is to be consulted. Additionally, after decommissioning a second LQA is to be carried out to ascertain what level of contamination can be contributed to the use of the installation. This is especially relevant if the land is to be handed over for civilian use. Fuel installations should be considered for retention if DIO advise that they would add to the value (and therefore receipt) of the site. Conversely, where permanently de-commissioned fuel installations are remaining on site, there may be additional works required to fully remediate the site before transfer of the site to a new owner. There may also be costs applied by the new owner before acceptance of the site due to the perceived risk associated with the remaining installations.

SECTION 6 – ARMY HEADQUARTERS PETROLEUM INSPECTORATE

1.2.23. **Operational Role**. The Army HQ Petroleum Inspectorate provides operational support to both 101 and 102 Log Bdes[4] as Force Protection specialist advisors on the storage and handling of F&L products. Advice can be provided on tactical (TFHE/JOFS deployment) and HN (fixed installations)[5] storage. The Petroleum Inspectorate also provides a capability to supervise the operation of deployed TFHE/JOFS cross-country pipeline, in conjunction with other Log Bde Units[6].

1.2.24. **Infrastructure Role**. The Army HQ Petroleum Inspectorate is responsible to Army HQ, as outlined in LANDSO 4419[7], for ensuring the safe storage and handling of F&L across the Command[8]. The Inspectorate conducts Unit Specialist Petroleum Inspections (SPI) as part of the Log Technical Inspection regime. The SPI also complements the (FGSR) licensing inspections of Unit MTFI. The functional areas inspected by the SPI are listed as follows:

a. BFCV Parks.

b. BFCV fleet – documentation and inspection.

c. LPG Stores, LPG Compounds, F&L Stores and compounds – Storage handling and siting.

4 UK Inspectorate affiliated to 101 Log Bde. BA(G) Inspectorate affiliated to 102 Log Bde.
5 Advice given in conjunction with RE specialist advisors.
6 Fuel Sp Sqn and RE.
7 LANDSO 4419 (Second Revise) (July 2006) – The Petroleum Inspectorate.
8 This include operational theatres, BA (G), overseas detachments (i.e. BATUS, BATLSK, BATSU(B)) and ARTD Units and estates. NI is subject to an independent inspection regime.

d. MTFI facilities (complements FGSR licensing inspection regime)

e. Servicing Bay Facilities.

f. Bulk Waste and Packed Waste Oil Storage Facilities.

g. Works Services in hand.

h. Planned New Works.

i. Publications.

j. Fire Safety.

k. Health & Safety.

l. Trained Personnel.

m. Environmental Protection, including Unit Spillage Response Plan.

n. Quality Assurance of products.

o. Licensing of semi-permanent storage facilities in operational theatres (in conjunction with FGSR).

1.2.25. The Army Headquarters Petroleum Inspectorate is able to provide detailed advice to Units on the above functional areas. Contact details are:

Address:	**Contact details:**
Army HQ (UK) Petroleum Inspectorate. HQ 101 Log Bde. St Omer Barracks. Aldershot. Hants. GU11 2BG	94222 (Aldershot Mil) Ext: WOIC 3437 SNCOs 3433/3435 Fax 3434 Email: 101LOGX-Pet-Insp-WOIC
Army HQ UKSC BA (G) Petroleum Inspectorate HQ 102 Log Bde. The Princess Royal Barracks. BFPO 47	94873 (Gutersloh Mil) Ext: WOIC 2607 SNCOs 2610 Fax 2433 Email: 102LOGX-POL-WOIC

CERTIFICATE FOR CONTINUED OPERATION (EXAMPLE)

CERTIFICATE FOR CONTINUED OPERATION

DSEA

TLB	COMMAND	UNIT	INSTALLATION	SERIAL
DIO	DIO/DTE	Stanford DTE East	Thorpe Barracks MTFI	FGSR/11/3/222

In accordance with JSP 317, a Fuel Safety Assurance Assessment was undertaken at

Stanford DTE East

by WO2 IA Gurner of the Defence Land Safety, Fuel & Gas Safety Regulator (FGSR) Section on 26 Jun 12.

From the evidence presented, the FGSR concluded that the installation is safe for a period of continued operation and a Certificate for Continued Operation is awarded to satisfy the Legislative requirements of the Petroleum Consolidation Act 1928.

This certificate expires on 26 Jun 13.

Issuing Officer:

WO2 IA Gurner
Inspector 1a
Fuel & Gas Safety Regulator
(9)6798 3799

This certificate is valid when presented in conjunction with a Task 249 Certificate of Fitness for Continued Operation. It is the Unit's responsibility to alert the FGSR of any amendments to the end to end safety procedures which may impact on the safety of the installation. This certificate must be displayed at the installation control point.

MECHANICAL TRANSPORT FUELLING INSTALLATION (MTFI) COMPOSITION

STORAGE TANKS

Tank No.	Capacity (Ltrs)	Product	Above/Below Ground	Construction	Remarks
1	55,451	DIESO MT	Below	Single Skinned Steel	*Tank Tightness due 4 Jan 13 and annually thereafter.
2	55,451	DIESO MT	Below	Single Skinned Steel	*Tank Tightness due 4 Jan 13 and annually thereafter.
3	55,509	ULGAS	Below	Single Skinned Steel	*Tank Tightness due 4 Jan 13 and annually thereafter.
4	55,451	DIESO UK	Below	Single Skinned Steel	*Tank Tightness due 4 Jan 13 and annually thereafter.

METERING/DISPENSE PUMPS

Pump No.	Serial No	Make	Product	Single/Double	Remarks
1	1234	Pumptronic	DIESO MT	Single	Pumps calibrated 4 Feb 12. Next due 4 Aug 12.
2	1235	Pumptronic	DIESO MT	Single	Pumps calibrated 4 Feb 12. Next due 4 Aug 12.
3	1236	Pumptronic	ULGAS	Single	Pumps calibrated 4 Feb 12. Next due 4 Aug 12.
4	12378	Tokheim	DIESO UK	Single	Pumps calibrated 4 Feb 12. Next due 4 Aug 12.

INTERCEPTORS

Int No.	Construction Material	Max Capacity (Ltrs)	Type (Full Retention or Bypass)	Class	Remarks
1	GRP	8,000	Full	1	Maintained by Aquatrine.

ANY ADDITIONAL INFORMATION

- *The average annual ULGAS throughput is 25,000Ltrs.*
- *The Unit have no ULGAS dependant vehicles and all ULGAS is used by exercising units.*
- **The Level 1 Assessment of the underground storage tanks was +10 and as a result Level 2 Tightness Testing will be required on an annual basis after the next inspection.*

RISK REGISTER

Risk Number	Hazard	Risk	Risk Control Measures			Owner	Action Taken	Signed /dated	Reported to FGSR
			1	2	3				
1	*Loose hand rail on steps leading to top of BFI 9*	*Personnel falling and harming themselves as a result of the loose hand rail*	*Steps are out of bounds to all personnel*	*Steps are marked out of bounds with orange tape*	*Note in Station Orders stating that steps are out of bounds*	*OC Fuels*	*Works Service request submitted to RPC on 12 May.* *Outstanding works must be rectified immediately due to the weekly requirement to complete dips of the BFI*	*Example*	*Yes – on 12 May to Inspector 2*

Please note if you have any questions regarding the completion of this form please contact FGSR. The log must be kept as a permanent record and not destroyed.

DECOMMISSIONING OF F&L FACILITIES

1. **In Use.** The **unit maintains and operates** its F&L facilities day-to-day. Standard maintenance rules apply.

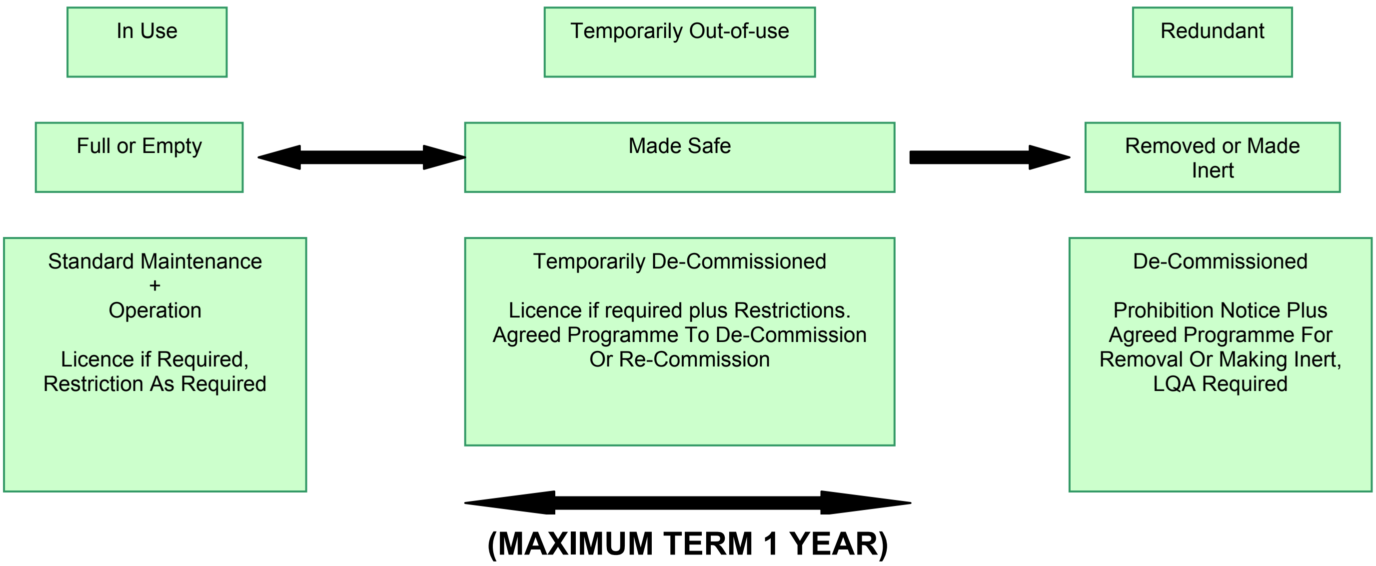
2. **Out of Use/Redundant.** The **unit** decides that it **does not require** the use of its F&L facilities:

a. **Permanently**. The unit sets a programme of de-commissioning and removal or making inert, a Land Quality Assessment (LQA) is required. The works budget (Long Term Costing) reflects the costs and date for completion. JSP 375, Volume 3, Chapter 5, Petroleum Appendix 10 rules apply.

b. **Temporarily**. The unit sets a programme of temporary de-commissioning, maximum term of 1 year, with a view to permanent de-commissioning or re-commissioning. A unit decision is to be made in-year for action at the end of the 1-year term. JSP 375, Volume 3, Chapter 5, Petroleum Appendix 10 rules apply.

c. **Care and Maintenance**. The unit does not wish to take the facility out of operation but does not wish to operate the facility for a set period, maximum term of 1 year, to assess the true need for the facility. Standard maintenance rules apply as at paragraph 1. A unit decision is to be made in-year for action at the end of the 1-year term. The facility is to be de-commissioned at the end of the 1-year term if the unit does not wish to retain the facility.

FACILITY OPERATIONAL CONDITION FLOW CHART



Part 1

Chapter 3 Sponsor FI FGSR

DEFINITIONS

SECTION 1 – GENERAL

1.3.01. **Scope**. This chapter provides the standard definitions of specialist terminology used in connection with the storage, handling and conveyance of F&L products within the MOD.

1.3.02. **Source**. Definitions used in this publication are mainly derived directly from legislation, Codes of Practice and Guidance Notes. In addition, NATO terminology has been introduced where appropriate. The relevant source is quoted wherever possible.

1.3.03. **Primacy**. In deriving the definitions used in this publication, several meanings have been found to exist for the same expression, e.g. working stock. Accordingly, the following table of accession has been adopted:

a. UK legislation

b. International Standards Organisation (ISO)

c. British Standards Institute (BSI)

d. Energy Institute (EI)

e. NATO Terminology (APP-1)

f. American Petroleum Institute. (API)

g. MOD

1.3.04. **Exceptions**. This Chapter does not include details of abbreviations; nor does it contain those technical terms which are used in specialist aspects of F&L handling, e.g. laboratory work and fuel specifications. Abbreviations and such technical terminology are detailed in Abbreviations.

SECTION 2 – GLOSSARY OF TERMS

1.3.05. The terms defined in this publication are contained in Table 1.3.1.

1.3.06. For the purpose of this Publication the following interpretations apply irrespective of any other meaning the words may have in other connections.

Table 1.3.1 – Glossary of Terms

Term	Definition	Source
Adapter	A self sealing male component on tank or line end to which hose couplings are attached. Located on the road tanker and at petrol station vapour connection. Features a valve which when not activated by a spigot on the mating connector seals off the vapour path.	APEA/IP
ADR	The regulations covering the carriage of dangerous goods by road in Europe.	
Agreed procedures and safety method statement (SMS)	A work procedure acknowledged as sufficiently proven to be a safe way of carrying out a specific task, so much so that if agreed precautions and SMS are relevant to impending work, and the issuing authority undertakes to ensure that they will be followed, then it is not necessary for the issuing authority to draft further procedures and SMS for the work.	APEA/IP
Airfield Road	A road within the airfield boundaries used for foot and vehicular traffic, but which is not classified as a Public Highway.	IP Pt 7
Approved List	The list of dangerous substances published by the HSC entitled The Road Tanker Approved List.	SI 1992 No 743
Attendant Operated	A filling station when an attendant directly operates and controls the dispensing equipment and the discharge nozzle on behalf of the customer.	APEA/IP
Attended self-service	A filling station where customers operate the self dispensing equipment which is activated, supervised and may be shut off in an emergency by an attendant in a control point.	APEA/IP
Authority	An individual or a corporate body, according to the circumstances, e.g. a corporate body is an artificial legal person in law just as an individual, with legal rights and obligations.	APEA/IP
Authorised Person	A person employed by, or commissioned by the Maintenance Management Organisation or MOD, and appointed for the purpose of implementing the MOD Safety Rules and Procedures by the Commanding Officer/Head of Establishment/Officer in Charge.	JSP 375
Automotive Repair	Any repair tasks involving any part of the bulk fuel tanker/refueller/UBRE (less the bulk fuel container, associated pipe work or dispensing equipment), which does not require either hot work or the equipment to be immobilised.	
Auxiliary Power Units (APU)	(Aircraft-borne) Power units of aircraft services built into the aircraft which can be operated independently of the main engines.	IP Pt7
Aviation Bulk Fuel Installation (Av BFI)	An Installation where large quantities of Aviation Fuel are stored and dispensed to a consumer.	

Term	Definition	Source
Back-up power supplies	Alternative arrangements providing a maintained supply to all or part of the electrical apparatus, in the event of failure of the mains supply, e.g. standby generation, uninterruptible power supply (UPS), battery back-up.	APEA/IP
BASEEFA	British Approval Service for Electrical Equipment in Flammable Atmospheres, now known as EECS, Electrical Equipment Certification Service.	APEA/IP
Bottom Loading	The filling of a mobile container at or near its lowest point by means of a connection at a low level.	APEA/IP
Bonding (Correct title – Equipotential Bonding) Bonding (Correct title – Equipotential Bonding)	Electrical connection maintaining various exposed conductive-parts and extraneous – conductive parts at substantially the same potential. 2 categories of Equipotential Bonding are:- Main Equipotential Bonding: In each installation, main Equipotential Bonding conductors shall connect to the main earthing terminal *extraneous conductive parts* of that installation Supplementary Equipotential Bonding: Where Supplementary Equipotential Bonding is necessary, it shall connect together the *exposed conductive parts* of equipment in the circuits' concerned *and extraneous conductive parts*. Supplementary Equipotential Bonding is required in areas if increased risk recognised as "Special Locations". A Hazardous Area would be considered as a "Special Location".	BS7671 BS EN 60079-0 BS EN 60079-14 BS7671 BS EN 60079-0 BS EN 60079-14
Breakaway coupling	A coupling designed to shear at a pre-determined load, in which the two halves, when parted are sealed by internal valves.	APEA/IP
Breathing	Emissions from, or intake of air into, a tank due to ambient temperature/pressure effects, or due to vaporisation/condensation of product and to compensate for product dispensed by forecourt pumps.	APEA/IP
Breathing Apparatus	See 'Respiratory Protection Equipment'.	
Bulk Fuel Carrying Vehicle (BFCV, inc.UST & CST)	A goods vehicle which has a tank (on these Regulations referred to a as a carrying tank) which is attached to the frame of the vehicle (whether structurally or otherwise) and (except when empty) is not intended to be removed from the vehicle; or an internal part of the vehicle.	SI 1992 No 743
Bulk Fuel Installation	An installation where large quantities of fuel are stored and dispensed to a consumer.	

Term	Definition	Source
(BFI)		
Bund	A wall of appropriate height constructed of concrete, earth, or other suitable material, and designed to confine spillage of oil from any cause.	IP Pt7
Bund Wall	See ‘Bund’	IP Pt7
Bunded Area	An area bounded by natural ground contours or by bund walls so designed to control spillage.	IP Pt7
Buried Tank	A tank underground which is so sited that no portion of the tank shell is above the surrounding ground level.	IP Pt7
Checklist	A secondary document which the performing authority is required to complete prior to, or in the course of, carrying our the work, by way of evidence that specific safety precautions have been taken.	APEA/IP
Class I and Class II electrical equipment	Equipment constructed in particular ways to protect against electric shock. (See BS 2754)	APEA/IP
Clearance certificate	The primary document used to request and approve the commencement if installation and maintenance work on petrol filling stations.	APEA/IP
Closed system	A product handling and transfer system designed to minimise vapour emissions to atmosphere.	APEA/IP
Coastal Waters	Those waters up to 3 miles out from the Low Water Mark	
Co-axial hose	A flexible petrol dispensing hose of annular construction in which vapour and flow are independent of one another.	APEA/IP
Combined Sewer	A sewer discharging to a sewage treatment works conveying both foul and surface water.	APEA/IP
Combustible	Combustible refers to any substance, solid, liquid or gas which will burn with the application of heat.	IP Pt7
Combustible Gas Indicator	An instrument to measure the concentration of flammable gas.	
Competent Person Competent Person	A person with enough practical and theoretical knowledge and actual experience to carry out a particular task safely and effectively. The person should have the necessary ability in the particular operation of the type of plant and equipment with which he or she is concerned, an understanding of relevant statutory requirements and an appreciation of the hazards involved. That person should also be able to recognise the need for specialist advice or assistance when necessary and to assess the importance of the results of examinations and tests in the light of their purpose. A ‘person’ can be taken to mean more than one, or a body corporate or incorporate. It is therefore possible to appoint appropriate organisations (e.g. inspection bodies) to carry out tasks designated for competent persons.	HS(G) 41 HS(G) 41

Term	Definition	Source
Competent Person (electrical)	For electrical work a person must satisfy the competence requirements of Regulation 16 of the Electricity at Work Regulations, which will necessarily involve being fully conversant with and having practical experience with BS 5345 and BSEN 60079 as applicable.	APEA/IP
Competent Petroleum Trained Personnel (CPTP)	A qualified tradesman who has the practical, theoretical knowledge and experience to construct and operate a Deployed Bulk Fuel Installation safely and effectively.	
Condensate	Liquid formed due to the change of state from vapour to liquid.	APEA/IP
Confined Space	Any tank, chamber, pit, or enclosure in which the atmosphere is likely to be hazardous by virtue of flammability, toxicity, deficiency of oxygen, risk of asphyxiation etc, due to restricted natural ventilation and restricted access and egress.	
Containment System	The combination of storage tank, delivery, fill and vent pipework including associated valves and fittings which together provide containment.	APEA/IP
Contractor	Any company or individual with whom a site owner has a commercial agreement to carry out installation or maintenance work on service stations. The contractor will normally be the employer of both the issuing and performing authorities. References to either is synonymous with a reference to the contractor also, the term 'contractor' is used in the text as a collective term for both. In some cases the contractor can be the employer of the verifying authority.	APEA/IP
Control Point	A position in a kiosk or other building at an attended self-service filling station from which an attendant can adequately view and supervise activities at the dispensing equipment, activate the equipment and shut it off in an emergency.	HS(G)41
Controlled Waters	River, streams, ditches, other surface water bodies such as canals, estuaries, coastal waters and ground waters.	APEA/IP
Coupling	A device to permit the connection of a pipe or hose to an adapter.	APEA/IP
Deployed Bulk Fuel Installation (DBFI)	For the purpose of this document this is a BFI that has been built and operate by CPTP for the purpose of receipting, issuing and handling fuel in the field.	
Dangerous Occurrence	An occurrence which arises out of, or in connection with, work and is of a class specified in Pt 1 of Schedule 1 of RIDDOR. (These include the release of flammable liquids or LPG from tankers, containers or pipelines).	RIDDOR

Term	Definition	Source
DCD	Driver Controlled Delivery is one where the complete operation of delivering product to the petrol filling station is under the control of the delivery driver without any assistance from the petrol filling station personnel.	
Dip hatch (point)	A covered opening in a tank to permit dipping.	APEA/IP
Dipping	Measurement of the height of fuel in a tank by means of a graduated tape or rod.	APEA/IP
Direct Fill Point	A product entry point, e.g. on an underground tank at a petrol filling station, positioned directly on top of the tank.	APEA/IP
Dispenser	A measuring system similar to a metering pump except that it does not incorporate its own pumping system.	HS(G) 41
Dispensing Equipment	Metering pumps and dispensing equipment installed at filling stations and used to dispense liquid fuel.	APEA/IP
Drainage system	A system for transporting foul and/or surface water to a point of disposal, normally subterranean.	APEA/IP
Dropped suction line	Where it is not possible to arrange a continuous fall from dispenser to tank it is possible to insert a vertical leg with a draw-off pit. The arrangement is referred to as a dropped suction line.	APEA/IP
Drop pipe	A fill pipe fitted vertically inside a tank and reaching to the bottom of the tank, designed to reduce splashing during tank filling and to maintain a liquid seal, so isolating the vapour space.	APEA/IP
Dry break coupling	A coupling designed to minimise the leakage of product when disconnected.	APEA/IP
Duty Holder	For the purpose of this document this is a person with specific delegated responsibilities for satisfying the objectives of the policy through the application of a safety regime of an Installation	
Element Of Construction	Any wall, floor, ceiling, door, roof or window (including the frame) etc that forms part of a building, room or other enclosure.	HS(G)51
Electrical Installation	All electrical/electronic and telecommunications equipment located within the boundaries of the filling station. (This includes cables feeding apparatus located outside the curtilage of the filling station).	APEA/IP
Emission	A release of vapour to the atmosphere.	APEA/IP
Enforcing Authority	The organisation charged with day to day responsibility for ensuring compliance with statutory regulations.	APEA/IP
EPA	United States Environmental Protection Agency.	APEA/IP
Evaporation	Conversion of a liquid to a vapour, without necessarily reaching the boiling point.	APEA/IP
Explosimeter	See combustible gas indicator.	
Explosive	A mixture, under atmospheric conditions, of air and	DSEAR 02

Term	Definition	Source
Atmosphere	one or more dangerous substances in the form of gases, vapours, mists or dusts in which, after ignition has occurred, combustion spreads to the entire unburned mixture.	(HSE ACOP L138)
Faucet	A valve. In the context of mobile containers the valve at the end of the discharge/loading pipe.	APEA/IP
Fire Resistant	A term used to denote a defined standard of resistance to fire exposure. (see BS 476)	APEA/IP
Fire Resisting	A fire-resisting element of construction is one which would have at least the stated period of fire resistance (relating to integrity, insulation and stability/load bearing capacity where appropriate) tested from either side in accordance with BS 476 Pt 8 or Pts 20 to 23:1987. In addition: a. Where 2 or more elements of construction together provide separation, the junction between them should be bonded or fire-stopped to prevent or retard the passage of hot gases, thus giving effective separation between the rooms or spaces on either side. b. Elements of construction should be such that their fire-resisting properties are not impaired by everyday wear and tear. Additional protection, e.g. crash barriers, reinforcing plates or wearing strips, may be required where mechanical damage is foreseeable.	HS(G)51
Fire Wall	A wall, screen or partition erected in the open air to help protect containers of flammable liquid from heat radiating from a nearby fire, and/or ensure an adequate dispersion distance from buildings, boundaries, sources of ignition etc for flammable liquid or vapour leaking from any container.	HS(G)51
Flammable (Synonymous with Inflammable)	Refers to any substance, solid, liquid, gas, or vapour which is easily ignited. The addition of the prefix 'Non' shall indicate that the substances, etc, are not readily ignited, but shall not necessarily indicate that they are non-combustible. Highly flammable products can be defined as those products with a flash point < 31°C	IP Pt7
Flame Arrester	Device built into equipment in order to prevent the unrestricted propagation of flame from within an enclosure to the external surrounding atmosphere.	
Flame Trap	See 'Flame Arrester'	
Flameproof Enclosure "d"	A type of protection where enclosures for electrical apparatus will withstand an internal explosion of the flammable gas or vapour which may enter it, without suffering damage and without communicating the	BS EN

Term	Definition	Source
	internal flammation to the external flammable gas or vapour for which it is designed, through joints or structural openings in the enclosure.	60079-14
Flash Point (Closed Cup)	The lowest temperature at which application of a small flame causes the vapour above a petroleum product to ignite when the product is heated under prescribed conditions in a 'closed' container (See IP Methods 33 and 170).	IP Pt7
Foot Valve	A valve at the base of a mobile container leading to the discharge pipework.	APEA/IP
Forecourt Separator	Part of the forecourt drainage system, which separates light liquid from waste water and retains the light liquid.	APEA/IP
Foul Sewer	A sewer discharging to a sewage treatment works.	APEA/IP
Fueller	(As for Mobile Fueller)	IP Pt7
Fuels, Lubricants And Associated Products (F&L)	Petroleum fuels, lubricants, hydraulic and insulating oils, temporary protectives, liquid coolants, windscreen washing fluids, de-icing and anti-freeze compounds together with components and additives for such products.	Def Stan 01/5
Fully documented procedures	Method statements and procedural statements to describe an activity (such as tank testing). The documentation should explain any equipment operation, the principles of operation and technician activity, making clear description of safe working practices.	APEA/IP
Gas Free	A tank of similar confined space is considered to be gas free if the concentration of combustible vapours present is below one per cent of the Lower Explosive Limit as measured by an accurate combustible gas indicator. Note: Gas free does not mean non-toxic.	
Gauging Device	A device for the measurement of the level of liquid in a tank.	APEA/IP
Ground Power Unit (GPU)	A portable unit for providing electrical power for starting aircraft engines and/or for operating auxiliaries.	IP Pt7
GRP	Glass reinforced plastic.	APEA/IP
Hazardous Area / Place	A place in which an explosive atmosphere may occur in such quantities as to require special precautions to protect the health and safety of the workers concerned is deemed to be hazardous	Directive 1999/92/EC
Hot Work	This includes welding or the use of any flame or electric arc or the use of any equipment likely to cause heat, flame or spark. It also includes caulking, chipping, drilling, riveting and any other heat producing operation, unless it is carried out in such a way as to keep the temperature of the tools and work	IP Pt7

Term	Definition	Source
	below 100°C.	
Hydrant Dispenser	A vehicle used for the delivery of fuel from any hydrant situated at an aircraft loading position to the aircraft and to which there may be structurally attached metering equipment, filters, pipework, hoses and a pump.	SI 1992 No 743
Hydrant Pit	A connecting point for drawing aviation products from a hydrant system.	IP Pt7
Hydrant System	A system which allows for aviation products to be pumped direct from the airfield depot or satellite depot to the parking apron for delivery in bulk to the aircraft.	IP Pt7
Hydrostatic Testing	The testing of a vessel by means of a pneumatic test in which the explosive energy which would be released on failure is reduced by almost filling the vessel with water.	HS(G) 41
Immobilised	A condition of the bulk fuel tanker/refueller/UBRE which prevents it being either immediately driven, towed or pushed clear of a hazardous situation.	
IMDG	The International Maritime Dangerous Goods Code used to cover the carriage of dangerous goods by sea.	
Impact Check Valve	An impact and/or heat activated device which closes to prevent flow from a pressure source and remains closed after activation.	HS(G) 41
Interceptor	A device installed in a surface water drainage system to separate out any petroleum products and thus preventing it reaching public drains, sewers or water courses.	HS(G) 41
Interlock	A safety system that ensures that two or more actions can only take place in a pre-determined system.	APEA/IP
Issuing Authority	The Authority responsible for raising requests for access to petrol filling stations to commence work, and subsequently raising and authorising any additional documentation as a condition of approval to proceed. The issuing authority will invariably be a competent person nominated by the contractor.	APEA/IP
Intrinsically Safe Circuit	An intrinsically safe circuit is one which any electrical sparking that may occur in normal working, under the conditions specified by the certifying authority and with the prescribed components, is incapable of causing an ignition of the prescribed flammable gas or vapour.	
IP Class (This system of classification applies to the bulk storage of F&L Products)	Petroleum products are classified according to their flash points: Class 0 Liquefied petroleum gas (LPG). Class I Products which have a flash point below 21°C.	IP Pt7

Term	Definition	Source
	Class II Products which have a flash point from 21°C to 55°C inclusive. Class III Products which have a flash point above 55°C up to and including 100°C. Unclassified Products which have a flash point above 100°C. Class II and Class III petroleum products may be sub-divided in accordance with the circumstances in which they are handled. Class II (1) or Class III (1) products refer to petroleum handled at a temperature below its flash point. Class II (2) and Class III (2) products refer to petroleum handled at a temperature at or above its flash point. For countries where ambient temperatures are high enough for the handling of petroleum products to rise above 21°C, or in circumstances where products are handled artificially heated, then liquids which as a consequence fall into Class II (2) or Class III (2) should be treated as though they are in Class I.	
Intrinsically Safe Apparatus	Electrical apparatus which are intrinsically safe	BS EN 60079-14
Intrinsically Safe Electrical System	An assembly of interconnected items of electrical apparatus, described in a descriptive system document, in which the circuits or parts of circuits intended to be used in a potentially explosive atmosphere are intrinsically safe	BS EN 60079-14
Intrinsic Safety "i" (ia and ib)	A type of protection based upon the restriction of electrical energy within apparatus and of interconnecting wiring exposed to a potentially explosive atmosphere to a level below that which can cause ignition either by sparking or heating effects. Because the method by which intrinsic safety is achieved, it is necessary that not only the electrical apparatus exposed to the potentially explosive atmosphere, but also other electrical apparatus with which it is interconnected is suitably constructed.	BS EN 60079-14 BS EN 50020
Leak detection system	An automated system for detecting product leaks from tanks and pipework.	
Licensing Authority	The body described in Part 1 Chap 6 for the place in which a filling station is situated.	HS(G) 41
Liquefied Petroleum Gas (LPG)	Commercial butane (i.e., a hydrocarbon mixture consisting predominantly of butane, butylene or any mixture thereof) or commercial propane (i.e., a hydrocarbon mixture consisting predominantly of	RIDDOR

Term	Definition	Source
	propane, propylene or any mixture thereof).	
Lower Explosive Limit	Synonymous with 'lower flammable limit'. It is the minimum concentration of vapour in air or oxygen below which propagation of flames does not occur on contact with a source of ignition.	
Maintenance Management Organisation	The organisation responsible for planning, organising and managing the operation, maintenance and repair of equipment and may include the design and construction of new works. The MMO may be a Contractor, DE or Military.	JSP 375
Manifold	One or more header pipes with branch connections used for collecting or distributing the products to be pumped direct from the airport depot / ship.	IP Pt7
Maximum Capacity	The maximum volume of product authorized to be held in a container/tank. N.B. The authority is the authorising engineer and the quantity is recorded on the tank.	
Maximum Working Capacity	The volume of useable product that can be held in the container/tank. NB This *excludes* tank bottoms.	
Metering Pump	A measuring system designed to dispense liquid fuel into fuel tanks. It contains its own pumping system to draw fuel from a supply tank or tanks.	HS(G) 41
Mobile Fueller (Bowser)	A vehicle designed for the transportation and transfer of aviation products in bulk to or from an aircraft.	IP Pt 7
Monitoring system	A system as used in double skinned containment systems (tanks and pipework) to identify failure of either of the containment walls. Alternatively a system of hydrocarbon sensing devices located in wells, placed so as to detect leakage of petroleum products.	APEA/IP
Mounded Tank	A tank above, or partly in, the ground completely covered by earth, sand, or other suitable material.	IP Pt7
MT Fuelling Installation	Premises at which petrol is dispensed into the fuel tanks of motor vehicles or into containers and which may be operated in one of the following modes: Attendant operated. A filling station where an attendant directly operates and controls the dispensing equipment and the discharge nozzle. Attended self-service. A filling station where customers operate the dispensing equipment which is activated, supervised and may be shut off in an emergency by an attendant in a control point. Unattended self-service A filling station where dispensing equipment is activated and operated by customers without supervision by an attendant.	HS(G) 41
Multi-Load	A load consisting of two or more dangerous substances in:	SI 1992 No 743

Term	Definition	Source
	a. Separate un-compartmented carrying tanks of a road tanker; b. Separate compartments of a compartmented carrying tank of a road tanker; or c. Separate compartments of a compartmented tank container, whether or not carried in conjunction with a substance which is not a dangerous substance.	
Multi-point (off-loading system)	A facility at which more than one hose can be discharged simultaneously from a road tanker into underground storage tanks.	APEA/IP
Nominal Capacity	The overall volume of a container/tank describing the tank/container, e.g. 200 litre drum or 1250 m^3 tank.	
Non-Combustible Material	A material that fulfils the criteria for non-combustibility given in BS 476 Pt 4: 1970. A material which when tested in accordance with BS 476 Pt 11: 1982 does not flame and gives no rise in temperature on either the centre (specimen) or furnace thermocouples.	HS(G)51
Non-Hazardous Area / Place	A place in which an explosive atmosphere is not expected to occur in such quantities as to require special precautions is deemed to be non-hazardous	Directive 1999/92/EC
Non precision test	Any test process not having certification as for a precision test.	APEA/IP
Nozzle	A device for controlling the flow of fuel during a dispensing operation.	HS(G) 41
Off-Set Filling Pipe	A filling pipe for a tank or tank compartment which leads from a tank to a connection point for a road tanker's delivery hose at some distance from the tank.	HS(G) 41
Off-set fill point	A filling point, e.g. on a filling station tank, in which connection for the hose of the delivery vehicle is at some distance from the tank.	APEA/IP
Overfill prevention device	A device designed to shut off automatically and prevent a delivery of fuel overfilling a tank (or compartment of a tank) beyond its maximum working capacity.	APEA/IP
Oil Interceptor (or Separator)	See Interceptor.	
Parking Apron	The area on an airport where aircraft are normally parked for ground service operations.	IP Pt7
Performing Authority	The individual who will physically supervise or carry out work on the petrol filling station. The performing authority is usually an employee of the contractor.	APEA/IP
Permit	A document issued by an authorised person permitting specific work to be carried out in defined areas.	IP Pt7

Term	Definition	Source
Permit to work	A formal written means of ensuring that potentially dangerous tasks are set up and carried out using the correct safety procedures.	APEA/IP
Petrol or petroleum spirit	Petroleum-spirit intended to be used as fuel for motor vehicles, motor vessels or aircraft. When tested in accordance with Petroleum (Consolidation) Act 1928, has a flash point of less than 21°C.	SI 1992 No 743 APEA/IP
Petroleum Fuel	Includes petrol, kerosene, diesel and LPG.	SI 1992 No 743
Personal Protective Equipment	Clothing which is worn in order to prevent contamination of the body or to reduce soiling or damage to underlying clothing.	
Pipeline Capacity	The volume of product required to fill pipelines.	
Pipework	All pipes, lines and fittings (including joints) designed to carry petrol or vapour.	APEA/IP
Poppet valve	A valve mounted in half a coupling that is opened by a protruding member on the other mating half of the coupling.	APEA/IP
Precision Test	Is defined as any tank tightness test which has the capability of detecting a leak rate of 380 ml/hr with a probability of at least 95% whilst operating at a false alarm rate of 5% or less. Precision tests take into account such variables as the thermal expansion of the stored product, evaporative losses, the compressibility and thermal expansion of any other medium being used and the effects of other variables including groundwater levels and properties of the medium surrounding the tank.	APEA/IP
Pressure / Vacuum valve (P/V valve)	A dual purpose valve which automatically prevents excessive positive or negative pressure in the tank or pipe to which it is connected.	APEA/IP
Public Highway	A street external to the airfield or Naval Base used by the public for general traffic of all descriptions.	IP Pt7
Remote Pump	An electrically driven suction pump assembly mounted above or adjacent to a supply tank and remote from a dispensing facility. The inter-connection is made by a pressurised delivery pipe protected by a leak detector valve or by other means.	HS(G) 41
Requirements for Electrical Installations	This document otherwise known as BS 7671, 1992 the IEE Wiring Regulations, 16th Edition, while not statutory is widely recognised as a code of practise likely to achieve compliance with relevant aspects of The Electricity at Work Regulations 1989. BS 7671 does not deal with fire and explosion hazards for which reference should be made to various Parts of BS 5345 or BS EN 60079.	APEA/IP
Respiratory Protection Equipment	A device which ensures that the wearer has a continuous supply of pure air through a face mask, helmet or mouthpiece.	IP Pt7

Term	Definition	Source
Responsible Person	For a dangerous occurrence in connection with a pipeline, the owner of the pipeline; for other facilities, the person for the time-being having control of the premises at which a dangerous occurrence happened.	RIDDOR
Restricted Area	A temporarily defined area which may or may not be in an existing hazardous area, in which there is increased hazard due to spillage, defects in installation or the type of maintenance operations to be carried out.	
Risk Assessment	Risk assessment is a process of recognising a hazard, estimating its likelihood of occurring and the possible consequences, then implementing appropriate control measures to remove the hazard or mitigate the consequences.	APEA/IP
Road tanker	A mobile road vehicle equipped with a tank containing two compartments or more for transporting and delivering fuel to a petrol station where it off-loads under gravity head.	APEA/IP
Runway	A prepared strip for the take-off and landing of aircraft	IP Pt7
Safe Area	See Non-Hazardous Area.	
Safety Method Statement	AN acknowledgement of the risks and intended precautions relating to a task. Performing Authorities must agree in writing to comply with the relevant SMS before being allowed to commence work.	APEA/IP
Secondary containment	A means to prevent loss of liquid product in the event of a leak or spill.	APEA/IP
Separator	A device installed in a surface water drainage system to separate out any petroleum products and thus prevent them reaching public drains, sewers or water courses. Now normally referred to as an oil separator.	APEA/IP
Servicing	Any maintenance task carried out on a bulk fuel tanker/refueller/UBRE (less the bulk fuel container, associated pipe work or dispensing equipment) which does not require either hot work or the equipment to be immobilised.	
Silt Trap	A containment facility for settleable waterborne particles.	APEA/IP
Single (off-loading) point	A facility at which only one mobile container can be off loaded at once.	APEA/IP
Site records	Permanent records, retained at the petrol filling station, including such details as the equipment installed, repairs, modifications and replacements carried out and the results of all inspection and testing of the electrical installation.	APEA/IP
Slide valve	A valve positioned in a manifold pipe system which slides shut when the vapour hose to the delivery vehicle is connected, thus closing off the line to the P/V valve on the petrol filling station. Removing the vapour hose opens the slide valve.	APEA/IP

Term	Definition	Source
Source of Ignition	Naked lights, flames, fires, exposed incandescent material, electrical welding arcs, electrical equipment of an unapproved pattern, or a spark or flame produced by any other means. Note: Any surface, such as a hot exhaust pipe, heated above the ignition temperature of a flammable petroleum vapour and air mixture may also constitute a source of ignition.	IP Pt7
Split delivery	A delivery of petrol to a petrol filling station in which the compartment is only partially emptied.	APEA/IP
Stage 1a	The control of vapour emissions during petrol storage and when loading at a refinery or terminal.	APEA/IP
Stage 1b	The control of vapour emissions during the filling of a storage tank at a petrol filling station.	APEA/IP
Stage 2	The control of vapour emissions during the filling of an automobile fuel tank at a petrol filling station. The two methods most widely used to achieve this are: a. Active system, in which a vapour pump installed within the dispenser or located remotely from it (centralised) is used to drive vapour from the vehicle fuel tank to the underground storage tank; b. Passive System, non-assisted system which relies on pressure differential to drive vapour from the vehicle fuel tank to the underground storage tank.	APEA/IP
Statutory Authorities	Environment Authority River Purification Board Department of the Environment (Northern Ireland) Regional Water Companies Local Authorities (as agents for water companies) Scottish Regional Councils SEPA	APEA/IP
Spark Arrestor	A device which is capable preventing the emission into the free air of incandescent particles such as carbon from the exhaust systems of internal combustion engines. It should be noted that a spark arrestor is not necessarily a flame arrestor.	IP Pt7
Stock	The volume of product in container/tank *including* tank bottoms and pipeline capacity held on accounting (inventory) records.	
Submersible Pump	An electrically approved pump immersed in the liquid fuel storage tank.	HS(G) 41
Surface water sewer	A sewer discharging to a river or stream.	APEA/IP
Tank Bottom	The volume of product at the bottom of a tank that is not useable.	
Tank Container	A tank, whether or not divided into separate compartments, having a total capacity of more than 3	SI 1992 No 743

Term	Definition	Source
	m³ (other than the carrying tank of a road tanker).	
Tank Contents	The amount of product contained in the tank *including* tank bottoms.	
Tanker stand	Position on a forecourt where a delivery tanker is located during the unloading process.	APEA/IP
Taxiway	A path normally used by aircraft between the runway and the parking system.	IP Pt7
Topping off	The act of filling a car fuel tank up to the top of the filler neck beyond the normal nozzle cut-off point, by lifting out the nozzle slightly and reopening the fill valve.	APEA/IP
Ullage	The difference in volume between the maximum capacity of a tank and the tank contents.	
Unattended Self service	A petrol filling station where dispensing equipment is activated and operated by customers without supervision by an attendant.	APEA/IP
UN Class (The UN System applies to the storage of packed stocks and for transportation)	Class 3 – Flammable Liquids Liquids, or mixtures of liquids, or liquids in solution or suspension which give off a flammable vapour at or below 61°C closed cup test. Class 3 is subdivided further, namely: Class 3.1 Low flash point group of liquids having a flash point below -18°C closed cup test. Class 3.2 Intermediate flash point group of liquids having a flash point of -18°C up to but not including 23°C, closed cup test. Class 3.3 High flash point group of liquids having a flash point of 23°C up to, and including, 61°C, closed cup test. Substances which have a flash point above 61°C, closed cup test, are not considered to be dangerous by virtue of their fire hazard.	IMDG Code ADR IATA ACL
Vapour Balancing	A system which allows vapour displaced from storage tanks during the delivery of petrol from a road tanker to be directed to the tanker via a vapour return hose. It ensures there is minimal discharge of vapour to atmosphere during tanker delivery.	HS(G) 41
Vapour Collection System	The pipe work and associated equipment used to connect vapour emission sources and feed them to a central collection point for eventual disposal or recovery.	APEA/IP
Vapour Generation	The production of hydrocarbon vapour by evaporation of a volatile product. This can occur during filling of the tank or when the tank is undisturbed during	APEA/IP

Term	Definition	Source
	periods when dispensing has stopped.	
Vehicle wash separator	Part of the vehicle wash system, comprising at least two chambers, which separates the settleable solids from the waste water and retains the settled solids.	APEA/IP
Verifying Authority	The authority for approving requests for access to petrol filling stations to commence work. This may be the developer's engineer or the nominated person employed by the contractor.	APEA/IP
Volatile Organic Compound (VOC)	Compound containing at least one carbon atom and which in liquid form readily evaporates at ambient temperature.	APEA/IP
Work control procedures	A system designed to ensure that installation and maintenance work on petrol filling stations is carried out safely and without risks to health.	APEA/IP
Working Stock	The volume of product in container/tank that can be used. NB this *excludes* tank bottoms and pipeline capacity.	
Zoning	Hazardous places are classified in terms of zones on the basis of the frequency and duration of the occurrence of an explosive atmosphere Zone 0 – A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour, or mist is present continuously or for long periods frequently. Zone 1 - A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour, or mist is likely to occur in normal operation occasionally Zone 2 - A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour, or mist is not likely to occur in normal operation but, if it does occur, will persist for a short period only.	DSEAR 02 (HSE ACOP L138)

Part 1

Chapter 4 (Sponsor Log Comm – DF&FS)

PRODUCT IDENTIFICATION SYSTEM

SECTION 1 – GENERAL

1.4.01. The purpose of marking and identification is to avoid confusion or errors which might lead to an incident concerning fire, injury to personnel, equipment or pollution.

1.4.02. All markings are to be clear, durable, not readily altered or obliterated (taking into account chemical corrosion) and positioned where they can easily be seen and read.

1.4.03. The use of paper or cardboard labels is to be avoided.

1.4.04. The product markings in this chapter are mandatory when specified in a contract or order, either by direct reference to this JSP or direct reference *Def Stan 05-52*.

SECTION 2 – IDENTIFICATION SYSTEM OUTLINE

GENERAL

1.4.05. NATO codes for petroleum products are allocated to those products which are standardised by the NATO Military Agency for Standardisation (MAS). The code consists of an index letter followed by a number, e.g. F-67. This code, when applied as an identification marking on containers, dispensing equipment, bulk carrying vehicles and installations, is enclosed in a rectangle, unless manufacturing processes preclude the use of boxed text due to font size.

1.4.06. The use of the NATO Code number ensures that units may exchange standardised petroleum products with other NATO forces without recourse to further technical advice on the use of the product concerned.

1.4.07. When a batch of product has been found to fail its specification requirements, the NATO Code markings must be cancelled by painting a diagonal line through the marking. The colour of the line is to contrast with the main container colour. All containers of the same failed batch are to be similarly marked. The product may continue to be used but only if authorised by the nominated petroleum laboratory or Chemical Laboratory Assistant (CLA). The product must not be exchanged with other NATO forces.

1.4.08. The NATO Code is not to be confused with the NATO Stock Number (NSN) which is a stores ordering code.

WARNING

1.4.09. The information contained within this chapter will only concern itself with the application of the product identification markings, it in no way absolves the supplier or user from the statutory obligations relating to Health and Safety at any stage of manufacture, use or in storage.

SECTION 3 – PRINCIPLES OF THE MARKING SYSTEM

1.4.10. Inks and/or paints used to mark containers are to be compatible with the metal, paint, wood and/or fibreboard used in the manufacture of the container or over pack.

1.4.11. Adhesives used for the attachment of labels shall be compatible with the metal, paint, plastic, wood and/or fibreboard used in the manufacture of the container or over pack.

1.4.12. The durability of the inks, paints, labels used for the markings shall be resistant to the product in the container and also to the other products as referred to in *Def Stan 01 – 5*.

1.4.13. Inks, paints, labels are to be resistant to fading caused by light, ageing or other agents and processes and shall be resistant to damage by impact, fretting or abrasion.

1.4.14. Product markings are not to be obscured by any additional marking applied in conformity with statutory regulations.

SECTION 4 – APPLICATION OF PRODUCT IDENTIFICATION MARKINGS

CONTAINERS HOLDING 210 LITRES OR LESS

1.4.15. There are two general categories of containers for petroleum products :

a. Returnable containers which are accounted for in the fuel and lubricants account.

b. Non-returnable containers which are non-accountable.

1.4.16. To readily identify the contents of a particular container, the product information is to be marked on the container. The markings to be applied for serviceable products are given in Tables 1.4.1 to 1.3.6. Markings for containers holding waste products are given at paragraph 1.4.17.

Table 1.4.1 - Jerricans - Markings - Depot Filled
The contents will be indicated by an appropriate jerrican identification label. The label will be colour coded according to the product and will be annotated with the abbreviated product designation, Batch Number, Proper Shipping Name, UN Class 3 Danger Sign (F Mov 255 (Small)) and the Environmentally Hazardous Substances warning label must also be displayed (in accordance with JSP 800 Vol 4b - Dangerous Goods by Road, Rail and Sea). These are shown in Annex A. On no account are identification labels to be removed.

Table 1.4.2 - Jerrican Product And Grade Identification Clips
The range of colour coded metal wrap around identification clips used on depot and unit filled jerricans are to be identified by the colour coded clips shown at Annex B.

Table 1.4.3 - Drums 205/210 Litres – Markings	
A	Joint Service Designation
B	NATO Symbol/Number
C	Packing date or re-inspection date
D	Batch Number
E	Consignor (name of packing unit or contractor)
F	Quantity (in Litres)
G	Specification
H	Part Number (if applicable)
I	Contract Number
The information is to be stencilled on the bung end of the drum only. Additional movement and safety data markings are to be stencilled or adhesively fixed on the side wall of the drum.	
The size of the stencil is to be 25 mm with the exception of the NATO symbol which is to be 38 mm.	

Table 1.4.4 - Packed F&L Products In Small Containers
Packed F&L products which are in small containers are to be marked, where possible, with sufficient information to facilitate the correct identification and batch control of the product. This will usually include the batch number, description of the product, fill date and date of next test.

WASTE PRODUCTS

1.4.17. Waste products should be collected and mixed only in accordance with the groupings identified in Part 3, Chapter 4, Annex A. The different groups of waste products should be stored in containers marked clearly and 2 examples are shown below. The description of the contents should reflect the group headings as appropriate in accordance with the table shown in Part 3, Chapter 4, Annex A. As per the examples below, the group heading is to be pre-fixed with the word ‘WASTE’ and suffixed by the word ‘ONLY’. The Disposal Services Authority (DSA) website is also available for further information.

Note: All containers holding waste fuel should be marked with a red cross as shown.

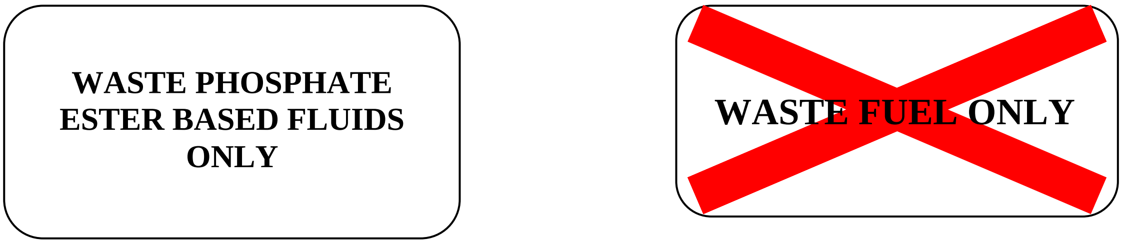


Figure 1.4.01

PACKED AND BULK FUEL CARRYING VEHICLES

1.4.18. Service vehicles that carry petroleum products are required to display symbols/ signs that warn other road users of the dangerous cargo and to assist the emergency services in the event of a spillage/fire. Details of the legal requirements in this regard are to be found in JSP 800, Volume 4b *"Dangerous Goods by Road, Rail and Sea"*.

1.4.19. **Product Grade Signs**. These signs are used to assist in the military identification of the product carried in BFCVs. Examples of these signs can be found within Annex C. Product grade signs are to be displayed as follows:

a. **Rear Line Support Tankers[1] and Aircraft (ac) Refuellers**. The sign is 375 mm in diameter and is positioned in a central position on each side of the tank body.

b. **Front Line Support Tankers[2]**. The Front Line Support Tankers product 150 mm sign is to be used and positioned as follows:

(1) Single Product Role. One sign is to be positioned in central position on each side of the tank body.

(2) Dual Product Role (UBRE only). Each tank must have the signs relevant to its contents displayed centrally on both sides.

1.4.20. **Colour Coding**. Colour coding is used as an aid to identifying products being carried on a vehicle and assists in avoiding possible contamination of products with vehicles employed in a dual fuel role. All inlet and outlet orifices of the equipment whether fuel it carries will be required to be colour coded with the fuel identification colour being carried. These are as follows:

a. All nozzles and hose ends that connect the nozzles.

b. All valves (caps/covers are not to be painted as these can become detached and interchanged).

c. Top Hatches.

d. Lay flat hoses (on the Avery Hardoll valves).

Units are to apply the colour coding with a degree of restraint i.e. a 25 mm (1") band around valves/hoses and the painting of top hatch handles in the appropriate colour code is sufficient.

[1] For the purpose of this document; the Close Support Tanker (CST), General Support Tanker (GST) and Airfield Support Tankers are classed as Rear Line Support Tankers (RLST).[2] For the purpose of this document; the Unit Support Tanker (UST), Fuel Dispensing Rack (FDR) and the Unit Bulk Refuelling Equipment (UBRE) are classed as Front Line Support Tankers (FLST).

1.4.21. **Multi-National Operations**. It should be noted that the colour coding used by other nations differs greatly from that used in the UK Armed Forces. As such, the colour coding of pipe work and facilities should not be taken as the only indicator of product grade and the NATO code for the product should always be checked before other nations F&L products are received. Info on UK code colours is avail from DefStan 05-52 (Part2). Info on NATO codes is taken from STANAG 1135.

PRODUCT MARKINGS – MILITARY PIPELINES

1.4.22. Permanent high-pressure pipelines are normally configured to pump large quantities of fuel over a great distance by means of Multi Product Pumping (MPP). Temporary pipelines are not marked as they get broken down and reused for different products.

1.4.23. However, on deployed Operations, it may be necessary to take over the operation of an existing single grade high pressure pipeline. If such action is required, *Def Stan 05 – 52 (Part 2)* is to be referred to.

1.4.24. For TFHE/JOFS pipelines, there is no requirement for product marking.

1.4.25. Permanent pipelines are to be identified at every junction, valve and ground penetration in accordance with Def Stan 05-52 (Part 2). The standard excludes equipment at Naval Bulk Fuel Depots and for replenishment at sea.

ABOVE GROUND TANKS

1.4.26. All above ground tanks are to be marked with the NATO Product and Grade Identification Markings as listed in Annex C. The markings shall be visible from all directions. (This does not apply to DBFIs).

1.4.27. Class I tanks shall be marked 'Highly Flammable' in accordance with the *Highly Flammable Liquids and Liquefied Petroleum Gases Regulations, 1972*.

1.4.28. Class I and Class II tanks shall be marked 'Flammable Liquid', 'No Smoking', 'No Naked Lights' in accordance with *HS[G] 176 The Storage of Flammable Liquids in Tanks*.

1.4.29. Additional signage may be required to comply with *Health and Safety [Safety Signs and Signals] Regulations 1996.*

BULK FUEL INSTALLATIONS

1.4.30. All primary pipe work is to be identified at every junction, valve, pump separator, monitor and ground penetration in accordance with Def Stan 05-52 Part 2. In addition, arrows shall be added to identify the direction of flow.

1.4.31. All receipt and dispense points shall be marked in accordance with Def Stan 05-52 (Part 2).

1.4.32. At installations that have above ground unprotected tankage, the requirements of paragraphs 1.4.26 - 1.4.29 apply.

MECHANICAL TRANSPORT FUELLING INSTALLATIONS

1.4.33. Where above ground tanks are installed, the requirements of paragraphs 1.4.26 – 1.4.29 apply.

1.4.34. Metering pumps/dispensers shall be marked with the NATO Product and Grade Identification Marking as stated in Annex C.

1.4.35. Reference should be made to DMG 14 Mechanical Transport Fuelling Installations for additional signage requirements.

1.4.36. Each direct filling or offset filling pipe is to be marked so as to be identifiable with its associated tank or compartment and to show the type of fuel which its associated tank or compartment is used for.

1.4.37. The markings are to be as close as possible to the connection for the delivery hose from a road tanker.

BIBLIOGRAPHY

1. Def Stan 05-52 (Part 2) Markings for the Identification of Fuels, Lubricants and Associated Products.

2. Highly Flammable Liquids and Liquefied Petroleum Gases Regulations 1972.

3. HS[G]176 The Storage of Flammable Liquids in Tanks.

4. Health and Safety [Safety Signs and Signage] Regulations 1996.

5. DMG 14 Mechanical Transport Fuelling Installations, Defence Estates.

6. JSP 800, Vol 4b, Dangerous goods by Road, Rail and Sea

7. NATO Standardisation Agreement 1135; Interchangeability of Fuels, Lubricants and Associated Products.

JERRICAN HAZARD AND PRODUCT LABELS

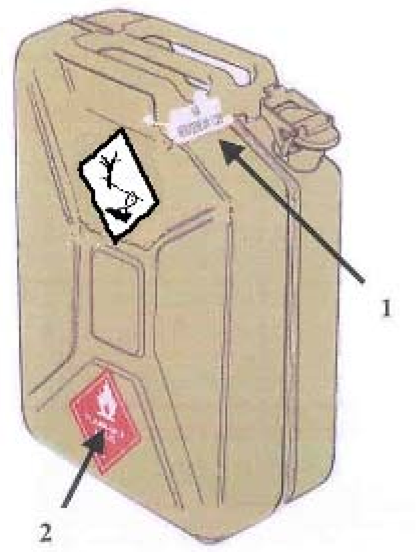


Figure 1.4.02

Figure 1.4.03

Figure 1.4.04

Figure 1.4.05

KEY:

1. Colour coded (Gasoline - Red, KERO - Grey, ULGAS - Eau de Nil, and diesels - Yellow) metal wrap around label showing Joint Service Designation, NATO Product Classification, and UN Number. See Annex B.
2. UN Class 3 Danger Sign (F Mov 255 (small))
3. The Plastic Seal will only be on the lids of Jerricans filled at DSDA West Moors. The seal is a 'zip tie' with a label on one end showing the batch fill data, and matches the colour of the metal label. The seal cannot be replaced once it has been broken. See Figure 1.4.01.

JERRICAN PRODUCT & GRADE IDENTIFICATION CLIPS

Figure 1.4.06 – DIESO UK, Depot Filled.
NSN: 40R 9905-99-767-3032 *(note 1)*
Pantone colour 1235C *(note 3a)*
BS 381C colour 356 Golden Yellow *(note 3b)*

Figure 1.4.07 – DIESO UK, Unit Filled.
NSN: 40R 9905-99-433-3092
Pantone colour 1235C *(note 3a)*
BS 381C colour 356 Golden Yellow *(note 3b)*

Figure 1.4.08 – DIESO MT, Depot Filled. (*Note 4)*
NSN: 40R 9905-99-845-9038 *(note 1)*
Pantone colour 1235C *(note 3a)*
BS 381C colour 356 Golden Yellow *(note 3b)*

Figure 1.4.09 - DIESO MT, Unit Filled.
NSN: 40R 9905-99-270-7856 *(note 1)*
Pantone colour 1235C *(note 3a)*
BS 381C colour 356 Golden Yellow *(note 3b)*

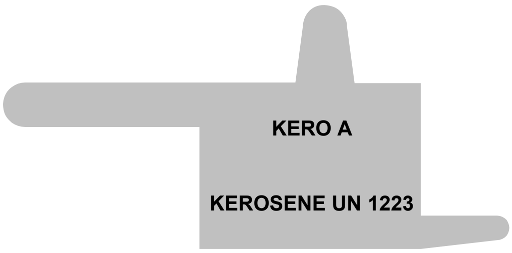


Figure 1.4.10 – KERO A, Depot Filled.
NSN: 40R 9905-99-297-6209 *(note 1)*
Pantone colour 444C *(note 3a)*
BS 381C colour 637 Medium Sea Grey *(note 3b)*

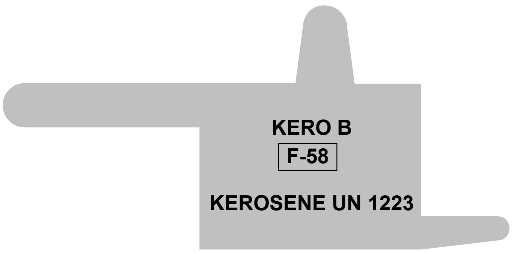


Figure 1.4.11 – KERO B F-58, Depot Filled.
NSN: 40R 9905-99-282-2259 *(note 1)*
Pantone colour 444C *(note 3a)*
BS 381C colour 637 Medium Sea Grey *(note 3b)*

Figure 1.4.12 – DIESO KT, Unit Filled. *(note 2)*
NSN: 40R 9905-99-474-5691 *(note 1)*
Pantone colour 302C *(note 3a)*
BS 381C colour 109 Middle Blue *(note 3b)*

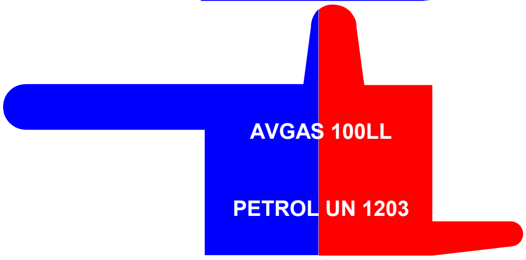


Figure 1.4.13 – AVGAS 100LL, Depot Filled.
NSN: 40R 9905-99-391-1675 *(note 1)*
Pantone colours 179C / 302C *(note 3a)*
BS 381C colours 537 Signal Red / 109 Middle Blue *(note 3b)*

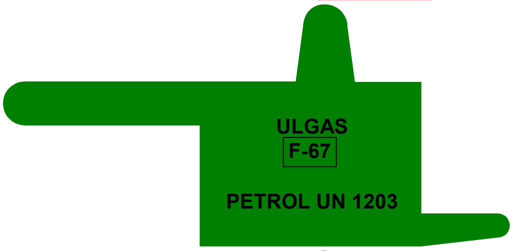


Figure 1.4.14 – ULGAS F-67, Depot Filled.
NSN: 40R 9905-99-256-5081 *(note 1)*
Pantone colour 577C *(note 3a)*
BS 381C colour 216 Eau-de-Nil *(note 3b)*

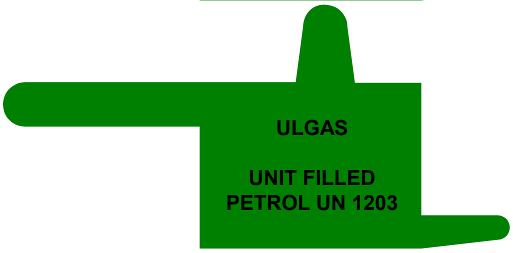


Figure 1.4.15 – ULGAS, Unit Filled.
NSN: 40R 9905-99-752-1047 *(note 1)*
Pantone colour 577C *(note 3a)*
BS 381C colour 216 Eau-de-Nil *(note 3b)*

Notes:

1. For GLOBAL System NSN, replace DMC prefix of 40R with POL.

2. When Single Fuel Policy fuel (F-34) is used in Theatre as ground fuel, it is packed as DIESO KT.

3. To aid accuracy when printing labels, signage, documents, etc,

   a. For printing purposes, the 'Pantone' colour reference number is included.

   b. For paint purposes, the British Standard colour reference (BS 381C) is included.

4. Jerricans filled at the Petroleum Depot West Moors will always contain the winter grade of DIESO MT to the latest BS EN 590 specification.

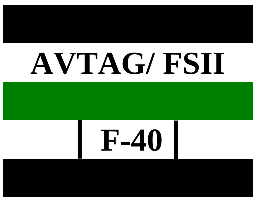
NATO PRODUCT AND GRADE IDENTIFICATION MARKINGS

1. The DF&FS in liaison with the GS PT has arranged the codification of the full range of product identification flashes. Units requiring product flashes should contact DF&FS- FGSE Section, Tel: 94379 4302) for the latest update.

Figure 1.4.16

AVTAG/FSII
F-40

375 mm



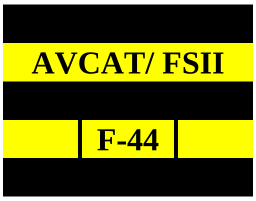
Green Bar: Pantone Colour 576C
BSC 381Colour 218 Green Grass

NSN: 9905-99-5513753

Figure 1.4.17

AVCAT/FSII
F-44

375 mm



Yellow Bars: Pantone Colour 1235C
BSC 381Colour 356 Golden Yellow

NSN: 9905-99-7367289

Figure 1.4.18

AVTUR/FSII
F-34

375 mm

Black and White

NSN: 9905-99-2196885

Figure 1.4.19

AVTUR F-34

375 mm
Reduced to non-aviation use only

Red Cross: Pantone Colour 179C
BSC 381Colour 537 Signal Red

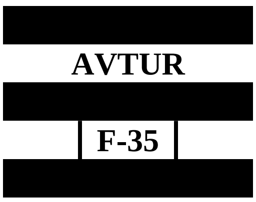
NSN: 9905-99-8964514

(As per fig 1.4.14 with red cross)

Figure 1.4.20

AVTUR F-35

375 mm



Black and White

NSN: 9905-99-9935063

Figure 1.4.21

Marine Diesel
F-76

150 mm

Pantone Colour 161C
BSC 381Colour 411 Middle Brown

NSN: 9905-99-2509200

Figure 1.4.22

Marine Diesel
F-76

375 mm

Pantone Colour 161C
BSC 381Colour 411 Middle Brown

NSN: 9905-99-8447431

Figure 1.4.23

FFO 3/50

375 mm

Pantone Colour 161C
BSC 381Colour 411 Middle Brown

NSN: 9905-99-3854355

Figure 1.4.24

DIESO UK
(Tax Free)

150 mm

Pantone Colour 1235C
BSC 381Colour 356 Golden Yellow

NSN: 9905-99-7300535

Figure 1.4.25

DIESO UK
(Tax Free)

375 mm

Pantone Colour 1235C
BSC 381Colour 356 Golden Yellow

NSN: 9905-99-1599284

Figure 1.4.26

DIESO MT
F-54

150 mm

Pantone Colour 1235C
BSC 381Colour 356 Golden Yellow

NSN: 9905-99-2640591

Figure 1.4.27

DIESO MT
F-54
375 mm

Pantone Colour 1235C
BSC 381Colour 356 Golden Yellow

NSN: 9905-99-5513754

Figure 1.4.28
ULGAS F-67
(Unleaded)
150 mm

Pantone Colour 577C
BSC 381Colour 216 Eau-de-Nil

NSN: 9905-99-6666576

Figure 1.4.29

ULGAS F-67
(Unleaded)

375 mm

Pantone Colour 577C
BSC 381Colour 216 Eau-de-Nil

NSN: 9905-99-6765160

Figure 1.4.30

AVGAS

375 mm

Background: Pantone Colour 179C
BSC 381Colour 537 Signal Red
Stripe: Pantone Colour 302C
BSC 381Colour 109 Middle Blue

NSN: 9905-99-2129315

Figure 1.4.31

DIESO KT
F-63

150 mm

Pantone Colour 302C
BSC 381Colour 109 Middle Blue

NSN: 9905-99-4713804

Figure 1.4.32

DIESO KT
F-63

375 mm

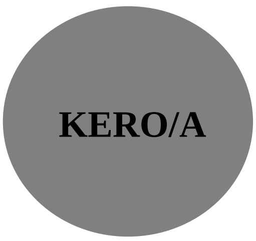
Pantone Colour 302C
BSC 381Colour 109 Middle Blue

NSN: 9905-99-6666577

Figure 1.4.33

KERO/A
(Indoor use)

375 mm



Pantone Colour 444C
BSC 381Colour 637 Medium Sea Grey

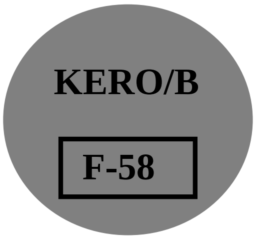
NSN: 9905-99-3680893

Figure 1.4.34

Pantone Colour 444C

KERO/B

375 mm



BSC 381Colour 637 Medium Sea Grey

NSN: 9905-99-2259501

Part 2

Chapter 1 (Sponsor DSEA FGSR)

HEALTH AND SAFETY – GENERAL

SECTION 1 – INTRODUCTION.

2.1.01. The purpose of the *Health & Safety at Work Act 1974 (H&SWA)* is to provide the legislative framework to promote, stimulate and encourage high standards of health and safety in the working environment. The H&SWA requires that all persons whilst at work shall take reasonable care of their own health and safety and that of any person or persons who may be affected by their acts or omissions. To this end it is incumbent on both staff and management to promote, stimulate and encourage high standards of health and safety at work.

2.1.02. There is no exemption in law for the MOD or the Services from the duties imposed by the H&SWA, or from Regulations made under it. In order to ensure that defence requirements are given appropriate recognition in relation to Health and Safety (H&S) legislation, MOD has entered into administrative arrangements with the Health and Safety Executive (HSE) to define its activities throughout the MOD. JSP 375 gives the appropriate details of these arrangements and details the requirements for managers, commanders and employees (service and civilian) with regards to the H&SWA.

2.1.03. This part of JSP 317 draws together areas of particular concern under the heading of H&S as this applies to the handling and storage of fuels and lubricants within the MOD. This information is not exhaustive and must be read in conjunction with the relevant Regulations, Codes of Practice, and other publications referred to in the text.

SECTION 2 – H&S FOCAL POINTS

2.1.04. The focal point responsibility for H&S for each Service rests with the respective Command Environment and Safety Officer (CESO). MOD H&S policy and information can be found in JSP 375, further advice and guidance may be obtained from the respective H&S CESOs.

SECTION 3 – RISK ASSESSMENTS

2.1.05. All processes / activities involving Fuel & Lubricants (F&L) i.e. storage, handling, distribution, and maintenance of systems / plant, containing F&L, are potential hazardous activities. In accordance with current legislation these processes require a risk assessment. The procedures for identifying the hazards and subsequent implementation of risk assessments is detailed in JSP 375 (leaflet 39).

SECTION 4 – DANGEROUS SUBSTANCES & EXPLOSIVE ATMOSPHERES REGULATIONS 2002 (DSEAR 02)

2.1.06. DSEAR 02 aims to protect the safety of workers and others that may be at risk from dangerous substances that can cause fire or explosion. DSEAR 02 is the framework adopted by the UK Government (HSE) to facilitate compliance to the *ATEX 137 (99/92/EC) Directive*. The UK *Equipment Protective Systems Regulations* (EPS 96), originated from the *ATEX 100a (94/9EC) Directive*. The EPS 96 regulations require electrical and non-electrical products to be compliant for their intended use in the relevant Hazardous Zone. DSEAR 02 is designed to complement EPS 96 regulations. The requirements of DSEAR 02 and EPS 96 are summarised in leaflet 56 of JSP 375, Vol 2.

2.1.07. For all Bulk Fuel, Packed F&L storage installations and distribution facilities there is a requirement for the following, to ensure compliance with DSEAR 02, which is a Statutory Requirement:

a. An initial risk assessment detailed at JSP 375 Vol 2 Sect 6 leaflet 56 iaw MOD Form 5014 Part 1 and 2, identifying whether the potential for an explosive atmosphere exists shall be held by the Operating Authority.

b. If an explosive atmosphere does exist; then a risk assessment as detailed in JSP 375 Vol 2 Sect 6 leaflet 56, iaw MOD Form 5014 Part 3 to Part 8 & MOD Form 5014a shall be completed, including a plan showing the boundaries of hazardous zones, shall be held by the Operating Authority.

c. Demonstrate that all machinery (mechanical and electrical) and portable equipment used in hazardous areas is identified as fit for purpose for the respective zones, is correctly maintained, and is asset tracked in iaw DSEAR regulations.

Note: Production of a Hazardous Area Classification Drawing only, IS NOT compliance of the DSEAR 02 Statutory Requirement but is required as part of a DSEAR Risk Ass*essment.*

2.1.08. DSEAR 02 defines a “hazardous area / place” as a place where an explosive atmosphere may occur in quantities that require special precautions to protect the health and safety of workers. (Special precautions mean precautions to control potential ignition sources within a hazardous area, particularly in relation to the construction, installation, and use of equipment). To avoid confusion; the term “hazardous area” or “zoned area” should only be used in the context of DSEAR 02 compliance and should not be used as a generic terminology to identify fuelling areas and bulk / packed stock fuel storage areas.

2.1.09. Once completed, a site Hazardous Area Classification Drawing shall identify site specific areas, encompassing buildings, plant, infrastructure, and equipment (permanent and portable) (ELECTRICAL and MECHANICAL). Therefore all completed Hazardous Area Classification Drawings shall be held by the Design Organisations (DIO), Management Maintenance Organisations (MMO), Authorised Engineers (AE), Authorised Persons (AP), Regional Prime Contractors (RPCs), 170 Gp Infra RE, and Operating Authorities as appropriate, to ensure that the maintenance of subject electrical and mechanical equipment (permanent and portable) / plant./ infrastructure is identified, is asset tracked, and maintained in accordance with the regulations.

DSEAR 02 RISK ASSESSMENT CONSIDERATIONS FOR BULK FUEL, PACKED F&L STORAGE INSTALLATIONS, AND DISTRIBUTION FACILITIES

2.1.10. For the purpose of the DSEAR 02 Risk Assessment in bulk fuel, packed F&L storage installations and distribution facilities, explosion risk concept can in practice be assessed by the means of six generic questions. The first 4 questions are used to determine in principle whether there is an explosion risk; and whether explosion protection measures are necessary at all.

2.1.11. If an explosion risk has been established, the last 2 questions determine whether the proposed protective measures limit the explosion risk to an acceptable level. The question sets are as follows:-

2.1.12. **Are flammable substances present? (1)**

a. Flammable substances can be present as raw material, fuel for platforms or equipment, waste, a product requiring to be distributed, or the result of a common malfunction (spill). (A spill where the entire contents of a bulk container are emptied is deemed to be a catastrophic failure of the system. This is not classified as a common malfunction, and is not covered within this chapter).

2.1.13. **Can sufficient dispersal in air give rise to an explosive atmosphere? (2)**

a. An explosive atmosphere can exist if the necessary degree of dispersion and concentration of flammable substances in air is present. By their very nature fuel vapours have a sufficient degree of dispersion. Other considerations of F&L are:

(1) Upper and Lower Explosion Limits (UEL, LEL) of F&L.

(2) Flash point of F&L.

(3) Working or ambient temperatures.

(4) Physical state of F&L (mist, aerosol, spray). Vapour is flash point dependant. Mist / aerosols are not, i.e. explosive atmospheres can form below the F&L flashpoint when in mist / aerosol form.

2.1.14. **Where can explosive atmospheres occur? (3)**

a. The properties of F&L must be identified. F&L vapours, mists etc are heavier than air and will spread out, sink, and accumulate in trenches, bunds, and ditches.

2.1.15. **Is the formation of a Hazardous Explosive Atmosphere possible? (4)**

a. If yes to the above, then explosion protection measures are necessary by limiting the formation of Hazardous Explosive Atmospheres as far as possible.

2.1.16. **Is the formation of Hazardous Explosive Atmospheres reliably prevented? (5)**

a. This is the basis of risk assessment i.e. remove the hazard. If this is unfeasible (as in the case of bulk fuel, packed F& L storage installations, and distribution facilities), then control mechanisms must be in place. Use of substitutes, inerting, limiting concentrations, gas alarms, design of plant, maintenance regimes, and good housekeeping should be considered.

2.1.17. **Is the ignition of Hazardous Explosive Atmospheres reliably prevented? (6**)

a. The probability that a Hazardous Explosive Atmosphere and a source of ignition will coincide is to be estimated. The result of which will define the requirement of Hazardous Area Classification (Zoning). This is described fully in Part 2, Chapter 3.

2.1.18. A generic checklist is enclosed at Annex A to assist operators of bulk fuel, packed F&L storage installations, and distribution facilities in assessing the existing explosion protection strategy on the basis of targeted questions and to take any further action necessary.

SECTION 5 – ASSESSING THE RISK

2.1.19. The requirement to assess the risks from dangerous substances (F&L) in bulk fuel, packed F&L storage installations, and distribution facilities should not be considered in isolation. It should be carried out as part of the generic risk assessment process as detailed in JSP 375. However the DSEAR element of the risk assessment must consider the following. (An example of a DSEAR risk assessment, using the existing template contained within JSP 375).

a. The hazardous properties of the F&L (Annex B, note 1).

b. Information on safety provided by the supplier, including information contained in any relevant safety data sheet. (Annex B, note 2).

c. The circumstances of work including:-

(1) Work process and substances used and their possible interactions.

(a). The equipment / components used.

(b). The design / construction of buildings / equipment.

(c). The materials used.

(d). Operating / maintenance procedures.

(e). Possible interactions with similar and other plant / equipment and the surrounding working environment.

(2) The amount of F&L involved. (Annex B, note 3).

(3) Where the work will involve more than one dangerous substance, the risk presented by such substances. (Annex B, note 4).

(4) The potential for F&L to be released (either intentionally or unintentionally) from plant / equipment, or during handling. For example normal operation, start-up and shutdown, cleaning and malfunction.

(5) The potential for explosive atmospheres to occur and its persistence. (Annex B, notes 5, 6, & 7).

(6) The arrangements for the safe handling, storage, (dispersing, decanting, spill plans, leaks) of F&L.

(7) The arrangements for the transport of F&L (including internal / on site movement) (Annex B, note 8).

d. Activities such as maintenance on plant / equipment, where there is the potential for a high level of risk (Annex B, note 9).

e. The effect of measures already in place or taken as a result of DSEAR.

f. The likelihood that ignition sources, including electrostatic discharges will be present and become active and effective (Annex B, note 10).

g. The assessment procedure must be carried out for every work or production process and for every operational status and change of status of the plant / equipment. Assessment of new / existing plant / equipment should be based on the following conditions: -

(1) Normal operating conditions, including maintenance.

(2) Commissioning and decommissioning.

(3) Malfunctions which may be reasonably anticipated.

(4) Misuse which may be reasonably anticipated.

h. Any places which are or can be connected via openings to places in which explosive atmospheres may occur.

i. Any additional safety information that may be needed in order to complete the risk assessment.

2.1.20. The bulk fuel packed F&L storage and distribution facilities risk assessment must be reviewed regularly and should be carried out by those who have knowledge of the properties of flammable materials, the process, and the equipment used. Consultation as appropriate with competent safety, electrical, mechanical, and other engineering personnel should be carried out, as the operator / line manager may not have all the relevant information readily available. Examples of such personnel to assist Bulk Fuel Installation operators are, Design Organisations (DE), Management Maintenance Organisations (MMO), Authorised Engineers (AE), Authorised Persons (AP), Regional Prime Contractors (RPCs), and 170 Gp Infra RE and external civilian industrial safety consultants.

2.1.21. As stated in article 2.1.02, there is no exemption in law for the MOD or the Services from the duties imposed by the H&SAWA. The 'Person responsible' for producing the site DSEAR Risk Assessment and associated Hazardous Area Classification drawings must consider that these documents may be used as evidence by the HSE if any accident or incident occurs on site.

2.1.22. Potential Authors of DSEAR Risk Assessments and Hazardous Area Classification Drawings on bulk fuel, packed F&L storage and distribution facilities are to be aware that both DSEAR 02 (SI 2002 No 2776), and EC Directive 1999/92 (ATEX) **do not quantify** the level of competency required for personnel to carry out these assessments. However, compliance of these regulations and directives **is a statutory requirement.**

2.1.23. Any unit that is unable to carry out these statutory requirements is to record this on their respective Corporate Risk Register and report the non-compliance to their Command Environmental Safety Organisation at the earliest opportunity, stating the reason for non-compliance.

2.1.24. A record of the significant findings of the risk assessment must be made as soon as is practicable after that assessment is made including in particular: -

a. The measures which have been or will be taken.

b. Sufficient information to show that the workplace and work processes are designed, operated, and maintained with due regard for safety and that in accordance with the Provision and Use of Work Equipment Regulations (PUWER).

c. Where an explosive atmosphere may occur due to F&L at the workplace, sufficient information to show:-

(1) Those places, which have been identified into zones (Annex B, notes 11, 12 and 13).

(2) Equipment which is required for, or helps to ensure, the safe operation of equipment located in places classified as hazardous. (Annex B, note 14).

(3) That any required ventilation for overall explosion safety has been carried out (Annex B, notes 15 &16).

2.1.25. No new work activity involving a dangerous substance (F&L) can commence unless an assessment has been made and the measures in accordance with DSEAR have been implemented.

SECTION 6 – HAZARDOUS ZONES

2.1.26. Examples of Hazardous Zone Area Classification for bulk fuel and packed F&L storage and distribution facilities can be obtained in IP Model Code of Practice, Part 15- *Area Classification Code for Installations Handling Flammable Fluids.* These drawings are based on, "type examples" as contained within IP Model Code of Practice.

BIBLIOGRAPHY

1. H&SWA 1974.

2. JSP 375 'MOD Health and Safety Handbook'

3. Dangerous Substances and Explosive Atmospheres Regulations 2002. (DSEAR 02).

4. Approved Code Of Practice (ACOP) for Dangerous Substances and Explosive Atmospheres Regulations 2002. HSE Publication L138.

5. Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 1996 – (EPS Regulations).

6. BS-EN 60079/10 Part 10, Classification of Hazardous Areas.

7. BS-EN 60079/17 Part 17 Inspection and Maintenance of Electrical Installations in Hazardous Areas (Other than Mines).

8. BS-EN 1127-1, Explosive Atmospheres Part 1 Basic Concepts and Methodology.

9. IP Model Code of Practice, Part 15- Area Classification Code for Installations Handling Flammable Fluids.

GENERIC CHECKLIST TO ASSIST OPERATORS OF BULK FUEL, PACKED F&L STORAGE AND DISTRIBUTION FACILITIES

For use to evaluate explosion protection around plant and equipment to assist in risk assessment – guidance only

Item	Reference	Yes No	Measures Taken / Comments
1. Is the formation of explosive atmospheres around equipment prevented? a. Are explosive atmospheres prevented by operational measures, design, or spatial configuration? b. Is the apparatus / equipment Leakproof (including Ventilation / Extraction)? c. Is ventilation or extraction used and maintained?	JSP 317 Para 2.1.17 JSP 317 Pt 2 Ch 1 Annex B JSP 317 Pt 2 Ch 3. JSP 317 Para 2.1.02. JSP 317Pt 2 Ch 1 Annex B Para 14. JSP 375 Vol 2 Lflt 5 Para 10.		
2. Are arrangements in place to monitor the concentration around apparatus / equipment? a. By means of gas instruments which trigger an alarm? b. By means of gas instruments which trigger protective measures? c. By means of gas instruments which trigger emergency functions?	JSP 317 Para 2.1.02. JSP 317 Pt 2 Ch 1 Annex B Para 17		
3. Can a hazardous explosive atmosphere occur around the apparatus / equipment despite the above measures?	JSP 317 Para 2.1.20		
4. Are measures taken to prevent the ignition of a hazardous explosive atmosphere? a. Are zones known and classified? b. Are known ignition sources to be expected with the zoned areas?	JSP 317 Para 2.1.25. JSP 317 Pt 2 Ch 1 Annex B JSP 317 Pt 2 Ch 3 JSP 317 Pt 2 Ch 1 Annex B Para 10		

5. Are the effects of fire / explosion limited to an acceptable extent by suitable mitigation measures by use of:- a. Fire / explosion resistant design? b. Explosion relief? c. Fire / Explosion suppression? d. Prevention of flame and explosion propagation to upstream and down stream items of apparatus / equipment? e. Flame arrestors?	JSP 317 Para 2.1.06 JSP 317 Pt 2 Ch 1 Annex B Para 14. JSP 498 (MACR) Unit fire Orders		
6. Are organisational measures taken to ensure the effectiveness of the technical procedures? a. Are operating instructions in place? b. Is the apparatus / equipment operated by qualified personnel? c. Is suitable training available for operation of apparatus / equipment and procedures (including emergency procedures) in place? d. Is a permit-to-work system in place for the maintenance of installed apparatus / equipment?	AESPs, APs, BRs, DE FWS various. JSP 317 Pt 3 JSP 317 Pt 4. Unit SOPs JSP 317 Pt 4 JSP 317 Pt 2 Ch 8 JSP 317 Pt 5 Ch 7 JSP 317 Pt 2 Ch 5 JSP 375, Vol 3, Chap 5, Petroleum Appendix 10, AESPs, APs BRs, DE FWS		
7. Are protective measures both organisational and physical in place for maintenance work, including off site Contractors?	JSP 375, Vol 3, Chap 5, Petroleum Appendix 10 JSP 375 Vol 2 Leaflet 34		

Checklist of explosion protection documents to assist in risk assessment– guidance only

Item	Information Source / Document	To be Produced YES / NO
1. Description of workplace / work process / working areas? a. Textual description. b. Site plan. c. Plan of escape and rescue routes.		
2. Description of the process / activities? a. Textual description. b. Process flowchart (if applicable)? c. Ventilation plan (if applicable)?		
3. Description of substances used? a. Textual description, quantities? b. COSHH / HDS? c. Safety parameters (working /operating temperatures, potential reactions)?		
4. Hazard considerations? a. Hazardous places inside plant / apparatus /equipment, (textual) (if applicable)? b. Hazardous places surrounding apparatus /equipment, (textual). c. Zoning (textual)? d. Zone plan? e. Hazards in normal operation? f. Hazards during start up and shutdown? g. Hazards in the event of malfunction (not catastrophic)? h. Hazards during cleaning? i. Hazards in the event of process / product changes?		

5. Technical explosion protection measures? a. Prevention? b. Mitigation? c. Process Control Equipment measures (if applicable)?		
6. Organisational explosion protection measures? a. Written SOPs? b. Instructions for use of work equipment? c. Description of PPE? d. Evidence of operators' qualifications? e. Documentation of training (operator and emergency response / spill / fire)? f. Description of the Permit-To-Work system? g. Description of maintenance, testing, and calibration periodicities of apparatus / equipment. h. Documentation of the marking of the hazardous places? i. Evidence of Unit Spill Response Plan?		

NOTES ON DSEAR 02 RISK ASSESSMENT CONSIDERATIONS FOR BULK FUEL & PACKED F&L STORAGE INSTALLATIONS

1. General F&L product information can be found in Def Stan 01-5. Only the main characteristics of products are given. (Temperature range / flash point of the product, or where relevant the operating temperature range of the equipment). The full specification of the product is available from the individual product Def Stan.

2. Hazardous / Material Safety Data Sheets are available through JSP 515, Hazardous Stores Information System (HSIS). All units should also consult Control Of Substances Hazardous to Health (COSHH) sheets for all hazardous products used in their processes iaw JSP 375, MOD Health and Safety Handbook.

3.Line managers should take into account the frequency of loading and unloading operations and mitigate this in their DSEAR 02 risk assessments. For the purpose of **hazardous area classification**, (the notional division of a facility into hazardous areas and non-hazardous areas, and the sub-division of hazardous areas into zones), 3 grades of release are defined in terms of their likely frequency and duration (details in Table 1). The grades of release are completely independent of rate of release, degree of ventilation, or the characteristics of the fluid.

Grade Of Release	Descripton / Example	Quantitive (Likely Examples Of Frequency)
Continuous	A release that is continuous, or nearly so, or that occurs frequently and for short periods	Present for more than 1000 hours per annum
Primary	A release that is likely to occur periodically or occasionally in normal operation, i.e. a release which, in operating procedures is anticipated to occur	Present >10 hours <1000 hours per annum
Secondary	A release that is unlikely to occur in normal operation and, in any event, will do so only infrequently and for short periods i.e. a release which, in operating procedures, is not anticipated to occur e.g. fracture / corrosion of a pipe	Present for 1 to 10 hours per annum. (Where releases are likely to be present for upto 1-10 hours per annum, but are anticipated as normal operation, e.g. routine sampling points, they should be regarded as primary grade releases unless carried out under permit-to-work circumstances).

Table 1 - IP Model code of safe practice, Part 15 – definitions.

4. Where substances with different properties are processed together, the fire properties of any resulting mixture will be different from the individual components. The presence of hybrid mixtures of flammable gases, vapours can considerably increase the effect of any explosion. These mixtures may form an **explosive atmosphere,** *(a mixture with air, under atmospheric conditions of flammable substances in which after ignition has occurred, combustion spreads to the entire unburned mixture),* even though the concentrations of the individual fuels are still below their lower explosion limit.

5. The basic elements for establishing the hazardous zone types are the identification of the source of release and the determination of the grade of release (Table 1 above). Since an explosive atmosphere can only exist if a flammable gas or vapour is present with air, it is necessary to ascertain if any of these flammable mixtures can exist in the area concerned. (*Vapour is flash point dependent. Mist / aerosol ARE NOT i.e. flammable mixtures can form below fuel flashpoint in mist or aerosol form).* It is necessary to identify where an explosive atmosphere can exist inside a process plant, or where a release of flammable materials can create an explosive atmosphere.

6. Once the existence of an explosive atmosphere, has been established, it can be assumed that an explosion will cause substantial harm and a **hazardous explosive atmosphere** *(explosive atmosphere which, if it explodes causes damage),* is deemed to have been formed. As an example; a rough estimate can be made by the rule of thumb that in such rooms, explosive atmospheres must be regarded as potentially hazardous if they occupy more than one ten thousandth of the room volume (8L in a room of 80m^3). This does not mean that the whole room should be regarded as a **hazardous place,** *(a place in which an explosive atmosphere may occur in such quantities as to require special precautions to protect the health and safety of the workers is deemed to be hazardous),* but only the part in which the hazardous explosive atmosphere can arise. A continuous volume of over 10L of explosive atmosphere in a confined space must always be regarded as a hazardous explosive atmosphere, irrespective of the size of the room. Therefore a hazardous place exists whenever explosive atmospheres occur or may occur.

7. The extent of the zone depends on the estimated or calculated distance over which an explosive atmosphere exists before it disperses to a concentration in air below its Lower Explosive Limit (LEL). Explosive atmospheres will only exist when fuel vapours are within the UEL-LEL. The concentration in the headspace above flammable liquids will remain below the LEL if the temperature at the surface of the liquid is at all times kept below the flashpoint (a safety margin of 5°C is usually adequate for pure solvents and 15°C for solvent mixtures). The UEL is usually exceeded with liquids with a low flash point, (e.g. in a car petrol tank). If the concentration in a container is above the UEL, there is no explosion limit within the vessel, however a hazard outside it may result as released vapours are mixed with air. When assessing the area of spread of gas or vapour before dilution to below its LEL.

8. Transportation of Dangerous Goods (including internal movements within the process / plant / site) should be carried out in accordance with the current legislation and MOD policy (JSP 800 – *Defence Movements and Transport Regulations Volumes 1,2,3,5 and 6,* JSP 800 Volume 4a – *Dangerous Goods by Air,* JSP 800 Volume 4b –*Dangerous Goods by Road Rail and Sea.*

9. Part 2, Chapter 5 details the scope and application for carrying out maintenance on Bulk Fuel Storage Installations. Line Managers must liaise with Maintenance Management Organisations (MMO), to ensure all parties are familiar with DSEAR risk assessments.

10. If it not possible to prevent the formation of a *hazardous explosive atmosphere* within the process/ plant /site, then potential sources of ignition should be avoided. Common examples of standard ignition sources in accordance with BS-EN-1127-1 are as follows: -

(a). Hot surfaces.

(b). Flames and hot gases.

(c). Mechanically generated sparks.

(d). Electrical apparatus.

(e). Stray electric currents, cathodic protection.

(f). Static electricity.

11. Examples of generic bulk fuel and packed F&L storage and distribution facilities are identified in Part 2, Chapter 3. It must be emphasised that the diagrams in Chapter 3 are hypothetical "typed examples" only, and do not take into consideration wide ranging local environmental, climatic, topographical, associated infrastructure / processes that exist on various sites throughout the MOD.

12. Guidance on the production of hazardous area classification for generic bulk fuel, packed F&L storage installations, and distribution facilities can be found in IP Model Code of Practice, Part 15 – *Area Classification Code for Installations Handling Flammable Fluids*. This Petroleum Industry Approved Code of Practice offers a direct example approach for classification of common bulk fuel and packed F&L storage and distribution facilities in open areas. This publication forms a suitable basis for assessing the extent and type of zone, and can be used as a guide to complying with the requirements in DSEAR. **When using this publication, site-specific factors should always be taken into account.**

13. Another source of information is BS EN 60079/10– Part 10: *Classification of Hazardous Areas.* This standard explains the basic principles of area classification for gases and vapours. **Again this standard cannot give the extent and type of zone in any particular case, as site-specific factors should always be taken into account.**

14. From 1 July 2003 DSEAR 02 requires that new equipment and protective systems used in a hazardous area must be selected on the basis of the requirements set out in the Equipment and Protective Systems for Use in Potentially Explosive Atmospheres Regulations 1996, known as the EPS regulations. All existing workplaces must be DSEAR 02 compliant by 1 July 2006. As well as electrical equipment, the EPS regulations also apply to mechanical equipment that is a potential ignition source. A standardised marking scheme is now implemented that identifies equipment suitable for a specific location. Equipment built to the requirements of EPS Regulations will carry the explosion protection symbol "Ex" in a hexagon, the equipment category number (1, 2, or 3), the letter G and/or D depending on whether it is intended for use in gas or dust atmospheres, and other essential safety information. In many cases this will include a temperature rating expressed as a "T" marking, and sometimes a gas group. These indicate limitations to safe use. Operators and personnel installing equipment should consider the marking and documentation provided with "Ex" equipment when it is being installed.

15. The rate of gas vapour dispersion in the atmosphere increases with wind speed, but a minimum speed of 2m/s-3m/s is required to initiate turbulent diffusion. Below this velocity, layering of the vapour can occur and the distance for safe dispersal is greatly increased. In plant areas sheltered by large vessels and structures, the speed of air

movement may be below that of the wind; however, obstruction of air movement caused by infrastructure, may cause localised areas of turbulence. The layout of plant, placement of equipment, where possible, should be sited to aid the rapid dispersal of explosive gas atmospheres. Fuel vapours may escape at low velocity. They will tend to flow downward and may travel long distances along the ground before being safely dispersed. Vapours may also collect in hollows, pits, or trenches.

16. The degree of ventilation will affect the extent of the hazardous zone. Many factors can affect the type and degree of ventilation. The terminology, "*natural ventilation, open area, enclosed area, adequate ventilation*" all have quantifiable definitions stated in either BS-EN-60079/10– Part 10, and IP Model Code of Practice, Part 15. The correct use (therefore methodology) when describing and mitigating for *ventilation* must be adhered to when carrying out a DSEAR risk assessment.

17. Gas alarms for use in *hazardous places* must be approved and suitably marked as safe electrical equipment in accordance with 94/9/EC. A qualified person must verify the performance of gas alarm systems after installation and at suitable intervals. Gas alarms should undergo individual or type checks of their meteorological performance when they are used as safety, controlling or regulating devices in avoiding ignition sources (e.g. to switch off a non-explosion proof equipment on the occurrence of a *hazardous explosive atmosphere*).

Part 2

Chapter 2 (Sponsor DSEA FGSR-FI)

HAZARDS OF STORAGE AND HANDLING OF FLAMMABLE LIQUIDS

2.2.01. The handling and storage of small amounts of flammable liquids on a daily basis should not be threat to life or hazardous to the environment if the correct procedures are applied. The context of which can be related to refuelling a vehicle at a filling station, a weekly task carried out by an individual with basic fuel handling rules applied. These are usually displayed on small posters at the pump. Some of these rules (*No smoking, no mobile phones*) are adhered to without the individual realising and the vehicle is refuelled without incident. However, this ease of access to fuel and its interaction with life and work styles can lead to familiarity and the basic rules ignored.

2.2.02. When involved with large amounts of fuel the dangers are more significant, and personnel employed in fuel handling must be given information, instruction and training about the rules to guard against the risk of familiarity. For the untrained, what would seems to be a simple task of storage or handling could attract many varied Statute regulations, this is because not only is fuel a threat to life but also it has the potential to have a devastating impact on the environment.

SECTION 1- MAIN HAZARDS

2.2.03. The four main hazards associated with the storage and handling of flammable liquids are:

a. Fire.

b. Explosion.

c. Health.

d. Environmental.

FIRE

2.2.04. Some gases, liquids and solids can cause fire or explosions. For combustion to occur three factors are necessary, heat, oxygen and fuel, this is commonly known as the Triangle of Combustion. Combustion will continue as long as the three factors are present. However, removing one of these factors will collapse the triangle and combustion will cease.

2.2.05. **Oxygen.** Air normally contains 21% Oxygen, and approximately 16% is required to support combustion. Some materials contain sufficient oxygen within their structure to support burning e.g. certain types of weed killers.

2.2.06. **Heat.** Heat sources are required to reach ignition temperatures; these can be produced by compression of gasses, electrical energy (static), friction, spontaneous combustion (chemical reaction), hot surfaces or open flames.

2.2.07. **Fuel.** This can be in the form of Solids (Coal, cloth, wood, wax, paper). Liquids (Alcohol, kerosene, paint, varnish, turpentine). Gases (Butane, propane, hydrogen, acetylene, natural gas). Combustion of flammable liquids occurs when the vapours realised from the surface of the fuel ignites.

EXPLOSION

2.2.08. Petroleum is a volatile liquid that gives off vapour even at very low temperatures. The vapour, when mixed with air in certain proportions, can form a flammable atmosphere which could ignite or explode if a source of ignition is present. A flammable atmosphere exists when the proportion of vapour in the air is between approximately 1% Lower Explosion Limit (LEL) and 8% Upper Explosion Limit (UEL). For ignition to occur the vapour air mixture must be within the LEL and the UEL. As an example 1 litre of petrol could produce approximately 225 litres of petroleum vapour. When mixed with air this has the capacity to produce an explosive atmosphere in the region of (225 x 1,000) 225,000m^3 of explosive petroleum vapour. One ton of fuel could explode with the same energy as 10 tons of TNT.

2.2.09. **Vapour.** Petroleum vapour is heavier than air and does not disperse easily in still air conditions. It tends to sink to the lowest level of its surroundings such as depressions, cavities, pits, and could accumulate in access chambers, tanks and drains. It is important to know that in enclosed spaces (confined) or areas with poor ventilation vapour can persist for long periods even when there is no visible sign of the liquid fuel.

2.2.10. **Volatility.** All F&L products give off various amounts of vapour depending on their volatility. Volatility is the ease of which a liquid readily evaporates. This can be greatly affected by the surrounding ambient temperature. For the purpose of identifying the most volatile products these are separated into Flash Point Classifications identified by the Institute of Petroleum (IP). Flash Point and IP Flash Point Classifications are described in Part 1, Chapter 3.

2.2.11. **Boiling Liquid Expanding Vapour Explosion (BLEVE).** Additionally the storage of petroleum based products in containers poses a greater hazard if involved in a fire; this is known as a BLEVE. If an external heat source is introduced to or near a container of petroleum product, this acceleration of heat will cause the expansion of the liquid contained, increased volatility, resulting in the rapid build up of contained pressure. An explosion occurs as a result of the constrained pressure being greater to the integrity of the container. The methods of prevention of such explosions are described in Part 2, Chapters 1, 8 and 11.

2.2.12. **Dangerous Substances and Explosive Atmospheres Regulations (DSEAR)**. The aim of DSEAR is to provide protection of workers against the risk of fire and explosion. It provides precautions against the harmful physical effects from thermal radiation (burns), over pressure effects (blast injuries) and oxygen depletion (asphyxiation). One of the main requirements is that where dangerous substances are used in such quantities that they may give rise to explosive atmospheres then a hazardous area classification study must be completed.

2.2.13. Hazardous area classification is the name given to the process of identifying the areas of a facility, plant or process where potential flammable or explosive atmospheres may arise. DSEAR ensures that with the aid of drawings theses areas along with a guide to its extent and persistence are recoded. Hazardous areas are described in Part 2, Chapter 3. DSEAR Risk Assessments are detailed in Part 2, Chapter1.

2.2.14. An area identified as an Explosive Atmosphere requires special precautions to be implemented to prevent the risk of ignition. JSP 375 Vol 3 Chap 5 States the safety rules, procedures and guidance for work on petroleum installations. These are discussed in Part 2, Chapter 8.

HEALTH

2.2.15. The storage and handling of large amounts of petroleum based products can if not controlled, present a serious hazard to health. The 3 main health hazards are:

a. Asphyxiation.

b. Toxicity.

c. Dermatitis.

ASPHYXIATION

2.2.16. A number of people are killed or seriously injured in confined spaces each year in the UK. Many more are seriously injured. Asphyxiation and toxic fumes are the two most common causes of death, but others include fire and explosion. Two or more people are often involved in these incidents. One person is overwhelmed and then the others attempt to rescue them without being adequately prepared. It is emphasised that the danger of asphyxia is more extreme in confined spaces, oxygen deficiency as well as been caused by air displacement by petroleum vapour can also be caused by large build ups of rust inside gas free or disused tanks.

2.2.17. **Asphyxiants.Some** gases and vapours, when present at high concentrations in air, act as simple Asphyxiants by reducing the oxygen content by dilution to such an extent that life cannot be supported. Many asphyxiants are odourless and colourless and not readily detectable. Monitoring the oxygen content of air is often the best means of ensuring safety. There are substantial risks if the concentration of oxygen in the atmosphere varies from the normal 20.8%. Statute law requires that any difference in oxygen content from the normal should be investigated, the risk assessed, and appropriate measures taken in light of the risk. It further states that the amount of oxygen in the general body of the air as not less than 19% by volume.

2.2.18. Asphyxia due to vapour or rust causes a lack of oxygen supply to the lungs through the blood that produces a potentially lethal build up of carbon dioxide waste in the tissues of the body. It represses the respiratory system, eventually causing death by asphyxiation.

Fresh air contains 21% oxygen which is essential to normal human breathing. If this proportion falls to 17%, distress is felt immediately.

2.2.19. **Asphyxiation Symptoms.** Any oxygen deficiency in the air will lead to the following symptoms:

a. Headache.

b. Sleepiness.

c. Reduced mental alertness.

d. Coma.

2.2.20. On no account is anyone to be allowed to enter a confined space until they have passed official training and initial tests are taken using a Multiple Gas Detector. The limits for entry are the lowest being 19% for oxygen deficiency and 22% for oxygen enrichment. These readings must be continuous throughout the length of the entry.

2.2.21. **Asphyxiation First Aid:**

a. Remove the victim to a clear atmosphere.

b. Use artificial respiration.

c. When breathing place in the recovery position.

d. Seek professional medical aid immediately.

TOXICITY

2.2.22. Many people are exposed to a variety of substances at work which can, under some circumstances, have a harmful effect on their health. These are called “Hazardous Substances”. If exposure to a hazardous substance is not properly controlled it may cause ill health in a number of ways. The substance may cause harm by too much being taken into the body through breathing, by being absorbed through the skin, by being swallowed, or by acting directly on the body at the point of contact e.g. skin. Some illnesses caused by exposure to hazardous substances in the workplace may not appear until a long time after the first exposure. Therefore, it is important to know well in advance how to protect the health of people working with hazardous substances and also of other people who may be affected by the work being carried out.

2.2.23. Many substances can hurt you if they get into your body. Exposure can have an immediate effect and repeated exposure can damage your lungs, liver or other organs. Some substances may cause asthma and many can damage the skin. Special care is needed when handling cancer-causing substances (carcinogens).

2.2.24. **Toxicity**. Toxicity is the capacity of a material to produce injury if it reaches a susceptible site or sites on or within the body. The constituent substances of petroleum that present the most concern are benzene and lead alkyls:

a. Benzene is an aromatic hydrocarbon with a sweet aroma and is a constituent of most fuels. Benzene is highly flammable, toxic by inhalation or ingestion and presents a danger of serious damage through prolonged exposure. The Workplace Exposure Limit (WEL) for benzene is regularly reviewed, and can be found in HSE publication *EH 40 Workplace Exposure Limits*. Information on the benzene content of specific products can be found on the relevant Safety Data Sheet (SDS).

b. Lead alkyls are present in all military automotive gasoline (F-67 ULGAS) and also in aviation gasoline (AVGAS 100LL). The particular toxic danger from lead alkyls is that the effects are cumulative, with any damage done by previous exposures being compounded by subsequent exposure.

2.2.25. **Routes of Exposure.** For most substances, the main route of entry into the body is through inhalation. However, some substances have the ability to penetrate the skin and become absorbed into the body, thus contributing to systemic toxicity. In total the four routes of exposure that can lead to acute effects are:

a. Inhalation.

b. Skin Contact.

c. Ingestion.

b. Eye Contact.

INHALATION

2.2.26. The presence of fuel in the environment does not always lead to exposure. Clearly, in order for it to cause any adverse health effects you must come into contact with it. A short, one-off exposure to fuel vapour will not normally cause any long-term health effects. However, Inhalation can be avoided by following the following precautions:

2.2.27. **Inhalation Precautions:**

a. At all times, inhalation of fuel vapours is to be avoided.

b. Ensure that all fuel related activities are conducted in well ventilated areas.

c. Any exposures to fuel vapours are to be maintained below WEL.

d. Respiratory Protective Equipment must be employed within an area that is vapour saturated above the WEL stated in EH40/JSP 375.

2.2.28. **Inhalation Symptoms.** Inhaling large quantities of fuel vapour may cause signs of:

a. Drowsiness.

b. Dizziness.

c. Drunken behaviour.

d. Impaired judgment.

e. Nausea.

f. Headache.

g. Effect of central nervous system.

h. Unconsciousness.

2.2.29. **Inhalation First Aid.** Remember, even in an emergency do not allow entry into a poorly ventilated or confined space; think twice, has the atmosphere been deemed safe by a competent person. Once safe, the following first aid action is to be conducted:

a. Remove the affected person to fresh air.

b. If breathing has stopped contact the emergency services then administer Cardio Pulmonary Resuscitation (CPR).

c. If the person is breathing, but unconscious place in the recovery position.

d. On arrival of the emergency services a copy of the Softy data Sheet (SDS) must be made available.

SKIN CONTACT

2.2.30. If you handle F&L, use petroleum to clean equipment, or if it is stored at your workplace, you may be exposed to them through skin contact. A common source of skin contact is from personnel leaving oil soaked rags in their coverall pockets. The following precautions are to be adhered to:

2.2.31. **Skin Contact Precautions:**

a. When involved in fuel duties all personnel must use pre-work barrier and after work cream.

b. Personnel must ensure that they wear PPE correctly.

c. All personnel must handle F&L carefully especially during transfer from a container.

d. The face and hands are to be washed frequently with hot water and soap.

e. Nails are to be scrubbed with a nail brush.

f. On no account are personnel to practice the cleaning of hands with a petroleum product.

g. Working clothes are not to be worn outside of working hours and personnel are to ensure that such clothes are laundered weekly.

h. Hot baths or showers are to be taken at the end of each working day; this must also take place immediately if contamination has occurred.

2.2.32. **Skin Contact Symptoms.** When fuel comes into contact with a person's skin it can cause various symptoms:

a. Irritation.

b. De-fatting of the skin.

c. Drying.

d. Cracking.

e. Oil acne.

f. Oil folliculitis.

g. Warty growths.

h. Erythema.

2.2.33. **Skin Contact First Aid:** If your skin comes into contact with petroleum immediately carryout the following:

a. Wash the affected area with lukewarm water and soap for at least 10 – 15 minutes.

b. If clothing has been contaminated, it must be first soaked with water and removed immediately.

c. Seek professional medical aid immediately.

INGESTION

2.2.34. After handling petroleum products, toxic substances can be transferred to food and drink as a result of poor hygiene. Prolonged exposure to this type of poisoning can cause mouth and throat cancer and stomach ulcers. A severe form of lung damage called pneumonitis may occur if liquid petrol is inhaled directly onto the lungs, for example, whilst manually siphoning a tank or from inhaling vomit after swallowing petrol. This is why it is important not to make someone sick if they have swallowed petrol and to seek immediate medical advice.

2.2.35. **Ingestion Precautions:**

a. General hygiene precautions are to be taken and enforced.

b. Food or beverages must not be taken into or consumed within a hazardous area.

c. Personnel are to wash their hands before eating, drinking, smoking and using the lavatory.

d. The mouth is to be rinsed with water before eating or drinking.

2.2.36. **Ingestion Symptoms:**

a. Chemical burning of the mouth.

b. Vomiting.

c. Aspiration into the lungs.

d. Chemical pneumonitis.

2.2.37. **Ingestion First Aid:**

a. Wash out mouth with water.

b. Don’t induce vomiting.

c. Seek professional medical aid immediately with a copy of the Softy data Sheet (SDS).

EYE CONTACT

2.2.38. Eye contact could occur through splashing or pressurisation of fuel during transfer operations. Personnel could simply contaminate the eye by brushing the face with a soiled glove or from the skin because of poor hygiene.

2.2.39. **Eye Contact Precautions:**

a. Avoid contact by correctly wearing eye protection.

2.2.40. **Eye Contact Symptoms:**

a. Discomfort will be felt immediately.

2.2.41. **Eye Contact First Aid:**

a. If you have got fuel in your eyes, (If worn remove contact lenses), and irrigate the affected eye with water for at least 10 – 15 minutes.

b. If discomfort persists, seek professional medical aid immediately.

DERMATITIS

2.2.42. Dermatitis is inflammation of the skin caused by skin contact with a range of materials that dry out and damage the skin. It can affect all parts of the body, but it is most common to see the hands affected. Sometimes the consequences of skin contact with a material are immediately visible, sometimes skin contact occurs without apparent effect. However, every contact can cause minute amounts of 'invisible' damage to the skin that can build up until more serious signs are seen i.e. dermatitis. So, don't be lulled into a false sense of security, you need to make sure regular skin checks are carried out to look for early signs of dermatitis.

CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH (COSHH)

2.2.43. The law requires employers to adequately control exposure to materials in the workplace that cause ill health like dermatitis. Employers and employees need to comply with the COSHH Regulations. They require employers to assess risks, provide adequate control measures, ensure the use and maintenance of these; provide information, instruction and training; and in appropriate cases, health surveillance.

2.2.44. COSHH Risk Assessments (RA) should be carried out in accordance with JSP 375 A COSHH RA Sheet is to be raised by the user section for all activities involving F&L products. To conduct this assessor must have a copy of the relevant Safety Data Sheet, supplied by the product manufacturer.

JSP 515 – THE MOD HAZARDOUS STORES INFORMATION SYSTEM (HSIS)

2.2.45. Procurement, commercial and contract managers are required to provide appropriate Safety Data Sheets SDS for F&L products to HSIS in accordance with JSP375 and JSP 886. Those responsible for activities involving the handling and use of F&L products must first carryout COSHH RA; the MSDS provides essential information for these assessments and are available through JSP 515 – HSIS.

MANAGERIAL PREVENTATIVE MEASURES

2.2.46. Personnel are to confirm their suitability for employment on F&L duties to their Line Manager. The Line Manager is to discharge their Duty of Care to ensure the Health and

Safety of their personnel. It is the duty of personnel to inform their Line Manager of any changes to their medical status in regard to working with F&L. Personnel with a history of skin related diseases; asthma sufferers and pregnant women may be unsuitable for employment involving F&L.

Main Managerial Preventative Measures

2.2.47. As a manager of personnel involved in fuel activities, the management must ensure a positive attitude is perceived by actively enforcing the following main managerial preventative measures:

a. Ensure procedures are available and followed.

b. Promote a positive culture of good health awareness.

c. Highlight and promote good housekeeping measures.

General Managerial Preventative Measures

2.2.48. The general managerial preventative measures to be adopted to combat the Main Health Hazards presented by petroleum-based products are:

a. Initial medical examination of personnel employed in fuel activities

b. Personnel with open cuts, abrasions or eczematous lesions of the skin are not to handle petroleum products.

c. Personal hygiene is to be the uppermost priority; individuals are to be given instruction as to why this is so and the consequences resulting from unhygienic practice.

d. Regular inspections of housekeeping measures by Line Managers and if available Medical and Health & Safety Officers.

e. Provision of adequate emergency first aid treatment and equipment.

f. Provision of adequate and readily available quantities of emergency eye wash.

g. Provision of changing and washing facilities at place of work.

h. Adequate supplies of pre-work and after work barrier creams.

i. Provision and correct use of Personal Protective Equipment (PPE) and Respiratory Protective Equipment (RPE).

j. The management of good housekeeping is reliant upon all personnel being fully trained for the task in which they are employed, i.e. Competent Person nominated by the CO, OC or supervised personnel.

k. Ensure that fuel operations are conducted in a well ventilated area, by natural or mechanical means.

PPE Requirement

2.2.49. In addition supervisors are to ensure that PPE is provided and worn, dependent upon the assessment of the above mentioned hazards, JSP 375, Volume 3, Chapter 5, Petroleum Part 10 provides full guidance to PPE in relation to Risk Assessments.

2.2.50. The Minimum PPE requirement for personnel handling F&L and operating F&L associated equipment:

a. **Safety Footwear**: (see JSP 437)

(1) Boots, Safety (Specification: EN ISO20345:2004),

(2) Boots Safety Conducting (Specification: EN ISO20345:2004),

b. **Coveralls for Military personnel**

(1) Smock, Petroleum Protective (Specification: BS EN 531 and BS EN 469) (see JSP 768).

(2) Salopettes, Petroleum Protective (Specification: BS EN 531 and BS EN 469) (see JSP 768).

(3) Bag, POL (see JSP 768).

c. **Coveralls for Civil servants working on MOD sites**: (Refer to Defence Clothing contract DC1BESL/6035)

(1) Patagnia Coveralls

(2) Barcelona Coverall Jacket

(3) Pyrosafe V high Visibility Overall Jacket

(4) Pyrosafe P High Visibility Overall Jacket

d. **PPE Gloves**. The minimum standard for Petroleum resistant Gloves will meet Specification: BS EN420, BS EN388: 4;1;0;1 BS EN374). (See JSP 437 for full-itemised list of PPE Gloves). No other gloves shall be worn whilst handling F&L.

e. **Goggles and Visors**. Used for general work affording basic protection, when handling bulk products. (Specification: BS EN 166, BS EN155) see JSP 437 for itemised list of goggles and visors.

2.2.51. The additional PPE requirement will required depending on a risk assessment being carried out:

a. **Safety Helmets**. If the hazard of head injury exists, the area is to be designated a hard hat area, industrial safety helmets are to be provided and worn at all times. (Specification: EN 397)

b. **Jacket, High Visibility**. The Jacket High Visibility is only required depending on a Risk Assessment or meeting current legislation. The Jacket shall meet BSEN471 and EN1149-5 standard.

c. **Orinasal Masks**. Orinasal Masks (BS EN 149) are specific PPE, which excludes use of respirators or breathing apparatus. Guidance is to sort from JSP 437.

ENVIRONMENTAL

2.2.52. Under normal operating circumstances, F&L products present no threat to the environment. In the event of a mechanical failure or operating error, the release of the hydrocarbon-based products into the environment can have far-reaching and serious consequences. Pollution control measures are covered in greater detail in Part 5.

BIBLIOGRAPHY

1. DSEAR 2002

2. JSP 375 - MOD Health and Safety Handbook

3. JSP 515 - MOD Hazardous Stores Information System

4. JSP 768 - Defence Clothing Catalogue

5. JSP 437 - Personal Protective Equipment Catalogue

Part 2

Chapter 3 (Sponsor DIO-PTS)

HAZARDOUS ZONE CLASSIFICATION

SECTION 1 - GENERAL

2.3.01. This chapter deals with general guidance to provide a basic understanding of the classification of hazardous areas/places around equipment handling or storing flammable fluids (Class I, Class II, Class III,) where there is risk of ignition due to the presence of flammable gas or vapour, mixed with air under normal atmospheric conditions. It does not cover ignitable dusts or address the releases of flammable refrigerated or cryogenic liquids for which the dispersion characteristics are markedly different from those fluids at higher temperatures. Further information on cryogenic and industrial gases refer to JSP 319.

2.3.02. The aim of hazardous area classification is to avoid ignition of those flammable releases that may occur from time to time in the operation of facilities handling flammable liquids and vapour. The approach is to reduce to an acceptable minimum level the probability of coincidence of a flammable atmosphere and an electrical or other source of ignition; this is explained in detail in Part 2, Chapter 1.

2.3.03. It is not the aim of hazardous area classification to guard against the ignition of major releases of flammable materials under catastrophic failure of plant such as failure of containment. The incidence of such releases must be kept within acceptable limits by correct design, construction, maintenance and operation of facilities.

2.3.04. Hazardous Zones will occur where fuel is stored or handled. Examples of some of these locations are as follows:

a. Mechanical Transport Fuelling Installations (MTFI).

b. Bulk Fuel Installations (BFI).

c. Dangerous goods store.

d. Ship-to-ship or ship-to-shore fuel transfer operations.

e. Interceptors and Separators.

f. Filling of containers and drums.

g. Areas where a spill or leak has occurred.

h. Contaminated Tactical Fuel Handling Equipment (TFHE) storage.

i. Bulk Fuel Carrying Vehicles (BFCV) and BFCV Parks.

j. Uninstalled engine test facilities.

k. Gases Storage and Handling - *refer to* JSP 319

l. Hardened Aircraft Shelters (HASs) - *refer to Crown Fire Standard E10 Aircraft Hangars Annex A or Annex B as appropriate.*

m. Aircraft Hangars - *refer to Crown Fire Standard E10 Aircraft Hangars Annex C*.

n. Marine Facilities and Jetties – *For vessels refer to the appropriate maritime code of regulation such as DG Ships, IEC 6000920502 Tanker -special features and the International Safety Guide for Oil Tankers and Terminals (ISGOTT*).

2.3.05. A Hazardous Area can be defined as a three-dimensional space in which an explosive atmosphere may be expected to be present at such frequencies as to require special precautions for the design and construction of equipment, and the control of other potential ignition sources. There are 3 levels of areas subdivided into Zones based on the likelihood of occurrence and duration of a flammable atmosphere, as follows:

a. **Zone 0** – A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour, or mist is present continuously or for long periods frequently. (Typically > 1000 hr/year).

b. **Zone 1 -** A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour, or mist is likely to occur in normal operation occasionally. (Typically 10-1000 hr/year).

c. **Zone 2 –** A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist is not is not likely to occur in normal operation but, if it does occur, will persist for a short period only. (Typically 1-10 hr/year)

Non-hazardous areas - are defined as areas that do not fall into any of the above.

Note: No durations are associated with the Zone definitions, but the 10 and 1000 hour threshold are often attached as a guide. These definitions of the Zones are from BS EN 60079-10:2003. In this document the term 'explosive' is used as a synonym for 'flammable'.

2.3.06. For the purpose of hazardous area classification, a source of release is defined as a point from which a flammable gas, vapour or liquid may be released into the atmosphere. Three grades of release are defined in terms of the likely frequency and duration as follows:

a. **Continuous Grade Release** - A release that is continuous or nearly so, or that occurs frequently and for short periods. (Typically likely to be present for more than 1000 hr/year).

b. **Primary Grade Release** - A release that is likely to occur periodically or occasionally in normal operation i.e. a release which, in operating procedures, is anticipated to occur. (Typically likely to be present for between 10 and 1000 hr/year).

c. **Secondary Grade Release** - A release that is unlikely to occur in normal operation and, in any event, will do so only infrequently and for short periods i.e. a release which in operating procedures, is not anticipated to occur. Such releases may be of known size e.g. fracture of a drain, or unknown size e.g.

corrosion hole. (Typically likely to be present for between 1 and 10 hr/year and for short periods).

2.3.07. The grade of release is dependent solely on the frequency and duration of the release. It is completely independent of the rate and quantity of the release, the degree of ventilation, or the characteristics of the fluid, although these factors determine the extent of vapour travel and, in consequence, the dimensional limits of the hazardous area.

2.3.08. Building apertures must be considered as these influence external hazardous Zones. Once the hazardous area classification drawing has been produced, there must not be any changes to the process or layout of the facilities without reference to the competent person responsible for the drawing/zoning. Any modifications may change the Zone classification. Where changes are necessary it is essential that the Zones are checked and reclassified and that the DSEAR risk assessment is amended as appropriate.

SECTION 2 - EXTREME OPERATING CONDITIONS

2.3.09 Care is to be taken on facilities that are storing Class II (2) or Class III (2) fuels respectively in elevated ambient temperatures. If Class II and Class III products are stored above their flashpoint then the ambient temperature can expected to be above 38°C. (Ambient temperatures of +50°C are not uncommon in current operating theatres).

2.3.10. Class II or Class III products, which are stored or handled at temperatures above their flash point, or are stored in conditions that are likely to cause mists or spays, are identified as Class II (2) and Class III (2) products respectively. When F&L products are to be stored in the Class II (2) or Class III (2) condition, or are likely to be exposed to conditions above their flash point *(or within 5°C of flash point),* the facilities should be classified as laid down for Class I and the hazardous Zones are to be marked accordingly.

SECTION 3 - CLASSIFICATION OF AREAS CONTAINING EXPLOSIVE ATMOSPHERS

2.3.11. DSEAR Regulation 7 requires areas where explosive atmospheres may occur to be classified into hazardous and non-hazardous workplaces. Any hazardous workplaces should also be classified into zones. Such workplaces and zones should be identified as part of an employer's assessment of risk under Regulation 5 for further information in regards to DSEAR, refer to JSP 375 Vol 2, leaflet 56.

2.3.12. Hazardous area classification should be carried out as an integral part of a risk assessment process. Its purpose is to define the extent, frequency and duration of any occurrence of an explosive atmosphere (the zone). The zone in turn defines the requirements for the selection and installation of equipment and protective systems so as to prevent sources of ignition.

2.3.13. The controls apply particularly to the selection of fixed equipment that can create an ignition risk; but the same principles may be extended to control the use of mobile equipment; other sources of ignition that may be introduced into the workplace, eg matches and lighters; and the risks from electrostatic discharges.

2.3.14. In relation to equipment, in situations where an explosive atmosphere has a high likelihood of occurring, reliance is placed on using equipment designed for that area, ie

with a low probability of creating a source of ignition. Conversely, where the likelihood of an explosive atmosphere occurring is reduced, equipment constructed to a less rigorous standard may be used.
BS EN 60079/10,65 explains the basic principles of area classification for gases and vapours. These standards form a suitable basis for assessing the extent and type of zone, and can be used as a guide to complying with DSEAR regulation 7 and Schedule 2. However, they cannot give the extent and type of zone in any particular case, as site-specific factors should always be taken into account.

2.3.15. HSE guidance documents and industry codes contain examples of hazardous areas for a number of different circumstances and, provided they are applied appropriately, are valuable in encouraging a consistent interpretation of the requirements. Such guidance and codes include: HSG 140, HSG 71 HSG 51 HSG 176, Energy Institute - Model code of safe practice (Part 15: *Area classification code for installations handling flammable fluids),*74 IP/APEA *Guidance for the design, construction, modification and maintenance of petrol filling stations,*

2.3.16. The conclusions of an area classification study usually take the form of drawings identifying the hazardous areas and types of zones. This is normally supplemented by text giving information about the dangerous substances that will be present, the work activities that have been considered, and other assumptions made by the study. Whenever such drawings and documents have been produced, they should be retained as part of the documentation in support of regulation 5. These documents should be reviewed whenever new equipment is to be introduced into a zoned area.

SECTION 4 - COMPETENCE

2.3.17. Those undertaking DSEAR assessments must be able to demonstrate professional competence, gained preferably through an accredited scheme such as International Electrotechnical Commission Explosive Atmospheres (IECEx) Personal Competencies. Formal training with a recognised body helps with any demonstration of competence that may subsequently be required by the HSE. In addition those deemed competent are to have:

a. Knowledge of all work activities, maintenance operations, dangerous substances stored, used and transported within the adjacent areas identified as or suspected to be hazardous areas

b. Knowledge and experience of explosive atmospheres and associated regulations, the flammable materials and substances involved and the processes and equipment concerned.

This will enable comprehensive risk assessments to be conducted on the likelihood, extent, force and collateral effect of any potential explosion or fire and the subsequent development of zone drawings.

BIBLIOGRAPHY

1. Energy Institute Model Code of Safe Practice Part 15 Area Classification Code for Petroleum Operations.

2. HS (G) 41 Design and Construction of Petrol Filling Stations.

3. APEA/IP Guidance for the Design, Construction, Modification and Maintenance of petrol Filling Stations.

4. DIO DMG 14 Mechanical transports fuelling installations.

5. DIO DMG 13 Mechanical transports facilities.

6. HS (G) 176 The storage of Flammable Liquids in Tanks.

7. HS (G) 51 The Storage of Flammable Liquids in Containers.

8. HS (G) 140 The Safe Use and Handling of Flammable Liquids.

9. HS (G) 71 Chemical warehousing. The storage of packaged dangerous substances. 4th edition

10. Health and Safety Guidance Notes CS 4 The Keeping of LPG in Containers.

11. BS EN 60079 14 Selection, Installation and Maintenance of Electrical Apparatus for use in Potentially Explosive Areas.

12. BS EN 60079 10 Classification of hazardous areas.

13. DIO Functional Standard 14 Design and Installation Guide for Specialist Works on Petroleum Installations – Electrical.

14. Crown Fire Standard E10.

15. The Dangerous Substances and Explosive Atmospheres Regulations 2002.

16. ATEX (‘ATmosphere EXplosif’) directive 94/9/EC which applies mainly to the manufacture of electrical and mechanical equipment.

17. ATEX 'Worker Protection' directive (also known as the 'Use' or 118a/137 directive) which applies mainly to use of equipment.

18. International Safety Guide for Oil Tankers and Terminals.

19. International Electrotechnical Commission. (60079-10).

20. Design, Construction and Operation of Workshops for Petroleum Road Tanker Maintenance, 3rd Edition (Nov 2007).

Part 2

Chapter 4 (Sponsor DIO PTS)

MANAGEMENT MAINTENANCE DESIGN AND CONSTRUCTION ACTIVITY

SECTION 1 - SCOPE AND APPLICATION

2.4.01. The Maintenance Management Organisation (MMO) is the organisation responsible for planning, organising and managing the operation, maintenance and repair of equipment and may include the design and construction of new works. The MMO may be a Contractor, DIO or Military.

SECTION 2 - INSPECTION AND MAINTENANCE

2.4.02. The MOD operates a range of fuel facilities which are maintained by Maintenance Management Organisations (MMO) under contract. An annual Professional Inspection of Fuel Installations and Flammable Dangerous Goods Stores is mandatory within these contracts in order to comply with the requirements of JSP 317 as the professional inspection is an integral element of the Licensing regime.

This professional inspection shall be annual and its purpose is to:

a. Confirm that all currently applicable legislation and legal requirements are adhered to.

b. Confirm that there is a maintenance management system in place (with details) and that the facilities are being maintained to the appropriate standard.

c. Provide a report based on a thorough visual inspection of the facilities.

d. Review non-destructive examination data to ensure appropriate future actions are programmed as part of the asset management strategy.

e. Confirm that the facilities can continue to be used until the next annual inspection or to precisely define the actions required in order for the facilities to continue to be used.

f. It should be noted that this annual professional inspection does not include the evaluation of operating procedures or fuel quality checks, which are detailed elsewhere in this JSP.

2.4.03. It should be noted that this annual professional inspection does not include the evaluation of operating procedures or fuel quality checks, which are detailed elsewhere in this JSP.

2.4.04. Storage tanks and all associated equipment, including walls and fences, must be properly maintained as detailed in Defence Works Functional Standard 07 which covers the scope and frequency of planned inspections and maintenance work. Particular attention must be paid to periodic inspection of electrical equipment and regular inspection and cleaning of interceptors and separators, bunds, vents, slop tanks and buildings where flammable vapour may be present (see also Pt 2 Chapter 5)See Pt 2 Chapter 9 for OWI design and operation.

2.4.05. Compliance with JSP 375 Volume 3 Chapter 5 is mandatory for all persons working on petroleum installations, under the control of the Ministry of Defence (except where agreed with the SAA) from their initial specification and design though their installation operation maintenance and eventual de-commissioning.

SECTION 3 - DESIGN AND CONSTRUCTION WORKS

2.4.06. Construction works are defined within the Construction (Design and Management) Regulations (CDM) and include construction, alteration, conversion, fitting out, renovation, installation, commissioning, repair, upkeep and removal of services.

2.4.07. The client or those specifying works must consider the needs of the operators of the petroleum installations to be able to isolate items of equipment for maintenance. The design must incorporate adequate valves to accommodate safe isolation and draining of the equipment. When producing the design, consideration must be given to the needs of the operator and maintainer of the plant to enable safe working. Although site changes are inevitable, any changes made to the original design are to ensure safe working is not compromised and preserve the ability for safe isolation. The Project Manager in charge of the works is to ensure that any alterations made on site do not affect the application of JSP 375 Volume 3 and relevant Chapters.

2.4.08. At the initial design stage of a project the CDM Client and or designated Project Manager are to formally notify the responsible MMO's Coordinating Authorised Engineer (CAE) appointed for the location, facility or installations at which the works are to take place; to initiate the necessary exchange of pre-construction information and to inform design and build deliberations. The CDM Client must not permit work to commence until they have confirmation from the MMO that plans meet CAE requirements. The CAE is in turn to notify the respective appointed Authorising Engineer(s) AE(s) and ensure that they are available to provide advice to the project team. The CAE is also to ensure the relevant contact details are provided to the CDM Client for onward submission to appointed designers and contractors; where the project is notifiable (see JSP 375 Volume 2 Leaflet 20) the CDM coordinator takes the lead role for coordination and for managing the flow of information between all stakeholders.

2.4.09. On receipt of notification, the AE(s) are to notify the site Safe System Coordinator and appropriate discipline AP(s) of the proposed work within the area for which they are responsible. They, in turn, are to liaise with the Client or Project Manager as appropriate.

2.4.10. Further information on the process between project works and MMO AE and AP(s) including design reviews, commissioning, handover familiarisation and training can be found in JSP 375 Volume 3 Chapter 2 'Common Requirements' .

Part 2

Chapter 5 (Sponsor DIO-SFSM)

FIRE PRECAUTIONS

SECTION 1 – GENERAL

2.5.01. The likelihood of a major fire can be minimised by good plant design and layout, sound engineering, good operating practices and proper instruction, supervision and training of personnel in both routine operations and emergency procedures. Plant design and layout must include the provision of adequate water supplies, fire protection and fire fighting equipment, means of escape for employees and means of access for fire brigades in the event of fire. The level of protection afforded to petroleum facilities will very much depend upon the size, complexity and nature of business conducted at each location. It is important to assess the risks involved at each location and provide and install the appropriate fire safety measures for each particular risk. The Defence Fire Risk Management Organisation (DFRMO) is to be consulted on these matters in order to ensure compliance with all relevant fire safety legislation, for instance DFRMO Fire Safety Risk Assessment (FSRA) and Resource Allocation Risk Management (Re-ARM). The provision (type, quantity and location) of fire extinguishers at facilities will normally be detailed by the Project Fire Officer during the design and construction of the facility, or on acceptance of refurbishment works. The information should also be recorded within the FSRA for the building or facility.

2.5.02. The objective is the elimination of all sources of ignition from areas of petroleum ignition risk and where risks cannot be eliminated, to establish safe systems of control.

2.5.03. Operations and maintenance activities performed in hazardous areas can only be carried out provided that actions to eliminate potential sources of ignition are taken.

2.5.04. Ignition risks apply to Class I, Class II and also to Class III products which are heated to temperatures at or above their flash point. All operating and AP (Pet) procedures inclusive of JSP 375, Volume 3, Chapter 5, Petroleum Appendix 10 must be adhered to at all times. In any case of doubt concerning the possibility of working practices causing ignition risks, reference must be made to the Operating Authority for operational matters, and to the AP (Pet) and the *MOD Safety Poster and Safety Rules and Procedures*, for maintenance work on fixed petroleum installations.

INSTALLATIONS CONTAINING CLASS 3 PRODUCTS

2.5.05. IP Class 3 installations, due to the high flash point of Class 3 products are generally classed as non-hazardous areas. However, there may be circumstances where, due to the nature of the site, the prevailing temperatures, or other factors, hazards abnormal to Class 3 Installations arise. In those circumstances, it may be appropriate to consider the provisions of paragraphs 2.5.09 to 2.5.14.

SECTION 2 – FIRE PLAN

2.5.06. A comprehensive fire plan is to be provided for all locations storing and handling petroleum products. This is to take account of the guidance on fire protection and safety precautions described in this section. Factors to be considered when formulating the fire plan are to include:

a. The nature and quantity of materials processed and stored

b. The proximity of other process plant, storage vessels, works and public buildings and vegetation

c. Fire Service response times

d. Accessibility to the site for fire fighting appliances

e. Emergency escape routes for staff

f. Site security

g. Liaison with DFRMO Fire Service site fire brigades, local fire authorities, medical services and water authorities

h. Environmental effects

2.5.07. The **fire plan is to provide details of:**

a. Fire detection and alarm systems

b. Water and other chemical fire fighting agents

c. Fire fighting equipment

d. Emergency plant shutdown procedures

e. Emergency evacuation procedure and assembly points in a safe location including, where necessary, the establishment and staffing of a fire control centre

f. Staff fire training.

g. The duties of all persons nominated in the plan.

h. Arrangements for the testing and updating of the plan.

COMMUNICATION / ALARMS

2.5.08. There should be an effective means of both raising the alarm and giving warning in case of Fire. It should be audible to all those likely to be affected by the fire. Advice should be sought from the establishment Fire Officer. Communications are required as follows:

a. **BFI**: A telephone is to be provided on the installation.

b. **Mechanical Transport Fuelling Installation (MTFI)**: If the installation is unmanned i.e. it has a Ground Fuel Management System (GFMS), a telephone is to be provided. The telephone is to be in a prominent position and readily identifiable in case of emergency. If the installation is manned then attendants must be made aware of where the nearest telephone is located as part of their induction training.

c. **F&L Store**: There is not a requirement for a telephone to be installed, although establishments may do so as they see fit.

SECTION 3 – HAZARDOUS AREAS

2.5.09. Whenever petroleum products are stored or handled, even in small quantities, hazardous conditions can arise. The extent of all hazardous areas is therefore to be clearly indicated by the use of notices such as 'PETROLEUM SPIRIT – HIGHLY FLAMMABLE – NO SMOKING – NO NAKED LIGHTS', conspicuously displayed in the appropriate languages, with other appropriate hazard warning and supplementary signs conforming in shape, size and colour with the requirements of *the Health and Safety (Safety Signs and Signals) Regulations 1996*. Units in Germany requiring dual language signs should contact the BA (G) Petroleum Inspectorate, HQ 102 Log Bde, BFPO 47 for advice.

2.5.10. Personnel entering or working in hazardous areas or confined spaces are to be made aware of the dangers, particularly the need to ensure that adequate ventilation is available. They are to be conversant with the uses and operation of the fire fighting equipment provided and the method of calling the fire service. Fire Safety Notices & Fire Action Notices must be displayed and comply with the Health and Safety (Safety Signs and Signals) Regulations 1996. Locations and quantities should relate to the local risks and be the result of a risk assessment.

2.5.11. Smoking or smoking materials are not permitted in a hazardous zone. Before personnel enter a hazardous zone or likely hazardous area, all smoking materials should be deposited at a safe and designated contraband appointed place. However within certain petroleum installations or depots, smoking may be permitted in an area or area set aside for the purpose, and where express authority is given. This area must be outside of the area technically classified as a hazardous zone. Equipment for catering purposes and other equipment which potentially is a source of ignition located in such buildings or areas must be of a type which cannot be removed and taken into the defined hazardous zone

2.5.12. The following precautions are to be observed in the selection and use of equipment and clothing within hazardous areas:

a. Footwear studded or tipped with exposed metal must not be worn unless approved over-shoes are also worn. All footwear must be worn in accordance with Part 2 Chapter 2.

b. The wearing or carrying of non ATEX 100a certified portable equipment containing dry batteries, such as transistor radios, portable tape recorders, video cameras, automatic cameras, flash attachments, electronic car keys, calculators (including wrist watch types), mobile phones etc, is prohibited.

c. The wearing of hearing aids is forbidden at Class I and II installations unless they are certified intrinsically safe. Batteries must not be exposed or changed within the Hazardous Area. This rule applies at Class III installations when the product is stored at high temperatures (above its flash point) or under extreme pressure. In certain circumstances, the facility manager may approve the wearing of hearing aids. In each case the facility manager must complete a suitable risk assessment and annotate the individual's Certificate of Competence accordingly

d. Equipment and tools are to be used only for the purposes for which they are designed and care should be taken to prevent improper use. So called safety or non-sparking tools of non-ferrous metal are to be used with caution, as their use can lead to a false sense of security. Such equipment can be more dangerous than ferrous tools in certain circumstances.

e. Equipment must be certified for the hazardous zone, and limited to application in that zone. Equipment with electrical protection suitable for use in Zone 1 can be used in Zone 1 and Zone 2 applications. See Part 2, Chapter 1 and JSP 375 Vol 2, Leaflet 56 for details.

f. All fixed electrical apparatus and associated connections, and all portable items must conform to *BSEN 60079-14* applicable to the zone. (Refer to Part2,Chapter 1 for Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR 02), and Chap 3 *BS EN 60079-10* for hazardous zones, and to the installation hazardous area drawings).

g. Safety cans, safety taps and drip trays are to be utilised whenever possible.

2.5.13. Additional precautions to be applied during the handling of petroleum products in hazardous areas are:

a. When packed products are handled in a hazardous area, adequate precautions are to be taken to avoid the risk of sparks being caused by movement of either the package or any ancillary equipment. (See Part 2, Chapter 7).

b. Any spillage is to be mopped up immediately using sand or approved absorbent material, which must be removed from the area for safe disposal. (See Part 5, Chapter 1).

c. Any leakages are to be reported immediately and action is to be taken to reduce the leakage until permanent repairs are carried out. (See Part 5, Chapter 4).

d. Rags used for cleaning purposes are to be removed from the area immediately after use and disposed of as hazardous waste. Cotton waste is not to be used for cleaning purposes.

e. Loading, offloading, gauging or sampling of vehicles, rail tank cars, ships or tankage involving flammable liquids is not to be undertaken during thunderstorms, snow storms or hail storms, or where there is reason to believe that disturbed atmospheric electrical conditions could occur. (See Part 2, Chapter 10).

f. Oxidisers and acids are not to be stored with flammable liquids.

g. Glass bottles and broken glass must not be left in a hazardous area due to possible ignition conditions in sunlight.

2.5.14. All electrical apparatus and associated wiring, including portable lighting, is to conform to the requirements laid down in *BSEN 60079-14 Electrical Installations in Hazardous Areas other than Mines.* Overhead power cables are not permitted.

2.5.15. Telephones and other communications circuits are to be Atex 100a certified if sited within the hazardous zone. Before radio or radar equipment is sited or operated near a hazardous area, advice is to be sought from the appropriate technical authority.

2.5.16. The following precautions are to be observed in considering the use of heat producing equipment within hazardous areas:

a. Welding/cutting with the use of naked flame equipment and the creation of sparks by any work process is not permitted until the area has been certified gas free by a competent person in accordance with the *MOD Safety Rules and Procedures for Work on Petroleum Installations*.

b. Open fires, naked light heaters, open electric or gas elements and stoves are prohibited.

2.5.17. Grass and vegetation is to be cut and removed to a minimum of 15 m from the source of the hazard. Grass cutting and the removal of vegetation within the hazardous area must be carried out in accordance with the *MOD Safety Rules and Procedures for Work on Petroleum Installations*. Isolated deciduous trees may be left but coniferous trees are not permitted within the hazardous area. Where it is necessary to use weed-killers to control vegetation, they are to be of a chlorate-free type.

SECTION 4 – DUTY OF CARE

2.5.18. Personnel are to take the following precautions in petroleum installations:

a. All personnel working in the installation must be conversant with their duties in order that the current procedures for operating are followed. Personnel are to be trained and certified as a competent person in accordance with Part 2, Chapter 6.

b. All personnel working in an installation are to be fully instructed in, and have easy access to, all relevant information and safety regulations concerning the installation. In particular they must be conversant with the action to take in the event of an emergency and the method of calling the fire service. Comprehensive records of all personnel training are to be maintained.

c. Smoking is prohibited in an installation, except in such buildings or areas as may be set aside for the purpose, i.e. where express authority has been given. A source of ignition is to be provided in such buildings or areas and must be of a type that cannot be removed.

d. Matches, cigarette lighters or any other means of causing ignition are to be withdrawn into safe custody from personnel entering the installation.

e. Footwear of personnel working in, or entering, the hazardous area of an installation are not to have exposed metal studs or tips unless approved overshoes are worn.

f. When clothing is splashed with F&L products, it is to be removed as soon as possible and then washed before re-use. However, the friction caused by changing or removing clothing can, in certain circumstances, cause a source of ignition due to electro-static discharge. For this reason, the changing or removal of clothing within a hazardous area is prohibited, where applicable drench showers should be used.

g. Personnel are not to smoke or go near any open flames while wearing working clothing if it is contaminated in the slightest degree with F&L.

SECTION 5 – MISCELLANEOUS

2.5.19. **Inspections**. Hazardous areas are to be inspected regularly by a competent person delegated by the Commanding Officer to ensure necessary precautions are being observed. The appropriate authority must inspect all equipment, apparatus, tanks, pipelines etc, at frequent and regular intervals, so they are well maintained and checked to ensure earthing continuity.

2.5.20. **Repair of Cans, Drums and Vehicle Fuel Tanks**. There have been many accidents, some fatal, due to inadequate precautions being taken before the repair of cans, drums and vehicle fuel tanks. Before repairs requiring the use of heat or ferrous tools, all F&L containers are to be cleaned and made gas-free. These precautions must be taken irrespective of the Class of product that the container has previously held, or the time that the container has been empty. Closures must be opened or bungs removed before welding takes place.

2.5.21. The risks of the siting of radio, radar or laser equipment near to the Hazardous Area must be assessed, to ascertain if ignitions conditions can be created.

2.5.22. The siting of a petroleum installation within the sphere of influence of radio, radar or laser equipment must be checked for the risks of the creation of ignition conditions. (Refer to Siting board, Part 1,Chapter 2).

2.5.23. Dispensing and receiving equipment for loading and discharge operators to and from Bulk Fuel Installations, as distinct from Mechanical Transport Fuelling Installations, must be electrically bonded to ensure equi-potential before the operation can commence. The hazards associated with static are stated at Part 2, Chapter 13.

2.5.24. Administration. The following administrative action is to be taken:

a. If a catastrophic release of product occurs the MACR plan, if applicable, is to be instigated. If such an area is outside the jurisdiction of the Services the co-operation of the police is to be sought in enforcing the appropriate precautions.

b. Emergency procedures are to be prepared and exercised regularly. Liaison is to be established and a joint plan agreed and practised with local civil and military emergency services. A copy of the Fire Plan is to be held at the main gate/reception and handed to local fire brigade officers when attending an incident at the site.

c. A good housekeeping standard is to be maintained. Rubbish and refuse of any kind is to be removed.

d. Installations are to be protected by security fences, unless inherently secure, as within a secure area.

e. No vehicle is to be allowed to enter an installation unless authorised to do so. Only authorised equipment, plant, vehicles or locomotives may enter a Hazardous Area.

f. Pipelines and fittings are to be marked for identification purposes in accordance with *British Standard 1710: Identification of Pipelines and Services*, and *Def Stan 05-52 Part 2: Markings for the Identification of Fuels, Lubricants and Associated Products – Containers Over 205 Litres and Pipelines*.

g. Bonding connections, particularly on standpipes and hydrant points, are to kept free from paint and corrosion and be subject to periodic test.

h. Where a permit to work system is taken into use, the *H&S Commission Guide to the Principles and Operation of Permit to Work Procedures* are to be applied. For permanent installations, permit procedures are covered by the *MOD Safety Rules and Procedures for Work on Petroleum Installations*, which must be adhered to.

FIRE FIGHTING EQUIPMENT – SCALING AND SITING

2.5.25. The likelihood of a major fire can be minimised by good plant design and layout, sound engineering, good operating practice and proper instruction and training of personnel in routine operations and in emergency procedures. Plant design and layout must include the provision of water supplies, fire protection equipment, fire fighting, means of escape, means of access for fire brigade, appliances, protection of fire-fighters and arrangements to ensure an early call-out of the fire brigade in the event of fire. The MOD Fire Services must be consulted on these matters, at the planning stage in the case of new or altered facilities as well as reference to the *Crown Fire Standards*.

2.5.26. **Fire Notices**. Fire Actions posters in the Event of Fire are to be placed close to all fire extinguishers, on notice boards and at the park entrance point.

2.5.27. **Packed F&L Locations**. The number and location of all fire fighting equipment is to be determined by the Unit Fire Officer.

2.5.28. **MTFI.** The number and location of fire fighting equipment is to be determined by the Defence Fire Adviser. Table 2.5.1 lists the minimum scaling to prevent any small incipient fire spreading to the MTFI facilities.

Number of dispensers	Number of extinguishers required
Up to four	At least two
For each additional two dispensers	One more
Notes: 1. Equipment shall be in accordance with the Crown Fire Standard D1. 2. It is recommended that these extinguishers should be either AFFF 9 ltr Foam (temperate conditions) or Dry Powder with a capacity of at least 4.5 kg (where temperatures can be expected to remain below freezing for lengthy periods) 3. Hydrants if required are to be sized and located to enable the requirements of Fire Standard D3 to be met. 4. On Operations the number of fire extinguishers must be commensurate with the increased risk. Up to four dispensers at least **four** extinguishers are required and one more for each additional dispenser.	

Table 2.5.1 Portable Fire Extinguishers

2.5.29. **BFCV Parks**. Extinguishers Flurochemical Foam 90 Litre are to be provided to the scale of two for the first 12 BFCVs and one for each additional 12 or part thereof. Extinguishers are to be sited not less than 15 m from any BFCV in an easily accessible position.

2.5.30. **Permanent Bulk Fuel Installations**. The number, type and location of all fire fighting equipment is to be determined by the Defence Fire Adviser. Hydrants are to be sized and located to enable the requirements of *Crown Fire Standard D3 Water Supplies for Fire Fighting* to be met.

2.5.31. Manually operated fire alarms systems are to be in accordance with *Crown Fire Standard D5 Fire Warning Systems Manually Operated*.

2.5.32. Roads and hard standing shall meet the requirements of *Crown Fire Standard D8 Access and Facilities for the Fire Service*.

2.5.33. Where tank cooling is deemed to be necessary, either due to spacing between the tanks or due to a specific requirement from the Defence Fire Service; this should be in accordance with Table 3.11.1. *IP Model Code of Practice part 19* also specifies the required duration of tank cooling and how to calculate the required surface area. Cooling water should not be applied to the roof of floating tanks. Consideration is to be given to installation of measures to contain the fire fighting water run off.

Criteria	Flowrate	Source Document
Cooling of a tank if it is enveloped in flame due to its bund being on fire	10 litres/min/m²	IP Model Code of Safe Practice Part 19
Cooling of a tank if an adjacent tank is on fire	2 litres/min/m²	IP Model Code of Safe Practice Part 19

Table 2.5.2 – Tank cooling chart.

Note: Further guidance on the above can be obtained from DIO Fuels and Mechanical.

2.5.34. **Waste F&L Installations**. The number and location of all fire fighting equipment is to be determined by the Unit Fire Officer.

SECTION 6 DEPLOYED F&L INSTALLATIONS

2.5.35. This section will detail the fire cover for all deployed sites that store F&L products within a deployed and operational F&L installation.

2.5.36. Suitable and sufficient fire fighting equipment will be required to cover the event of a break out of fires within the installation and to ensure that all personnel are adequately protected from the fire where there is no DFRMO cover.

2.5.37. To assist in establishing a suitable fire cover and fire plan, the competent fire representative is to use the deployed FLG risk assessment at Annex A, as well as using the basic fire risk assessments from JSP 426.

2.5.38. All personnel who are required to work within a F&L compound are required to meet the training standards within JSP 426. However, personnel working on DBFI are required to attend in-unit training on TFHE Fire fighting equipment and the practice the procedures on an annual basis.

2.5.39. These standards are additional requirement to the required standards laid down within JSP 426.

BIBLIOGRAPHY

1. Crown Fire Standards (CFS)

2. Fire and Rescue Services (Northern Ireland) Order 2006

3. Regulatory Reform (Fire Safety) Order 2005

4.Building Regulations 2010

5.The Building (Scotland) Amended Regulations 2010

6. Health and Safety at Work Act 1974

7. Safety at Work (NI) Order 1978

8. The Control of Industrial Major Accident Hazard Regulations 1984 (CIMAH) and the Control of Major Accident Hazard Regulations (NI) 1985 (as amended in 1988 and 1991)

9. The Control of Substances Hazardous to Health Regulations 1994 (COSHH) and the Control of Substances Hazardous to Health regulations (NI) 1990 (as amended in 1972 and 1993)

10. The Construction (Design and Management) Regulations 1994 and the Construction (Design and Management) Regulations (NI) 1995 (CDM)

11. Management of Health and Safety at Work regulations 1992 and Management of Health and Safety at Work Regulations (NI) 1992

12. JSP 426 MOD Fire Safety Policy

13. Defence Works Functional Standards

14. British Standards Series

15. MOD Fire Safety Management Plan (FSMP)

16. Resource Allocation Risk Management (Re-ARM)

17. Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR 02),

18. Equipment & Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 1996.

DEPLOYED FUELS, LUBRICANTS AND GASES STORAGE INSTALLATIONS RISK ASSESSMENT	
Site / Establishment:	
Building No. and Title or Address:	
Duty holder:	
Assessor:	
DFRMO Supporting Officer:	
Date of Fire Risk Assessment Review:	
Date of Previous Fire Risk Assessment or Review:	
Date for Next Fire Risk Assessment or Review:	
Notes:	

GAS CYLINDER STORAGE Up to 25000 kg outdoors	Yes	No	REMARKS
Store cylinders in a well ventilated area – preferably in open air. Minimum Separation distances in Meters: The hazardous storage area must be away from any fire risk and sources of heat and ignition. The storage area must be free from naked flames and smoking in all direction of a minimum of 3m. Is access restricted to authorised personnel, where there is a clear gangways; wide enough to exit the storage area in an emergency? Is there fire-fighting equipment available? The minimum of fire protection is a minimum of two x 9 kg dry powder fire extinguishers suitable for use on a Class C (gases or liquefiable gases) fire. Quantity stored: Up to 400kgs - 2 x 9kg dry powder 401kgs to 1000kgs 2 x 9kg dry powder 2 x 50 kg dry powder 1001kgs to 2500kgs 4 x 9kg dry powder 2 x 50kg dry powder 2500kgs up to 5000kgs 6 x 9kg dry powder 4 x 50kg dry powder >5000kgs 8 x 9kg dry powder 6 x 50kg dry powder Is there a fire plan that relates to the storage area? Are fire notices located in key positions that clearly identify the procedures of an outbreak of a fire? Record of fire practices are carried out on a monthly basis? Records of fire extinguishers are inspected on an annual basis. Is there a record of fire-trained personnel? Are there firewalls in position?			

PACK FUEL AND LUBRICANTS STORAGE	YES	NO	REMARKS
The hazardous storage area must be away from any fire risk and sources of heat and ignition. The storage area must be free from naked flames and smoking in all direction from the following: 1000L – 2m 1001L – 100'000L – 4m >100,000L – 7.5m Is access restricted to authorised personnel, where there is a clear gangways; wide enough to exit the storage area in an emergency? Is there fire-fighting equipment available? Quantity stored: Up to 1000L - 2 x 9L foam extinguisher 1001L to 2000L - 2 x 9L foam Extinguisher 2 x 90L foam 2001L to 4500L - 4 x 9L Foam 2 x 90L Foam 2500L up to 5000L - 6 x 9L foam 3 x 90L foam >5000L 8 x 9L foam 4 x 90L foam Is there a fire plan that relates to the storage area? Are fire notices located in key positions that clearly identify the procedures of an outbreak of a fire? Is there a method of raising an alarm of a break out of a fire? Record of fire practices are carried out on a monthly basis? Record of fire extinguishers being inspected on an annual basis? Is there a record of fire-trained personnel?			

MOTOR TRANSPORT FUELLING INSTALLATION	YES	NO	REMAKS
Is there a fire plan that relates to the storage area? Are fire notices located in key positions that clearly identify the procedures of an outbreak of a fire? Record of fire practices being carried out on a monthly basis? Is there fire-fighting equipment available? Quantity stored: There must a minimum of 2 x 9L foam extinguisher on the Dispense Point (DP). If there is no supporting fire cover available .e.g. trained Fire-fighters with fire fighting equipment. There will be a requirement for a minimum of 40,000L Emergency Water Supply (EWS) with foaming making equipment ready to be deployed. Is there a method of raising an alarm of a break out of a fire? Record of fire extinguishers are inspected on an annual basis? Is there a record of fire-trained personnel?			
DELPOYED BULK FUEL INSTALLATION (DBFI)	**YES**	**NO**	**REMARKS**
Is the storage area clearly identified by Hazardous Warning Signs stating “**Petroleum Spirit, Highly Flammable, No smoking No Naked lights**” are displayed. The Hazardous area must be away from any fire risk and sources of heat and ignition. The storage area must be free from naked flames and smoking in all direction of a minimum of 10m? Is access restricted to authorised personnel, where there is a clear gangways; wide enough to exit the storage area in an emergency? Smoking or smoking materials are not permitted in hazardous zone. All smoking materials should be deposited at a safe and designated contraband appointed place.			

A comprehensive fire plan is to be provided for all locations storing and handling petroleum products. Consideration has should be given for the inclusion of the following – • Fire detection and alarm systems • Water and other chemical fire fighting agents • Fire fighting equipment • Emergency shut down procedures • Emergency evacuation procedures & assembly points • Staff fire training • Duties of persons nominated in the plan • Arrangements for testing and updating the plan Fire Fighting Equipment must be located at the following location within a BFI: **Dispense Point**: 2 x 2 kg dry powder covering pumping unit. 2 x 90L foam extinguisher covering the DP. **Aircraft issuing points**: 2 x 6 kg dry powder **Individual Site locations**: Note: In the absence of a fire Safety Management Plan the following is to be provided as a minimum: 2 x 90L foam extinguisher is required per storage bund holding fuel. 25L foam containers are to be positioned at each bund. 1 x TFC holding 40m³ of water and full CES of TFHE fire fighting equipment must be positioned within the DBFI. Is there a fire plan that relates to the storage area? Are fire notices located in key positions that clearly identify the procedures of an outbreak of a fire? Record of fire practices are carried out on a monthly basis? Record of fire extinguishers are inspected on an annual basis? Is there a method of raising an alarm of a break out of a fire? Is there a record of fire-trained personnel?			

BULK FUEL CARRYING VEHICLE PARK	YES	NO	REMARKS
The Hazardous area must be away from any fire risk and sources of heat and ignition. The storage area must be free from naked flames and smoking in all direction of a minimum of 10m? Is access restricted to authorised personnel, where there is a clear gangways; wide enough to exit the storage area in an emergency? Smoking or smoking materials are not permitted in hazardous zone. All smoking materials should be deposited at a safe and designated contraband appointed place. A comprehensive fire plan is to be provided for all locations storing and handling petroleum products. It should include details of – • Fire detection and alarm systems • Water and other chemical fire fighting agents • Fire fighting equipment • Emergency shut down procedures • Emergency evacuation procedures & assembly points • Staff fire training • Duties of persons nominated in the plan • Arrangements for testing and updating the plan Fire Fighting Equipment must be located at the following location within the park: • Two x 90L foam extinguisher covering 12 BFCVs • One additional 90L extinguisher thereafter per 12 BFCVs Is there a fire plan that relates to the storage area? Are fire notices located in key positions that clearly identify the procedures of an outbreak of a fire? Record of fire practices are carried out on a monthly basis? Record of fire extinguishers are inspected on an annual basis? Is there a method of raising an alarm of a break out of a fire?			

Is there a record of fire-trained personnel?			

RECOMMENDATIONS FROM RISK ASSESSOR:

Name of Assessor		Position	
Signature of Assessor		Date:	

F&L SNCO RECOMMENDATIONS:

Name of SNCO		Position	
Signature of SNCO		Date:	

DUTY HOLDERS RECOMMENDATIONS:

Name of Duty Holder		Position	
Signature of Duty Holder		Date:	

Part 2

Chapter 6 (Sponsor FGSR Inspector 1)

PRINCIPLES OF COMPETENT PERSONS WITHIN AN F&L ENVIRONMENT

SECTION 1 - INTRODUCTION

2.6.01. **Scope**. This chapter has been written to assist MOD establishments to correctly scale, train and appoint competent persons within F&L environments, and should be used in conjunction with MOD policy detailing mandated trained personnel for all Arms and Services.

2.6.02. **Legislation**. The Health and Safety at Work Etc. Act 1974 (HSWA) and enabling regulations provide the legislative framework for the safe storage and handling of fuel, lubricants and associated products within the MOD. The MOD does not exercise any exemption to the Act within the Home Base. It should be noted that certain exemptions apply within Military Works Areas and the principle of 'so far as is reasonably practicable (SFARP)' is replaced with 'as low as is reasonably practicable (ALARP)'. Further to the criteria laid out in this publication, JSP 375 requires that the MOD policy regarding HSWA is to be applied at all units/establishments worldwide, unless an existing Status of Forces Agreement (SOFA) requires the application of more onerous or stringent Host Nation legislation, regulation or requirements. In all cases JSP 375 is to be used as a point of reference.

2.6.03. **Head of Establishment**. The Head of Establishment (HoE) is bound in Law to ensure that all personnel are made aware of and comply with the Health and Safety arrangements applicable to the site. This includes visitors, members of the public and contracted parties. Contractors may already have their own separate company policy or arrangements, but it is stressed that any separate policy must be compatible with, and augment the arrangements made by the HoE.

SECTION 2 - GENERAL

2.6.04. **Legislative Compliance**. The HSWA requires the employer (HoE) to provide suitable and sufficient information, instruction, training and supervision as is necessary to ensure so far as reasonably practicable the health and safety at work of his employees. This responsibility may be formally delegated (but not formally discharged) within the chain of command.

2.6.05. **F&L Manager**. Hazardous environments containing products classified by the Institute of Petroleum (IP) as Class 1, 2 or 3 are to managed/supervised by a person who has been deemed as a Suitably Qualified and Experienced Person (SQEP). In the case of F&L, training, qualification and competency is certified with the appointment of a F&L Manager. The F&L Manager may manage a single fuel site, a group of local fuel sites, or indeed a complete region of fuel sites, the workload being dictated by the specifics of the site(s). For example, disparate Search & Rescue fuel sites may be managed by a single appointed F&L Manager, whereas a major garrison may dictate the scaling of numerous F&L Managers to cope with the scale of the infrastructure and fuel throughput.

2.6.06. **Establishment Appointments**. The size and complexity of F&L infrastructure will dictate the appropriate scale of staff. For example, an MTFI comprising a single diesel dispense point will require fewer installation operators than a major air/avn hub servicing both ground and airborne platforms. Between the HoE, the F&L Manager, and the operators, the HoE may appoint such staff at differing levels of management as is required to adequately manage and operate the F&L site(s). Whilst the HoE need not be specifically fuels trained, the staff directly managing and operating the site will require specific fuels training pertinent to their role, see Annex A. This JSP does not dictate a strict F&L management structure from HoE to operator, rather the TLBs, establishments and supporting contractors have scope to develop a management structure to suit their needs. In all cases however it is assumed that there will be a HoE responsible for H&S of his/her staff at the top of the establishment, and operators working on the fuel site. Example appointments are:

a. **HoE**. Typically the senior person of the establishment. Not necessarily fuels trained.

b. **Officer In Charge (OIC)**. The officer or person appointed to oversee the F&L site. Not necessarily fuels trained. May also be the HoE in the case of smaller establishments, whereby the HoE directly assumes management of the fuel site. The OIC may be a post appointed solely for the fuel site (OIC Fuels), or may be a secondary role for a QM or MTO.

c. **F&L Manager**. The holder of this post is to be formally fuels trained, see Annex A. May also be the OIC or HoE in the case of the smallest MOD establishments. Typically of Sgt/Cpl or equivalent service rank or civilian grade. May also be referred to as the SNCO Fuels. Main roles are the management of installation operators, management of wet stock quantities and rotation, undertaking of fuel quality assurance, monitoring of the F&L site infrastructure, coordination of in-unit F&L training such as spill response exercises, liaison with the Maintenance Management Organisation for routine inspections and infrastructure works, and liaison with the Aquatrine Service Provider (or local equivalent).

d. **Installation Operator**. Typically of rank range Pte to Cpl, or other service/civilian organisation equivalent. An operator is to hold a Certificate of Competency (CoC) see Annex B. In-unit instruction as per the requirements of the CoC is to be primarily coordinated by the F&L Manager. Specifically, RAF Senior Aircraftmen (SACs) employed in F&L duties may require attendance on RAF Halton F&L Section Operators course depending on their Job Specification (JS) TORs. Other operators need not undertake any further formal training above that covered in the CoC unless their JS TORs dictate otherwise. Main roles are to undertake the receipt and issue of fuel, undertake fuel quality testing, replenish stocks of PPE and PCS on site, undertake tank dipping as required, assist in the management of wet stock, site husbandry, and reporting of any infrastructure failures.

2.6.07. **Maintenance Management Organisation (MMO)**. In most cases across the MOD establishments will be supported by a contractor to undertake periodic inspection and maintenance of the F&L infrastructure. Examples are Aspire Defence Services Limited, Carillion, PriDE, Babcock, etc. Whilst inspections such as an annual electrical test, and pump calibrations, will be actively programmed by the MMO, the F&L Manager may liaise with the MMO Authorised Person (Petroleum) (AP Pet) to address non-routine infrastructure work such as arising from wear and tear, malfunction or damage.

2.6.08. **Project Aquatrine**. The 3 main Aquatrine Service Providers (ASPs); Kelda Water Services (KWS), Veolia Water Nevis (VWN), and Coast to Coast (C2C), deliver the maintenance of water drainage systems in the UK (from point of leaving buildings to local water authority drainage systems). The F&L site Oil Water Interceptors (OWIs) in the UK are therefore likely to be managed and maintained by an ASP. For Northern Ireland, Germany, and Rest of World, drainage management principles should be sought from the local water drainage governing body. It is key that the F&L Manager establishes liaison with the ASP or other relevant body, partly to ensure the site interceptor is maintained and fit for purpose, and also in formulating a Spillage Response Plan.

SECTION 3 – TRAINING/COMPETENCE OF MOD PERSONNEL/CIVILIAN CONTRACTORS

2.6.09. **Trade Training**. Certain trade training goes above and beyond the scope of this chapter, for example, the cleaning of sea vessel petroleum bulk storage tanks (RN only). Tri-service establishments should always staff correctly trained to undertake specific F&L duties unless express dispensation is given on a task basis. This dispensation is to be written and logged as part of a risk assessment.

2.6.10. **Validity**. Where training qualifications are not life-time awards, i.e. have a set expiry date, the individual and the chain of command are to ensure personnel in F&L posts undertake refresher or re-training as required.

2.6.11. **RAF Specific Training**. Annex C details Royal Air Force specific training for fuels competent persons. *(Sub-sponsor HQ Air Comd)*.

2.6.12. **Training Providers**. The training and qualification for F&L Managers within the MOD is provided by the Defence College of Logistics and Personnel Administration and delivered at the DPS and the LSTS. Military and civilian staff employed as F&L Managers are to undertake the required training for their posts at these locations.

2.6.13. **External Training**. Training support for bespoke courses not delivered at DPS or LSTS may be sourced from external providers subject to TLB authority.

2.6.14. **Course Loading**. The following course loading procedures are accurate as at 15 May 12, and apply equally to formed military units, and contractors supporting the MOD. Whereas reference is made specifically to mandatory training courses for Army personnel, equivalent read-across should be made to other Arms and Services, including contractors.

2.6.15. **SOTR Course Planning**. The Statement of Trained Requirement (SOTR) process looks out 18-24 months, and sets the scale of training requirements. This process is jointly run by HQ DRLC and HQ 22 Training Group, and invites all interested parties including contractors into the process; JSP 822 refers.

2.6.16. **Mandated Course Trained Personnel**. 2010DIN07-179: Mandated Course Trained Personnel within an Army Unit[1], mandates the training requirements for Army units. The December 2010 release of this DIN currently omits the F&L Managers course, however it is due to be included in future releases, and can be used as authority to bid for individual course places in line with those agreed in the SOTR process.

2.6.17. **ARTD Courses of Instructions**. Army Recruiting and Training Division (ARTD), Courses of Instructions - All Arms webpage[2] hosts the following pamphlets, which detail the course dates of both the All Arms Fuel & Lubricants Manager and F&L Section Managers and Supervisors:

Pam 10F - DCLPA, DLS, Defence Petroleum School.
Pam 10H - DCLPA, DLS, RAF Logistics & Supply Training Squadron.

2.6.18. **ITD(A) Course Bids**. Whilst Army units are to submit their course applications via email to DCLPA-DLS-DPS-CLKT and DCLPA-DLS-DPS-ClkA2, non MOD civilians are requested to bid via:

Courses Clerk, International Defence Training (Army)
Mil: 94344 8079/8091, Civ:01980 618091

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[1] http://defenceintranet.diiweb.r.mil.uk/DefenceIntranet/Library/CivilianAndJointService/BrowseDocumentCategories/TrainingAndEducation/TrainEdDelCourses/MilitaryTrainingIndividual/Din2010din07179.htm

[2] http://atrateams.tafmisweb.tafmis.r.mil.uk/teams/ops/coipam1/default.aspx

Annex A to
Part 2
Chapter 6

APPOINTMENT OF STAFF TO UNDERTAKE PETROLEUM DUTIES

1. **Responsibilities**.

HEAD OF ESTABLISHMENT

The HoE is responsible for ensuring that all personnel under their command/management have received specific fuels training as required, and are qualified for the specific petroleum duties on which they are employed.

↓

QM/MTO/TLB EQUIVALENT

As delegated by the HoE, the QM or equivalent is to identify any fuel installations present within the geographical boundaries of the establishment, i.e. a MTFI, BFI, Bulk Fuel Carrying Vehicle (BFCV) park, gas cylinder compound, etc. Specifically for a MTFI or BFI, a F&L Manager must be appointed. The F&L Manager may cover a single establishment or indeed be responsible for the fuel installations over a number of establishments, the decision being taken by the local chain of command. A F&L Manger, where appointed is to undertake the All Arms Fuel & Lubricants Manager Course and/or the F&L Section Managers And Supervisors Course, see course selection flowchart below.

↓

F&L MANAGER

Once trained, the F&L Manager is to coordinate the completion of CoCs for any operators employed in petroleum duties on that site. For example a Army unit MTFI will typically have an F&L Manager (CSgt/Sgt), and 2-3 operators at Pte-Cpl.

↓

INSTALLATION OPERATOR

2. **F&L Managers' Courses Selection**.

GROUND FUEL MTFI	AVIATION BFI*	GROUND FUEL MTFI & AVIATION BFI
↓	↓	↓
ALL ARMS FUEL & LUBRICANTS MANAGER COURSE Defence Petroleum School West Moors	**F&L SECTION MANAGERS AND SUPERVISORS COURSE** Logistics (Supply) Training School RAF Halton	

* In most cases Aviation BFIs are operated by RAF or Army Air Corps personnel who have received specific aviation fuels training. However in some instances RLC Petroleum Operators may be required to undertake the role of SNCO IC of an Aviation BFI. In this instance they may be required to attend the F&L Section Managers and Supervisors Course at the Logistics (Supply) Training School RAF Halton, in addition to completing all necessary trade courses.

CERTIFICATE OF COMPETENCE FOR PERSONNEL OPERATING BULK FUELS INSTALLATIONS

Annex B to Part 2 Chapter 6

Part A Personal Details

Rank/Grade	Initials & Name	Service Number

Part B Authorised Person (Petroleum)

I have briefed the person named in Part A on the safe methods of work for each of the installations listed in Part E, including:

- An overview of the site-specific schematic
- The building intake switch & main fuel valves
- Appointment procedures of the FM & maintenance team
- Roles & duties of the FM & maintenance team
- Overview of equipment & site specific anomalies
- Hazards specific to petroleum products
- An overview of the Permit to Work system
- Appointment procedures, roles and duties of the OA in maintenance works
- Details of site-specific routine maintenance tasks
- Details of future maintenance tasks including new works
- The procedure for reporting defects

Name	Signature	Date

Part C Fire Training

The person named in Part A has been trained to operate First Aid Fire Appliances and Fire Hydrant systems appropriate to local procedures for Fuels Operators.

Name	Signature	Date

Part D Training/Familiarisation

	Trained		Tested	
	Date	By	Date	By
▪ Bulk issue and receipt procedures				
▪ Water checks				
▪ Quality checks				
▪ Installation(s) operations				
▪ Use of PPE				
▪ Unit spillage response plan				
▪ Use of PCE/PCS				
▪ Fuels accounting (JSP 886 Vol 6 Pt 2)				

Part E Installations Authorised to Operate

CERTIFICATE OF COMPETENCE FOR PERSONNEL OPERATING BULK FUELS INSTALLATIONS

Part F Colour Perception (If applicable)

Standard					
Signature					
Date					

Part G Training Declaration by the Fuels Operator

I have received the training listed at Part D which is sufficient for me to operate the installations at Part E unsupervised.

I have informed my line manager of all relevant physical and medical conditions that could be aggravated by working in a bulk fuels environment. I will inform my line manager at the earliest opportunity of any circumstances that develop which might have a negative effect on health and safety at work.

Rank/Grade	Name	Signature	Date

Part H Assessment by the SNCO (or equivalent) or Delegated Person in Charge of the Installation(s)

The person named at Part A has received specific fuels training and has demonstrated his/her competency to operate the installations listed at part E unsupervised

Rank/Grade	Name	Signature	Date

Part I Authority From OC or Delegated Person to Operate Bulk Fuel Installation Unsupervised

The person named in Part A is authorised to operate the installation(s) listed at Part E unsupervised.

Rank/Grade	Name	Signature	Date

Part J Annual Review by the Officer in Charge of Fuels

Date of Review	Rank & Name	Signature	Remarks

***Certificate of Competence Completion Notes**:*

Part A. Details of the operator to be deemed competent.

Part B. The briefing shall be carried out by a representative from the MMO who has an in-depth knowledge of the site fuel installations, the equipment, maintenance and operation. The MMO Authorised Person Petroleum (AP Pet) shall provide an overview of the MOD Safety Rules and Procedures Petroleum (JSP 375 Volume 3 Chapter 5), with specific reference to the roles and duties of the AP Pet and Operating Authority.

Part C. A competent fire authority is to deliver fire training on the specific fire fighting appliances deployed at the installation(s). This part is signed by the fire instructor.

Part D. The F&L Manager delivers training in all areas detailed in this part and signs and dates the trained column on completion. The F&L Manager is then to test the operator, and sign and date once satisfied with the operator's competency.

Part E. Lists the fuel installations that the operator is deemed competent to operate.

Part F. This part is not applicable to all fuel installations. The minimum colour perception standard for Installation Operators whose duties include driving on active airfields is normally CP2. Similar conditions may apply in other locations and should be taken into consideration by the fuels officer, who will decide if a test is required.

Part G. This part is the operator's declaration that he/she has successful completed all aspects of the training objectives and is sufficiently confident to execute duties on the sites recorded. By signing this part the operator also confirms that he/she has informed line managers of any physical or medical conditions which may be aggravated as a result of working in fuel environments.

Part H. The F&L Manager signs this part on completion of all training and testing.

Part I. This part should be completed by the OIC Fuels or delegated person in charge of the installation(s) i.e. QM or MTO, or equivalent, having received confirmation from the F&L Manager that the operator is competent.

Part J. The F&L Manager is to re-test the operator on an annual basis from the date of the initial training. If the operator fails any test they are to be re-trained in the specific area(s) and re-tested until deemed competent. Once confirmed the OIC fuels or equivalent is to sign this part, with the process repeating annually.

Part 2

Chapter 7 (HQLF Tech WO)

SAFE PRINCIPLES FOR PACKED STOCK STORAGE

SECTION 1 - GENERAL

2.7.1. The storage of packed dangerous substances and flammable liquids can present serious risks not only to personnel but also to the environment. Breakage of storage containers can result in toxic or flammable substances being released into the atmosphere. Incidents that can cause the greatest concern are those that result in fire. The effects of a fire involving a dangerous substance include smoke, toxic fumes, explosions, and widespread distribution of substances harmful to the environment either in air or water borne media.

2.7.2. Therefore, the primary requirement for the correct storage of packed stock is to ensure the safety of MOD personnel and others who may be affected by the storage of packed dangerous substances and flammable liquids. In addition to the safety requirements, the storage of packed stock must provide the most efficient and environmentally friendly storage conditions appropriate to the products to be stored. To achieve this, a suitable storage facility is to be provided, i.e. storage area/compound, building, or room. The storage conditions that the facility should provide would depend on the nature and condition of the products to be stored and should be identified at the planning stage see paragraph 2.7.5.

2.7.3. This chapter details some of the practical measures to achieve the most suitable storage for packed stock to ensure that these requirements are achieved and details some of the key planning considerations for the suitable storage conditions. This includes the design, siting, and construction of permanent and semi-permanent facilities, and the requirements for the use of F&L storage lockers. Further information is contained within *HS(G) 51 & 71* and detailed MOD construction standards are at *DEO (W) Functional Standard Design and Maintenance Guide 03 'Storage of Dangerous Substances'*.

2.7.4. The guidance in this chapter is to be applied to all new and significantly modified storage facilities for packed stocks of dangerous substances and flammable liquids in containers with a capacity of 1,000 litres or less. For those existing installations that do not fully comply with these design and construction guidelines, the officer responsible for the installation should conduct a risk assessment of its non-compliant aspects. Areas of risk can include health and safety, fuel quality and environmental issues. The assessment outcomes are to be recorded and should form the basis for deciding the level of development required for the continued operation of the site. All changes in legislation which are pertinent to dangerous or flammable substances are to be implemented by units within the time-scale provided.

SECTION 2 - DESIGN

2.7.5. A high degree of consideration should be given at the planning stage to all sites and buildings where packed dangerous substances and flammable liquids are to be stored, whether this is for a new construction, or the refurbishment or modification of existing stores. A risk assessment is to be carried out in each instance and where appropriate, specialist advice should be sought from the Unit Fire Officer or FLC. If necessary, specialist advice may be requested from 170 (Infra Sp) Engr Gp or DIO. The risk assessment is to cover the following factors:

a. The quantity of hazardous product to be stored.

b. Specific hazards of the materials.

c. The intended location/siting of the store/compound.

d. The age and condition of any existing installation.

e. Other hazardous processes/materials being carried out or stored in the vicinity.

f. The cost of the works[1].

2.7.6. The scope of the assessment need not only include building/engineering design and installation standards, but also good management practices and operational procedures.

2.7.7. A complete risk assessment made under *the Management of Health and Safety at Work Regulations 1992* will also have to consider other hazards, such as manual handling and transport safety, which are not within the scope of this chapter.

2.7.8. This chapter covers construction specifications that will provide protection for the environment. Detailed information on the environmental hazards posed by flammable products is detailed at Part 5 of this JSP.

SECTION 3 - UN HAZARD CLASSIFICATION

2.7.9. The UN Classification Categories at Table 2.7.1 are applicable for storage of substances used as part of normal maintenance and operations.

UN Class	Classification
2.1	Flammable Gas
2.2	Non - Flammable, Non - Toxic Gas
2.3	Toxic Gas
3	Flammable Liquid
4.1	Flammable Solid
4.2	Pyrophoric and Oxidative Self-Heating Substance
4.3	Substance which in contact with water emit a Flammable Gas
5.1	Oxidising Substances

[1] This will not be an overriding factor. It may influence the solution, but should not undermine the project.

5.2	Organic Peroxide
6.1	Toxic Substances
8	Corrosive Substances

Table 2.7.1 - UN Hazard Classification Categories

Additional highly specialist precautions are required for the storage of substances within the UN Classes detailed at Table 2.7.2. UN Class 1, 6.2 and 7 are not covered within this Publication. Operators may be required, in some instances, to store UN Class 9 substances that have quite varied properties and the MSDS must be referred to, to ascertain the specific hazards. MSDS can be found in JSP 515.

UN Class	Classification
1	Explosives
6.2	Infectious Substances
7	Radioactive Substances
9	Miscellaneous Dangerous Substances

Table 2.7.2 - UN Hazard Classification Categories Requiring Specialist Precautions

SECTION 4 - SITING AND SEPARATION DISTANCE

2.7.10. All permanent and semi-permanent storage facilities are to be subject to a properly constituted siting board, as detailed at Part 1, Chapter 2, Section 3.

2.7.11. The storage of dangerous substances is subject to civilian legal requirements whose compliance is the responsibility of the Commanding Officer or Head of Establishment. The application of such requirements is dependent on the quantity and type of substance to be stored.

2.7.12. Packed stocks are to be stored well away from other processes and general storage areas, which are best achieved by physical distance, but a barrier such as a firewall or partition, can be used. Flammable liquids and dangerous substances should not be stored or handled within the prescribed safety distances for ammunition and other explosives unless authorised. Details of the prescribed distances can be found in JSP 482.

OUTDOOR STORAGE

2.7.13. Containers stored in the open air need to be located in well-ventilated areas, away from sources of ignition. The location needs to be designed to minimise the effect of heat from fire within the compound or outside the compound boundary.

2.7.14. Open-air compounds require separation distances from potential sources of ignition, boundaries, public roads, railway lines, and occupied buildings as shown at Table *2.7.3.* Although these distances may not provide complete protection to people or structures from fire in the flammable liquid storage area, they should allow time to evacuate to a place of safety.

GENERAL STORAGE

Quantity Stored (litres)	Minimum Separation Distance (m)
< 1,000	2
1,001 - 100,000	4
>100,000	7.5

Table 2.7.3 - Minimum Separation Distance

Notes:

1. The maximum stack size should be 300,000 ltrs, with at least 4 m between stacks.

2. Containers should not be stored within the bund of a fixed flammable liquid storage tank or within 1 m of the tank bund wall. Separation distances must be maintained from any building or potential source of ignition, and from any boundary, public road, and railway line. Any reduction in these separation distances must be in accordance with a siting board as detailed in Part 1, Chapter 2, Section 3.

2.7.15. A fire wall is a solid wall, screen, or partition providing at least 30 minutes fire resistance. Fire walls protect containers of flammable liquid from the effects of radiated heat from a nearby fire. A fire wall can also ensure adequate dispersion distance from buildings, boundaries, or sources of ignition for flammable liquid or vapour leaking from any container. Figure 2.7.1 provides examples of separation distance reduction that may be achieved through the use of firewalls.

2.7.16. Firewalls need to be at least as high as the container stack, with a minimum height of 2 m, and should be sited within 3 m of the stack. Provided these conditions can be met, the firewall may form part of a bund wall, building wall or boundary wall. The wall needs to be long enough to ensure that the distance between the edge of the bund and building, boundary or source of ignition is at least the appropriate distance quoted in Table 2.7.3, measured around the ends of the wall, see Figure 2.7.1.

a. Separation distance without a firewall

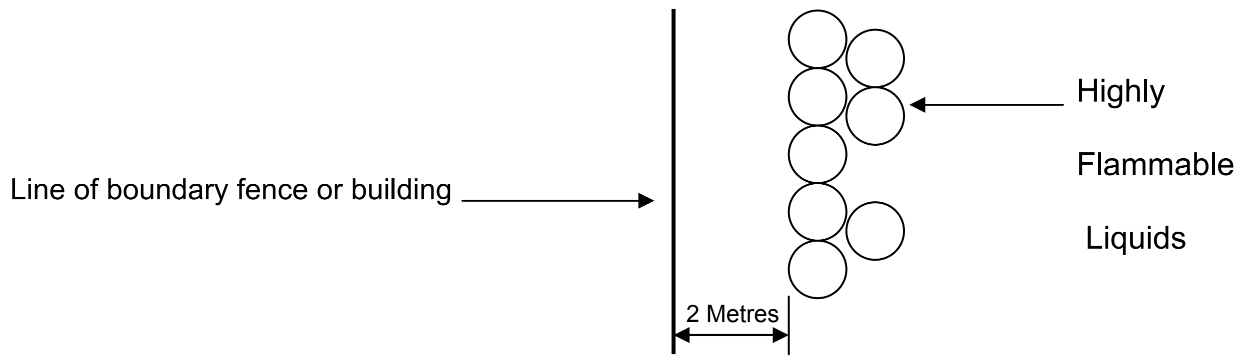
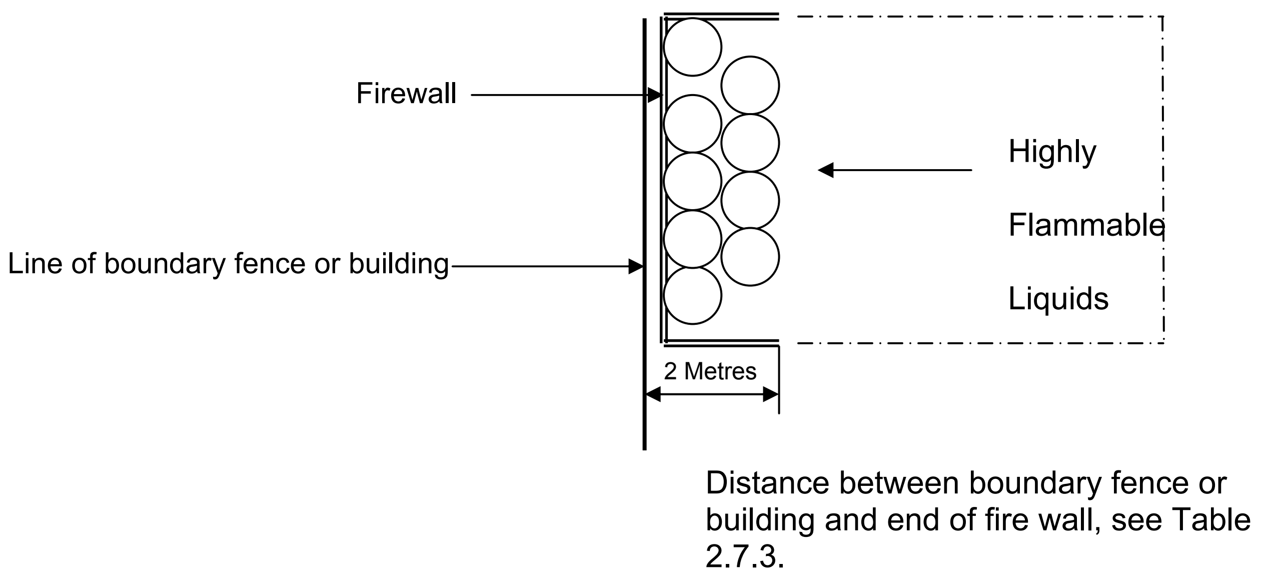


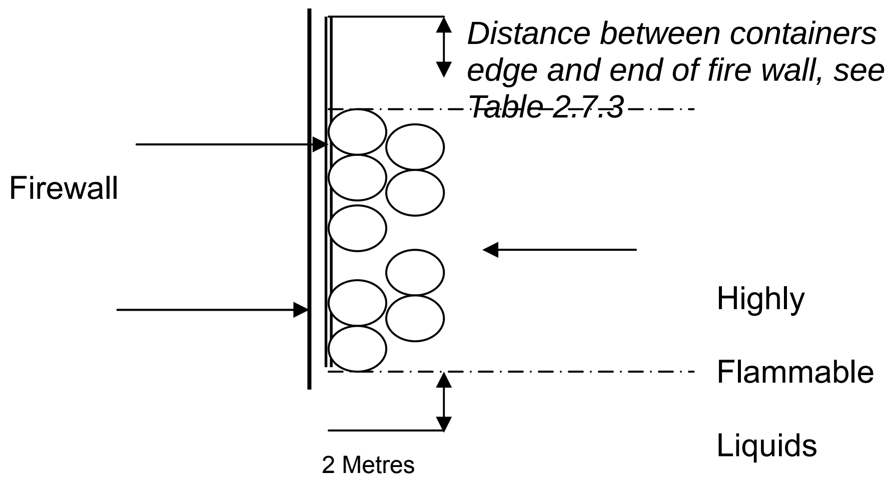
Figure 2.7.1 Separation distance for highly flammable liquids in drums and similar portable containers stored outside (viewed from above).

Note: Distance between boundary fence or building and edge of containers, see Table 2.7.3.

b. Separation distance with a fire wall



c. Separation distance with a firewall alternative arrangement.



Distance between containers edge and end of fire wall, see Table 2.7.3.

Figure 2.7.2 - General layout of external storage area

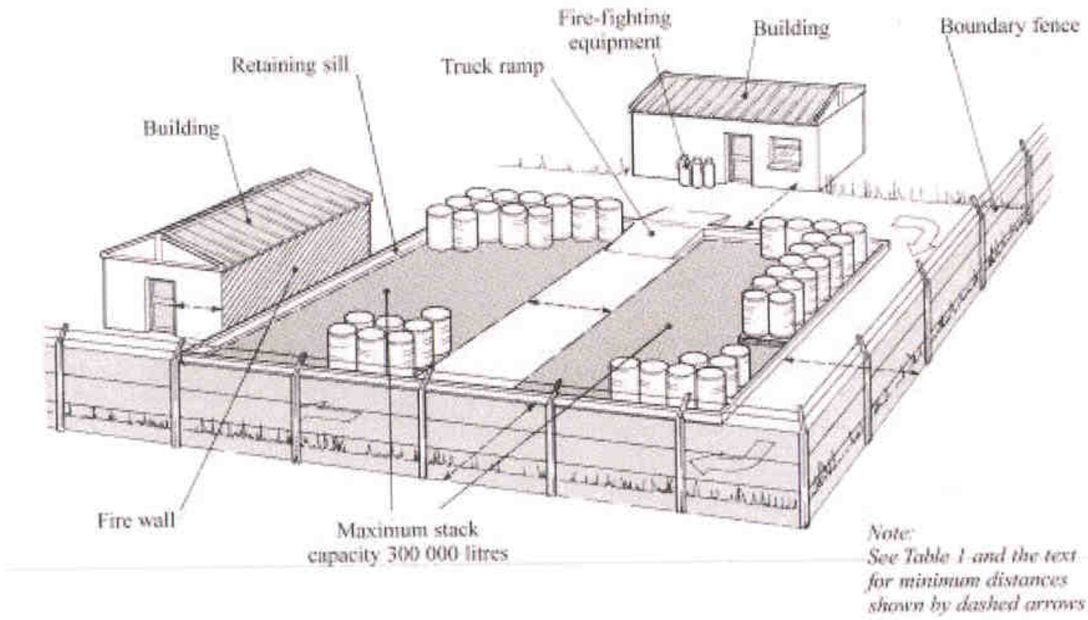


Figure 2.7.2 - General layout of external storage area

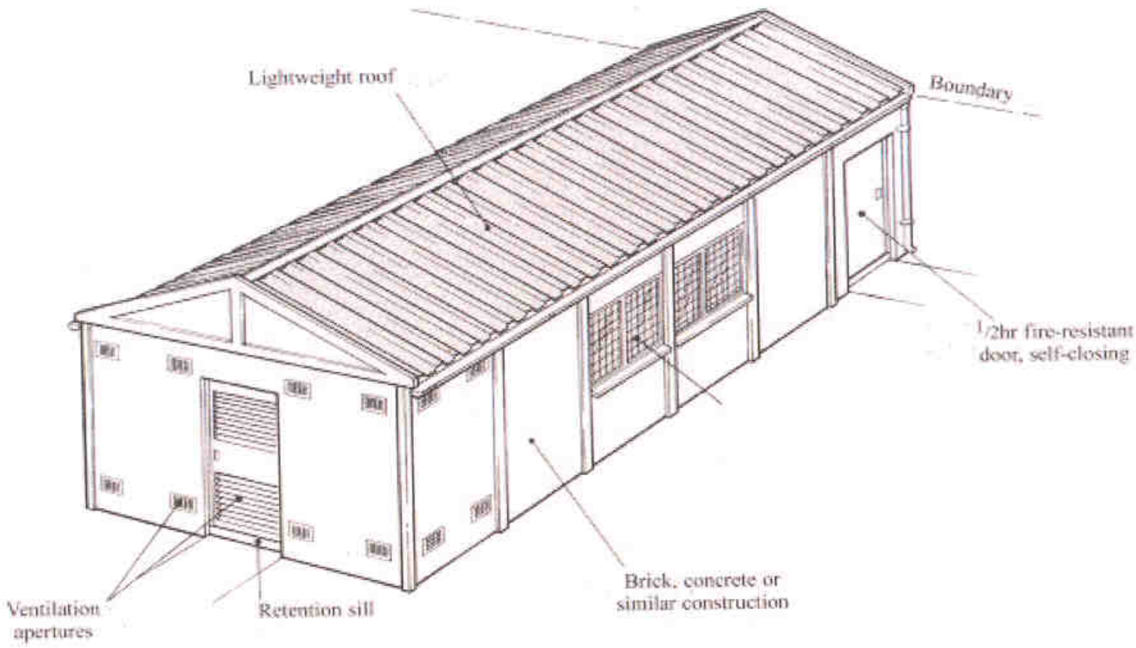


Figure 2.7.3 - External storage building (fire-resisting)

2.7.17. If flammable liquids are to be stored within specially designed separate builds, the control measures necessary to minimise fire and explosion risks are largely dependent on the location of the building.

2.7.18. Buildings sited in an area deemed a safe place, ie the distance between the outside wall of the building and any other building, boundary etc is at least that appropriate distance quoted in Table 2.7.3, the control measures are identical to those for the outdoor storage.

2.7.19. The use of a fire wall can also be considered for any part of a building located within the separation distances to the boundary detailed in Table 2.7.1 (see Figure 2.7.1c), namely:

a. The wall of the building on the boundary side is a fire wall; and

b. **Either** the walls of the building at right angles to the boundary are firewalls for at least 4 m from the boundary, **or** the firewall extends along the boundary for at least 4 m beyond the store on either side. *(The increased distance 4 m quoted above is to reduce the threat that a fire in the store would pose to adjacent buildings on or off-site, and to prevent the possible spread of flammable vapours into uncontrolled areas)*.

2.7.20. The precautions for storing containers in storerooms, which form part of a building used for other purposes, is essentially a variation of the measures covered above for separate buildings not in a safe place.

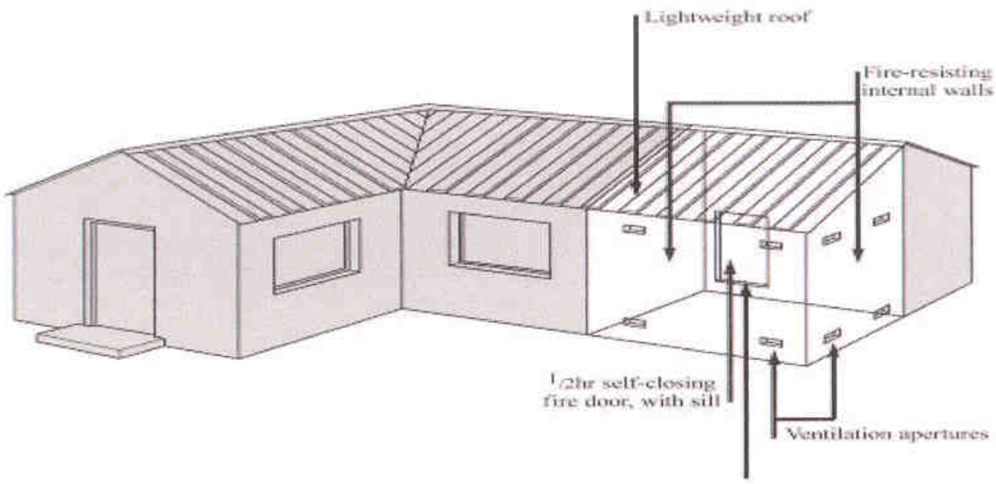


Figure 2.7.4 - An example of a suitable storeroom in a building. In the case of a multi-storey, advice should be sought from the relevant enforcing authority.

MANAGEMENT OF TEMPORARY CONTAINMENT PALLETS

2.7.21. The Control of Pollution (Oil Storage) (England) Regulations 2001, and the Water Environment (Oil Storage) (Scotland) Regulations 2006 mandate that above ground storage tanks greater than 200 Litres must be provided with secondary containment, (a bund or drip tray) to ensure any leaking or spilt oil cannot enter controlled waters. See Part 5 Chapter 1 for further details. Units may local purchase temporary containment bunded pallets if there is a requirement to store 205 Litre drums, and / or Intermediate Bulk Containers (IBCs), but they must ensure that temporary containment bunded pallets are compliant with in accordance with Article 5.1.17 and 5.1.20 respectively.

2.7.22. Oil shall be stored in a container which is sufficient strength and structural integrity to ensure that is unlikely to burst or leak in its ordinary use. The container must be situated within a secondary containment system which satisfies the following requirements.

a. It must have a capacity of not less than 110% of the containers storage capacity or, if there is more than one container within the system, of not less than 110% of the largest containers storage capacity or 25 % of their aggregate storage capacity.

b. It must be positioned, or other steps must be taken, so as to minimise any risk of damage by impact so far as reasonably practicable.

2.7.23. Where a drum is used in conjunction with a drip tray as the secondary containment system, it is sufficient if the tray has a capacity of not less than 25% of

a. The drums capacity; or

b. If there is more than one drum used at the same time with the tray, the aggregate storage capacity of the drums.

INDOOR

2.7.24. Units that store F&L within a building in Scotland; refer to Art 5.1.20. If the F&L stores' building itself is not bunded, then compliant "open" trays shall be used to store containers that are greater than 200 Litres.

OUTDOOR

2.7.25. Units that do not have F&L stores and utilise F&L compounds in the open with no weather protection shall store containers greater that 200 Litres on compliant temporary containment bunded pallets. It is recommended that weatherproof temporary containment bunded pallets are to be used when storing F&L in the open.

MANAGEMENT AND CONTROL

2.7.26. Management and basic husbandry of temporary containment bunded pallets is an important unit responsibility to reduce environmental incidents and reduce the risk of fire in the case of a spillage of a flammable substance. Temporary containment bunded pallets are manufactured from galvanized steel or UV / chemical resistant polyethylene. Both these type of bunded pallets have a limited shelf life and are only guaranteed by the manufacture for a 5 year operating life. Before purchasing temporary containment bunded pallets, units should consider whether a purpose built packed stock F&L compound /store is more cost effective. The following procedures are to be implemented and adhered to by units that are in possession of temporary containment bunded pallets:

a. Temporary containment bunded pallets are to receive weekly management checks to ensure no product has escaped.

b. Any release of product is to be cleaned up immediately and contaminated sorbents disposed of correctly as hazardous waste.

c. If product has escaped, the F&L account is to be adjusted in accordance with JSP 886.

d. The weekly check should also include a damage check to ensure that the integrity of the temporary containment bunded pallet remains intact. Damage that is not investigated may result in the unit purchasing a replacement.

e. Temporary containment bunded pallets stored outside should be regularly inspected to ensure no rainwater has collected in the sump, thereby reducing the storage capacity.

f. All temporary bunded pallets purchased by units should be recorded on a register, controlled by the PCO, as part of the USRP.

g. Any temporary containment bunded pallet older than 5 years shall have an inspection by the user to ensure that it retains full integrity, is compliant, and remains fit for purpose.

h. When using temporary containment bunded pallets, units shall still comply with segregation and separation rules.

i. The procurement/demand of the above storage media will only be authorised when recommended by the HQLF Petroleum Inspectorates as a result of a Logistic Support Inspection (LSI) Report.

SECTION 5 - DESIGN AND CONSTRUCTION

2.7.27. Protection against the dangers arising from storing dangerous substances could be compromised by the failure of the packaging that will result in leakage, which may in turn lead to a fire. The intensity of a fire, or its rate of growth, may be increased if incompatible materials are stored together. For example, oxidising agents will greatly increase the severity of a flammable liquid fire. In addition, a fire may grow and involve dangerous substances which themselves are not combustible. In this way, toxic materials can be widely dispersed in the smoke plume or carried in fire water. To prevent this type of escalation a system of segregation is necessary in storing dangerous substances.

SUBSTANCE SEGREGATION

2.7.28. The MOD policy is to provide storage for packed stock by UN Class compatibility. This does require the segregation of certain UN Classes as indicated at Table 2.7.4. This could be interpreted to provide a minimum number of store rooms in relation to substance compatibility.

Store Room	UN Class
1	2.2, 2.3, 4.3, 5.1, 6.1, 8
2	2.2, 3, 4.1, 6.1, 8
3	4.2, 6.1, 8
4	2.1, 6.1, 8
5	5.2, 6.1, 8

Table 2.7.4 – Store Room Requirements for UN Class Segregation.

Notes:

a. Within each storeroom the following UN Classes must be separated by a minimum of 3 m from any other Class, 2.1, 4.2, 5.2 and 3.

b. Additionally 3 m separation is required between 4.1 and 6.1, 2.2 and 8, 2.2 and 3, 5.1 and 8, 5.1 and 4.3, 2.3 and 8, 2.3 and 4.3, 2.2 and 2.3.

c. A reduction in the number of UN Classes stored may decrease the number of storerooms required.

d. Annex A lists product storage compatibility.

2.7.29. A separate room is required for repackaging of damaged containers, which can also act as a quarantine and transit area. This room is not required to be part of the store building and may be part of another building at the site. In an open compound this is to be a segregated area provided with drip trays.

2.7.30. If acid is to be stored, physical segregation or, preferably, a dedicated storage room is required with an adjacent emergency drench shower and eyewash.

2.7.31. It is important to have means of controlling spillages and releases within the storage area to prevent the uncontrolled spreading of flammable liquids. The preferred option is that a 75-mm retention sill surrounds stores or the floor is recessed to this depth, sloping towards a sump sized to contain the largest container stored within the room. An alternative approach would be to provide a 150-mm retaining sill without the provision of a sump, provided containment of the largest container is achieved. Sumps are not permitted to be connected to a drainage system.

2.7.32. If aqueous dangerous goods (e.g. AL 39) or marine pollutants are stored, the area **must** be bunded or so arranged to prevent any spillage from entering the drainage system.

2.7.33. Any storeroom/building intended to store LPG is not to be provided with sumps, drains or gullies, JSP 319 refers. Gas bottles, including medical gases, whether full or empty, are to be stored separately from packed stock in accordance with JSP 319.

2.7.34. Bunds for open-air compounds are to be of sufficient height to contain 110% of the largest container. A means of removing accumulated water from the bund is required. This water is classed as contaminated and should be disposed of as hazardous waste. Access ramps to either closed or open-air storage are to have a maximum slope of 1 in 15.

2.7.35. **Fire Protection and Escape**. All F&L stores/buildings should be constructed using non-combustible materials. The store building is to be provided with a lightweight roof to act as an explosive relief conduit, such a roof may be feasible for stores in single-storey buildings. Alternatively relief panels may be placed in one or more walls, provided they vent to a safe place.

2.7.36. **Means of Escape**. First establish the purpose of the building, in the case of flammable materials it is deemed a "Place of Special Fire Hazard". The distance of travel is not to exceed more than 9 m in one direction, if the means of escape is provided in more than one direction, the maximum travel distance is limited to 18 m. Emergency exits need to be obvious and gangway widths between stacks must remain constant or increase along the exit route. Gangways are to have a minimum width of 1.5 m. Exits are to open outwards and are to be immediately operable utilising a single action device by the person(s) making their escape without resorting to the use of a key. The advice of the Unit Fire Officer should be sought.

2.7.37. **Electrical Design**. The electrical equipment designated is to be Zone 2, Ex N; the most onerous temperature class is to be determined by the product range to be stored. Refer to BS EN 60079-01:2006.

2.7.38. **Lighting**. Lighting is to be installed to provide an average luminance of 200 lux at 0.8 m above ground. Emergency lighting is to be in accordance with *BS 5266 Part1* to give luminance of 2 lux for 3 hours at floor level.

2.7.39. **Lightning Protection**. A lightning protection system compliant with *BS 6651* is to be installed.

2.7.40. **Communication**. There should be an effective means of both raising the alarm and giving warning in case of fire. It should be audible to all those likely to be affected by the fire. Advice should be sought from the establishment Fire Officer. If a phone is not fitted, a risk assessment should be carried out. There must be access to a phone within a reasonable distance, which is to be clearly sign-posted.

VENTILATION

2.7.41. To prevent dangerous concentrations of flammable vapours building up in a store or storage area a good standard of ventilation in buildings or rooms used for storage is required, to disperse the vapour. The ventilation arrangements need to take into account the heavy nature of the vapours ensuring adequate air movement at high and low levels.

2.7.42. A standard of five air changes per hour is recommended. Ventilation openings are to have a total area equivalent to 1-3% of the total area of the walls to the outside air. In cases of doubt, measurement may be taken of the air change rate actually achieved in a completed building. Figure 2.7.5 shows the ideal high and low ventilation, air circulation is encouraged by wind forces resulting in thermal currents within the store. For small buildings, the simplest method of ensuring adequate ventilation is to be fixed, permanent openings (such as air bricks or louvers etc) at high and low levels in external walls to the outside air.

2.7.43. For ventilation requirements of Liquid Petroleum Gas stores / rooms see JSP 319.

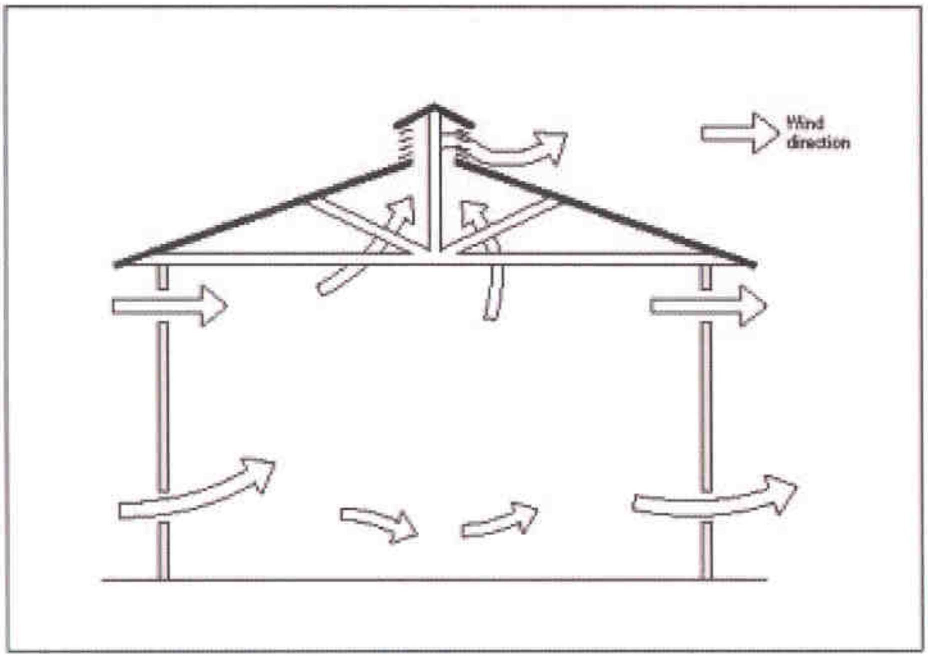


Figure 2.7.5 - Roof and Wall Ventilation.

2.7.44. **Hazardous Warning Signs**. Signs are to be displayed at all storeroom entrance points indicating the nature and the flammability of the substance, the marking must be clear and bold. The signs are to indicate the UN Classes stored within that storeroom and there is to be a sign stating "PETROLEUM SPIRIT HIGHLY FLAMMABLE, NO SMOKING, NO NAKED LIGHTS" see Figure 2.7.6. For facilities located overseas there is a legal requirement to display notices in the language(s) relevant to that country, a dual language notice is required for non-English speaking countries.

Figure 2.7.6 - Packed F&L Storage Area - Hazard Warning Sign

2.7.45. **Fire Fighting Equipment**. The number and location of all fire fighting equipment is to be determined by the Unit Fire Officer.

2.7.46. Pollution Control. Pollution Control Points are to be established at all F&L storage sites (except F&L lockers). The number and location should be determined by a Risk Assessment in consultation with the Unit Environmental Protection Officer or Pollution Control Officer.

SECTION 6 - OPERATING PROCEDURES

2.7.47. **Information and Training**. All personnel involved with the handling of flammable liquids are to receive specific training in both normal and emergency operating procedures. Periodic training will also be required to keep personnel updated.

2.7.48. Qualified personnel are deemed competent as described in Part 2 Chapter 6 as those who have attend the F&L Manager course held at the Defence Petroleum School.

STORAGE OF HAZARDOUS SUBSTANCES

2.7.49. The intensity of a fire, or its growth, may be increased if incompatible materials are stored together. For example, Oxidising Agents will greatly increase the severity of a flammable liquid fire. In addition, a fire may grow and involve dangerous substances which in themselves are not combustible. Resulting in the possible release of toxic substances by the means of a smoke plume or carried in the fire-fighting water, leading to potential consequences off-site to people or the environment

2.7.50. It is the segregation policy, which should be used to prevent these types of escalation. Annex A gives recommendations for the segregation of dangerous substances according to their classification.

SECTION 7 - STORAGE CRITERIA

2.7.51. Where intense heat is encountered (e.g. desert conditions etc), solar protection must be given, such protection is to include unhindered natural airflow, storage priority should be given to highly volatile products (Fire retardant camouflage nets maybe used).

2.7.52. Under normal circumstances if covered accommodation is available preference is to be given to products in the following priority:

a. Lubricating oils and greases in cartons or cases.

b. Lubricating oils and greases in uncased containers.

c. Aviation Fuels.

d. Diesel and heavier fuels.

e. Coolants.

f. Other fuels, including gasoline.

2.7.53. Containers with a capacity no greater than 200 litres and intended for use on the same day or shift may be stored temporarily outside a building providing the container is properly closed and labelled and the building wall is a fire wall.

2.7.54. Temporary storage of any container is not to be within 2 m of any door or plain glazed window, drain, ventilation opening or means of escape regardless of vertical distance, or otherwise so as to put at risk any means of escape from the building or area concerned.

2.7.55. Unused containers are to be returned to a storage area at the end of the working day or shift period.

2.7.56. Containers are to be so stacked so that any leaks are visible and easily detected.

2.7.57. Locations are to be inspected regularly for leakage, which on discovery are to be decanted into sound containers which are specifically designated for the storage of F&L.

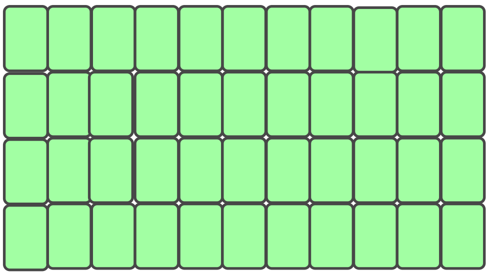
2.7.58. The frequency of inspection will vary according to the amount of product being stored but should as a minimum requirement is to be implemented weekly.

SECTION 8 - STACKING OF CONTAINERS

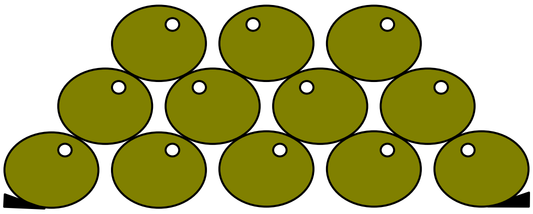
2.7.59. Schaefer F&L pallets and other suitable storage media should be used. Alternatively containers are to be stacked as follows:

a. **25 litre drums**.

(1) **Indoors**. Stacked upright with each tier inset half a drum. Where the design of the drum makes this method impracticable, the drums are to be stacked immediately on top of each other. The height is not to exceed 5 tiers.



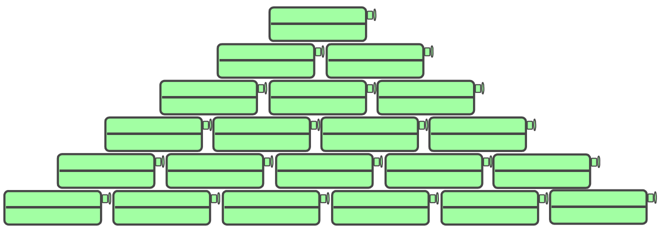
(2) **Outdoors**. Belly stack in rows of 2 butt to butt and up to 5 tiers high. Filler caps are to face outwards just below the liquid level in the drums. Bungs are to be inspected before stacking. A lane 2 m wide is to be left between each double row.



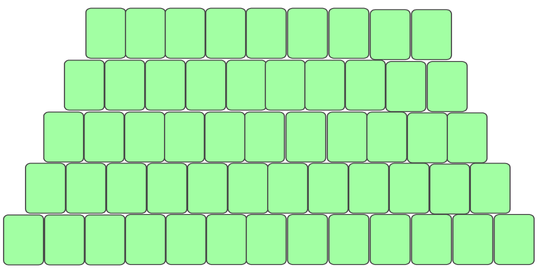
b. **Large Drums in Excess of 25 Litres**. These should not be stored in the upright position outdoors as water will collect within the chimb and the top will eventually rust through. All filled drums (200 litres and above), are to be belly stacked (stored on their sides), with both closures below the liquid and in such a position that the depth of liquid above the closure is as small as possible. They are to be stored in rows of 2, butt to butt, with the end bungs outward. Normally they should be stored 1 tier high but if real estate does not permit this then 3 tiers is acceptable. Ensure drums are stored on hard dry standings otherwise their weight will cause them to sink and rust will form.

Note: See paragraph 5.1.26 for the storage regulations for containers of 200 litres or more.

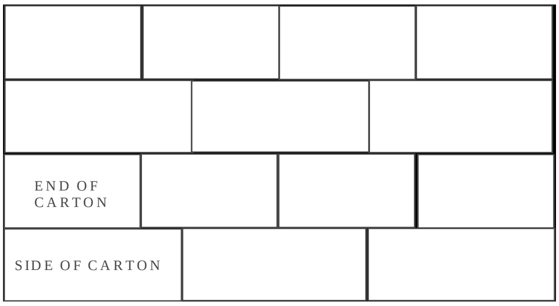
c. **Jerricans**. These are to be stored where possible upright to avoid leakage from closures. Jerricans can be stacked up to 4 tiers high but where real estate permits, 2 tiers upright should be provided for ease of working and extraction of leakers. On uneven ground belly stacking may prove necessary and if this is the case then closures are to be uppermost. Jerricans can be belly stacked up to 10 tiers high.



d. **Grease**. Grease in individual tins or kegs should be stacked upright not more than 5 tiers high and inset by half a tin in diameter at each tier, wherever possible these products are to be under cover.



e. **Cartonised Stocks**. All stocks in cartons/fibreboard overpacking, are whenever possible to be stored under cover. If stored outside the stack is to be provided with a tarpaulin cover. Cartons may be stacked up to 6 high and raised up from the ground by means of metal or brick dunnage to avoid deterioration from damp.



f. **Palletised Containers**. The method of stacking is dependent on the size of the pallet and containers. In general the height of stacking is limited by the Materials Handling Equipment (MHE) available. Larger lanes are to be left between stacks to allow MHE to manoeuvre, but in no circumstances are the safety distances prescribed to be reduced.

2.7.60. **Empty Containers**. Closures of empty containers are to be closed, bungs are to be replaced and screwed tight.

2.7.61. Packed stocks of Class I or II which do not exceed a liquid capacity of 100,000 litres are to be a minimum of 10 m from public roads, dwelling houses, occupied premises and railway lines where there is a possible hazard from locomotives or electrical power lines and any source of ignition.

2.7.62. Packed stocks in excess of 100,000 litres, unless given special dispensation by an authorised Siting Board, are in the case of Class I or II products to be a minimum of 15 m from all buildings and areas. Dispensation will not be granted for distances less than 15 m.

2.7.63. Where vehicles are permitted to enter packed petroleum stock areas, stacks are to be wide enough to accommodate the vehicle without the requirement for manoeuvring.

2.7.64. Ramps with a maximum slope of 1 in 15 are to be provided if access to packed stock areas requires a vehicle to manoeuvre over a retaining sill.

2.7.65. Where drums or other large containers are required to be moved by hand, cradles or trolleys are to be provided to minimise product spillage and injury to personnel as per JSP 375 Vol 2 Leaflet 4.

2.7.66. Petroleum products are to be stored under secure conditions. The storage and handling of petroleum products is to be forbidden within 15 m of any source of ignition, which may cause a fire or explosion.

2.7.67. Petroleum containers full or empty are not to be stored or left on wooden floors. Nor should they be left in barrack rooms, tents, garages or other places unless specifically authorised for the storage of petroleum.

SECTION 9 - CONTAINER WASHING, DECANTING & FILLING OPERATIONS

2.7.68. The risks associated with the washing, decanting and filling of containers are considerable. In addition to the precautions detailed in Part 2, Chapter 11 the following additional precautions are to be observed:

a. A competent person is to supervise all operations.

b. These operations are only to take place in locations designated for such a purposes and clearly marked as hazardous areas.

c. These operations are only to take place in locations where any spillage can be contained and prevented from seeping into soil, entering drains, sumps or underground conduits.

d. When these operations are being carried out under cover, particular attention is to be given to ensuring that the ventilation system provided is functioning correctly. A Vapour Gas Combustible indicator of an approved type is to be in use throughout the operation.

e. Personnel engaged in these operations are to wear protective clothing and use a protective barrier cream. If clothing is contaminated, it is to be removed as soon as possible and washed prior to reuse.

f. Care must be taken to ensure that the correct markings and labels corresponding to the contents are put on containers.

g. Containers are not to be filled in the back of vehicles.

STORAGE OF SMALL QUANTITIES

2.7.69. There may be a requirement to hold small quantities of F&L forward of the main store in direct support of operations or workshop activities, only the minimum quantity consistent with the need of the operation should be held forward. In compliance with The Highly Flammable Liquids & Liquefied Petroleum Gases Regulations 1972, up to 50 litres of highly flammable liquids (UN Classes 3.1 and 3.2) or small containers and cans of up to 250 litres of flash point liquids (UN Class 3.3 and those with a Flash point above 61°c) may be stored in the workplace under the following conditions:

a. Storage is maintained in approved fire resisting cabinets or bins constructed/tested in accordance with *BS 476*, and marked with the appropriate hazard warning signs as at figure 2.7.7.

b. The cabinet or locker is to be sited in a designated area at least 3 m and preferably 5 m away from the working or process activities. They are not to be sited below any opening or means of escape, regardless of vertical distance, including external stairways which are fire escapes. The Unit Fire Officer should be approached for guidance as each case for storage will have differing safety considerations.

2.7.70. The control of F&L products held forward by sub-units in workshops and bays presents various degrees of risk ranging from the hazards presented by the products themselves, through to the potential for cross contamination of vehicle components or weapon, aircraft and other systems due to poor husbandry. Additionally, poor husbandry could lead to the inadvertent use of incorrect or life expired F&L products on or in equipment which could have catastrophic results.

2.7.71. It is important to recognise, in the forward environment, the distinction between stocks held in their primary packaging and ‘in use’. Stocks held in primary packaging shall be accounted for and subjected to batch control and stock rotation in accordance with JSP 886 Vol 6 Part 2, and segregated from ‘in use’ products.

2.7.72. Once the primary packaging of any packed F&L or associated product is breached, by the end user, it is classed as ‘in use’.

REQUIREMENTS FOR THE CONTROL OF ‘IN USE’ F&L PRODUCTS

2.7.73. It is the responsibility of the sub-unit holding F&L products to maintain the good husbandry of the storage area as well as the integrity and quality of the ‘in use’ products. To achieve this, the following control measures are to be established:

a. Each approved storage building or locker for ‘in use’ products is to be controlled on a day-to day basis by nominated individuals and their deputies under the supervision of a SNCO. This is to be reflected in their Terms of Reference.

b. In addition to mandatory warning signs, each locker is to display an up-to-date contents list on which is to be annotated the batch number and life expiry dates of all products held.

c. Life expired products and products which are unidentifiable due to degradation of labels are to be segregated and quarantined from ‘in use’ stock pending disposal or investigation. The products should be clearly marked to avoid inadvertent use.

d. Sub-units holding ‘in use’ products are to carry out weekly locker checks which are to be recorded and made available to Quality audit teams.

e. Nominated personnel of the Logistics (Supply) trades competent in the storage of F&L are to conduct random snap checks of all ‘in use’ F&L lockers and F&L stores held forward within an 18 month period. On units without immediate logistic support the OC sub-unit is to conduct random snap checks of all buildings and lockers containing F&L products. Records of such checks are to be retained and made available to Quality audit & Logistic Support Inspection personnel.

2.7.74. Quantities greater than those stated at Paragraph 2.7.70 should be removed to a suitable store.

Note: This sign is to be prominently displayed on F&L cabinets / lockers. Dangerous Goods placards or DSEAR explosive warning triangles are not to be used

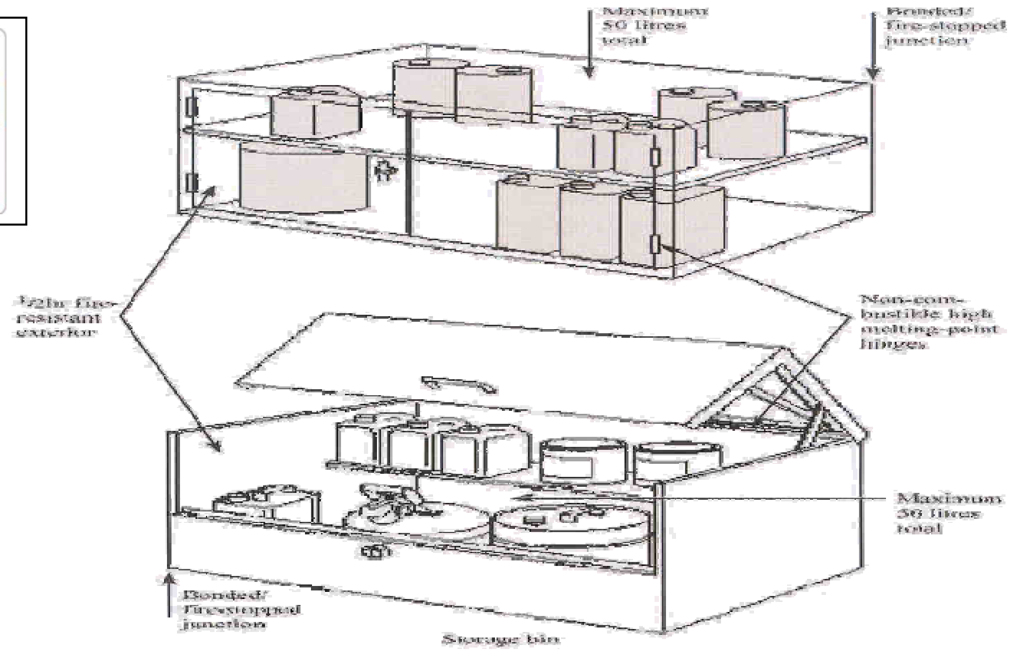


Figure 2.7.7 – F&L Cabinets or Lockers.

SECTION 10 - ENGINE ROOMS

2.7.75. Packed products for engine rooms, heating plants and pump houses are to be stored in approved locations outside that particular facility.

2.7.76. Access to such areas is Restricted, signs are to be displayed quoting; **"Petroleum Mixtures Unauthorised Persons Prohibited Beyond This Point, No Smoking, No Naked Lights"**

SECTION 11 – DEPLOYED/TEMPORARY PACKED F&L STORAGE AREAS

2.7.77. **Planning Factors**. Specific factors that apply to the siting of temporary Packed Storage Installations at deployed sites or exercise locations are as follows:

a. To avoid the need for specialist engineering assistance in preparing the site, the area should be flat and level and clear of combustible vegetation.

b. To avoid the risk of ignition due to vapour, the area is not to be sited on high ground adjacent to administration, sleeping or working areas were an explosive or flammable mixture might occur.

c. To reduce the risk of pollution, the area should not to be sited close to natural water catchment areas or rivers.

d. To reduce the risk of accidents, collateral damage and losses, the layout and allocated area is to provide for stock segregation, safety distances, and vehicle turning areas, road circuits, and control points.

2.7.78. **Environment, Health & Safety**. A risk assessment is to be carried out as part of the site recce; this will aid pollution control planning and the production of a Unit Spillage Response Plan. The plan should include the use of sandbag bunding, for large storage or higher risk areas the use of F&L resistant membranes. Detailed attention is required if container filling is intended. The siting of Pollution Control Points (PCP) should be carried out at this initial stage.

2.7.79. Specific factors that apply to the siting of temporary packed stock storage areas at deployed sites or exercise locations are as follows:

a. To avoid the need for specialist engineering assistance in preparing the site, the area should be flat and level and clear of combustible vegetation.

b. To avoid the risk of ignition due to vapour, the area is not to be sited on high ground adjacent to administration, sleeping or working areas where an explosive or flammable mix may occur.

c. Where practicable, an area should not to be sited close to natural water catchment areas or rivers.

d. Not co-located with ammunition or LPG stores.

2.7.80. A risk assessment is to be carried out as part of the site recce, this will aid pollution control planning, and the production of a unit spillage response plan, see Part 5. The plan should include the use of sandbag bunding and for large storage or higher risk areas the use of F&L resistant membranes.

2.7.81. Where possible a suitably designed container, drum store, or modular shed that has integral bunding and air vents should be used. These are essential for long stay field sites and for areas that are not provided with intercepted drainage. They prevent the deterioration of stock due to weathering, particularly the smaller drums (25 ltr and less) and cartons, and contain minor spillages from leakages. Normal commercial shipping containers (ISO containers) are not suitable and should not to be used for this purpose; advice should be sought from the appropriate FLC or DF&FS if there is no alternative mode of storage.

2.7.82. To avoid mistakes, different products are to be segregated. If complete segregation is not applied there is a real danger of losing the entire stock (in a Depot or Field location) to fire or enemy action. The solution in such cases is to split the location into a number of sections, each holding a proportion of all grades of stock whilst at the same time ensuring the different grades/flash point classes are segregated within those sections.

2.7.83. Within each section separate areas are to be allotted for:

a. Aviation Fuels, by type.

b. MT Gasoline.

c. Kerosene.

d. Diesel Fuels, by type.

2.7.84. Each section area is to be clearly marked by a notice board denoting type of product and it's Class.

2.7.85. Storage areas used in deployed locations may require special measure to protect the containers or products from the weather.

2.7.86. Solar shading is the preferred method of lowering the temperature of a product stored in locations with higher temperatures. Any solar shading used is to allow a free flow of air between the storage containers and the material used. The material should not hinder personnel and/or MHE in the movement of the containers.

2.7.87. Containers stored in the open are, in extreme climates, to be protected by means of tarpaulins (which are of a fire retardant material) etc. If used, these are to be permanently raised a few inches above the stock and lifted periodically to ensure free ventilation. If in tropical locations this is not done as condensation may occur and cause corrosion of the containers.

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2. HS (G) 71 - Chemical Warehousing the Storage of Packaged Dangerous Substances.

3. HS (G) 140 - The Safe Use and Handling of Flammable Liquids

4. BS 476 – Fire Tests on Building Materials and Structures

5. The Highly Flammable Liquids & Liquefied Gases Regulations 1972

6. DSEAR – Dangerous Substances and Explosive Atmospheres Regulations 2002

7. JSP 482 – MoD Explosive Regulations.

8. DEO (W) Functional Standard Design & Maintenance Guide 03 – Storage of Dangerous Substances.

9. Building Regulations 2000.

10. Regulatory Reform (Fire Safety) Order 2005.

11. Management of Health and Safety at Work Regulations 1992.

12. Crown Fire Standards.

13. COSHH.

14. JSP 886 - *The Defence Logistics Support Chain Manual*.

15. JSP 515 – Hazardous Stores Information System.

16. The Control of Pollution (Oil Storage) (England) Regulations 2001.

17. JSP 319 - The Joint Service Safety Regulation for the Storage, Handling and Use of Gases.

STORAGE OF HAZARDOUS SUBSTANCES

	EXPLOSIVE 1	COMPRESSED GAS 2	NON-FLAMMABLE NON-TOXIC 2	TOXIC GAS 2	FLAMMABLE LIQUID 3	SPONTANEOUSLY COMBUSTIBLE 4	DANGEROUS WHEN WET 4	OXIDIZER 5.1	ORGANIC PEROXIDE 5.2	TOXIC 6	RADIOACTIVE 7	CORROSIVE 8
EXPLOSIVE 1	✔	✘	✘	✘	✘	✘	✘	✘	✘	✘	✘	✘
COMPRESSED GAS 2	✘	✔	◆	●	●	●	●	●	✘	◆	✘	◆
NON-FLAMMABLE NON-TOXIC 2	✘	◆	✔	◆	◆	●	✔	✔	●	✔	✘	◆
TOXIC GAS 2	✘	●	◆	✔	●	●	◆	✔	●	✔	✘	◆
FLAMMABLE LIQUID 3	✘	●	◆	●	✔	●	●	●	✘	◆	✘	◆
SPONTANEOUSLY COMBUSTIBLE 4	✘	●	●	●	●	✔	◆	●	✘	◆	✘	◆
DANGEROUS WHEN WET 4	✘	●	✔	◆	●	◆	✔	◆	●	✔	✘	✔
OXIDIZER 5.1	✘	●	✔	✔	●	●	◆	✔	●	◆	✘	◆
ORGANIC PEROXIDE 5.2	✘	✘	●	●	✘	✘	●	●	✔	◆	✘	◆
TOXIC 6	✘	◆	✔	✔	◆	◆	✔	◆	◆	✔	✘	✔
RADIOACTIVE 7	✘	✘	✘	✘	✘	✘	✘	✘	✘	✘	✔	✘
CORROSIVE 8	✘	◆	◆	◆	◆	◆	✔	◆	◆	✔	✘	✔

✔ **ARE ALLOWED TO BE STORED TOGETHER**

● **SEGREGATE THESE COMBINATIONS IN DIFFERENT BUILDING COMPARTMENTS**

◆ **SEPARATE PACKAGES BY AT LEAST 3m OR ONE GANGWAY WIDTH**

✘ **ISOLATE – DO NOT STORE TOGETHER**

Storage of Hazardous Substances

Certain substances or classes of substance react violently when in contact with each other. If certain quantities are exceeded they are not to be stored together.
For Example: Combustible substances and oxidising substances are not to be allowed to be stored together because they could react and start a fire.
Furthermore, toxic, very toxic and oxidising substances are not to be allowed to be stored together with the following substances:

- Flammable substances with a flashpoint of 55°C or below
- Peroxides
- Substances which form flammable gases when in contact with water
- Pressurised gases
- Refrigeration liquid gases
- Ammonium nitrate fertilisers

Part 2

Chapter 8 (FGSR DIO PTS)

SAFE PRINCPLES FOR BULK F&L STORAGE INCLUDING PIPELINES

SECTION 1 - STORAGE

2.8.01. Part 3 covers the overall requirements for a wide range of infrastructure facilities necessary for the design and storage of fuels on the Defence Estate. This chapter identifies the design and construction policies to be complied with on generic permanent bulk F&L storage facilities. The MOD Engineering Authority for permanent infrastructure is the DIO Bulk Petroleum Section Part 2 Chapter 4. The Engineering Authority for the fuels equipment within TFHE/JOFS is Battlefield Utilities Project Team. The Engineering Authority for the design and assembly of the TFHE/JOFS into installations is 170 (Infra Sp) Engr Gp. The chapter on semi-permanent installations represents new developments in support of deployment of forces to a theatre for the longer term. 170 (Infra Sp) Engr Gp are primarily responsible for these developments with technical support from DE.

2.8.02. The full range of facilities covered in Part 3 is defined in the contents list. There will be occasions when other fuel handling processes, which are not directly covered in Part 3, are required. In these circumstances, consultation with the appropriate focal point or Engineering Authority should be made.

ABOVE GROUND STORAGE

2.8.03. Storage at ground level and in the open air is generally preferable because leaks can be more readily detected and contained and any vapour produced will normally be dissipated by natural ventilation. Tanks must be sited in a well-ventilated position away from sources of ignition. The location must minimise the effect of heat on the tank from a fire within the premises or outside the boundary, and also minimise the effects of a fire at the tank on adjacent buildings. Examinations, modifications and repairs are also easier and corrosion can be more readily identified and controlled.

BURIED OR MOUNDED STORAGE

2.8.04. Buried or mounded tanks give better fire protection and save space but long-term corrosion protection and control of any leakage can be difficult to achieve. However, buried, or mounded tanks are normally used where protection against blast damage is specifically required.

2.8.05. Locations to be avoided. Tanks must not be sited:

a. Under buildings.

b. On roofs of buildings.

c. Above tunnels, culverts, sewers or underground structures.

d. In a position raised high above ground level.

e. On top of one another.

CONTAINMENT

PRIMARY CONTAINMENT

2.8.06. Primary Containment is defined as the container within which F&L is stored (e.g. tank, drum, and TFC), together with any outer container which:-

a. Provides structural support to the inner container, (e.g. a drum supporting a flexible plastic container), or

b. Is connected to the outer container structurally, or.

c. The Primary and outer container rely on the same supports, or

d. The primary container is situated very close to the outer container, whereby the outer container will not contain F&L released from the Primary container due to *jetting*.

(Jetting – a phenomenon associated with the failure of the Primary container which results in an escape of F&L with sufficient force that it projects over the "bund" wall).

e. In the event of external impact, the closer both the Primary and outer containers are; then more likely they would suffer damage simultaneously.

f. In the event of the collapse from common supports, both the Primary and outer containers would be likely to suffer damage simultaneously

g. Primary and outer containers do not act independently.

Examples of Primary Containment

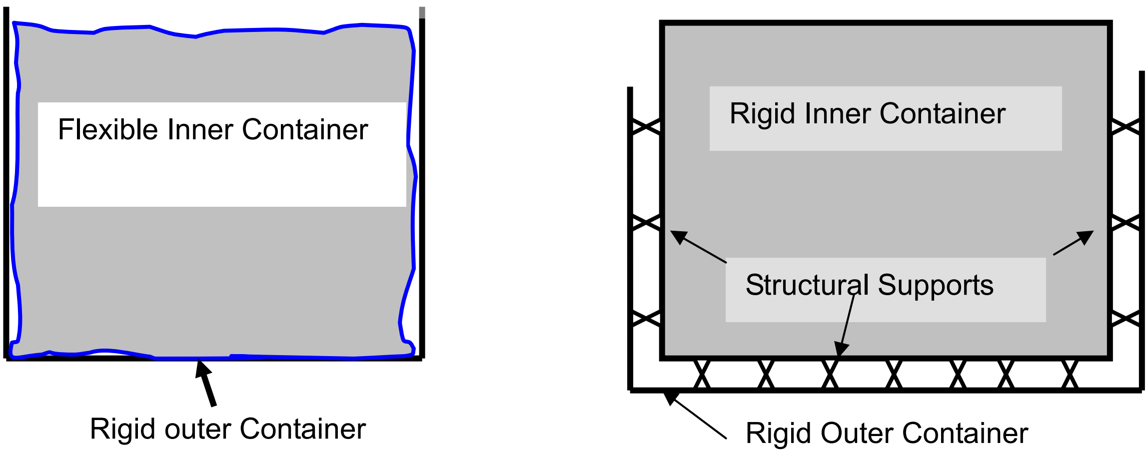

Fig 2.8.1 Examples of Primary Containment

SECONDARY CONTAINMENT

2.8.07. Secondary containment maybe categorised as local or remote. Secondary containment is defined as a containment system that is capable of preventing the escape of F&L to the aquatic environment in the event of failure of the primary storage or container. The policy for secondary containment is detailed in Part 5 Chapter 1. The capacities of secondary containment are summarised below:-

a. Capacity of secondary containment for a single container shall be 110% of the primary containers total capacity.

b. Capacity of secondary containment for multiple / group of containers shall be 110% of the largest primary container in the system, or 25% of the aggregate total capacity of the primary containers; whichever is the greater.

2.8.08. **Secondary Containment**. Local secondary containment is where provision is made to contain the escape of F&L by building a further impermeable containment system, “bund” around the Primary storage, or container, or group of tanks.

2.8.09. **Remote Secondary Containment**._Remote secondary containment is where provision is made to prevent F&L pollution by directing the escape of F&L to another suitable container.

Note: a double skinned Primary storage container may not, in itself, provide secondary containment.

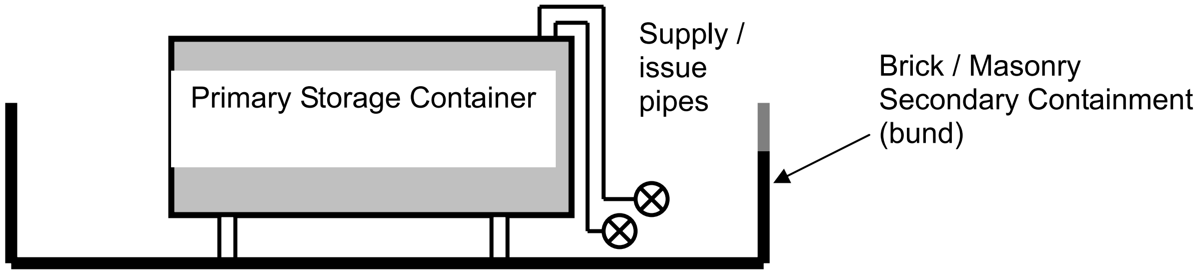

Fig 2.8.2 shows a Single Tank Containment

Examples of Secondary Containment

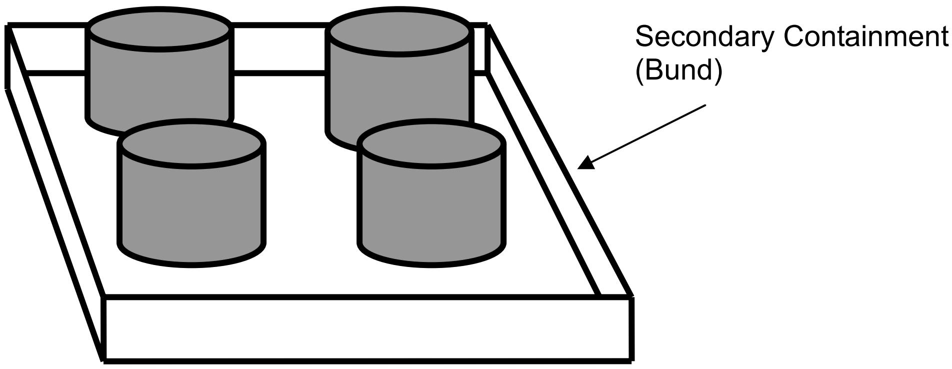

Fig 2.8.3 shows a Multi Tank Containment

PROPRIETARY ABOVE GROUND TANK SYSTEMS

2.8.10. Terminology such as “integrally bunded”, “double skinned” or “self bunded” tanks are used to describe various proprietary above ground storage tanks which incorporate an inner and outer containment tank within one unit. However, some types of proprietary above ground storage tank systems may be considered as high specification Primary storage tanks ***only***, because they are constructed with the caveats detailed in paragraph 3.1.06 and are therefore ***not*** compliant with the Oil Storage Regulations (England – Scotland) detailed in Part 5 Chapter 1

2.8.11. For proprietary above ground storage tanks to be compliant, the secondary containment must be able to contain at least 110% of the **primary tank brimful contents** (not 95% capacity with ullage space), as well as containing losses from associated pipework and valves in the event of a leak or overspill in the primary tank system; and be vented to atmosphere. This is the fundamental difference between traditional tank systems that require purpose built in-situ bunds; and proprietary above ground storage tanks. If these caveats are complied with then proprietary above ground storage tanks will be defined as **Compliant Integrally Bunded Storage Tanks.**

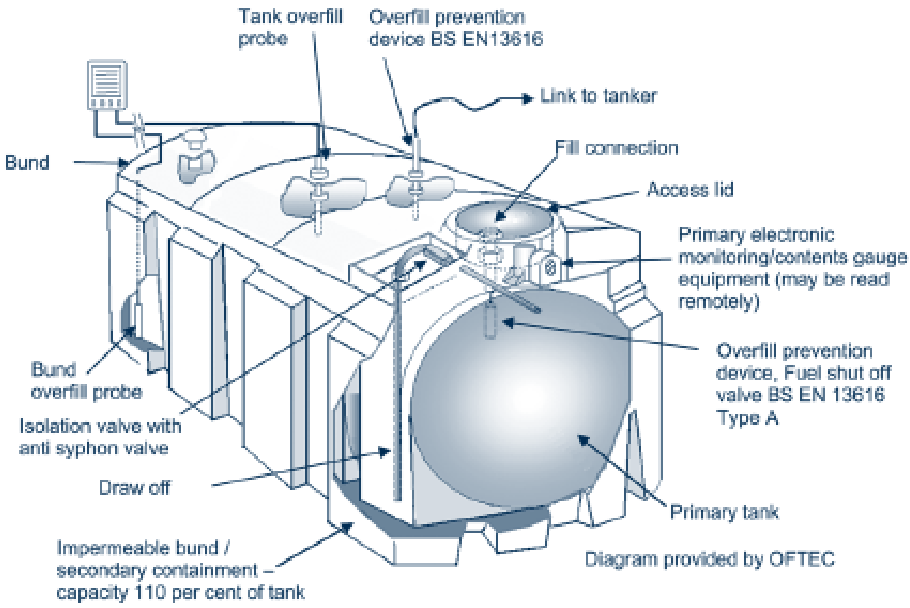

Fig 2.8.4 Example of Compliant Integrally Bunded Storage Tank (may not be this shape of design. Constructed from steel or polyethylene) *(EA PPG2.)*

SITING OF COMPLIANT INTEGRALLY BUNDED STORAGE TANKS

2.8.12. When used as a replacement for obsolete / decommissioned fuel storage infrastructure; Compliant Integrally Bunded Storage Tanks should be sited on bulk fuel storage areas (BFIs MTFIs) where compliant road tanker off loading facilities and drainage systems (including OWI) already exists. If Compliant Integrally Bunded Storage Tanks are to be located in remote, “stand alone” areas then a suitable appropriate risk assessment Part 5 Chapter 3 shall be carried out. As a minimum, the tank shall be sited on an impermeable surface and be isolated from surface water drainage systems, have a minimum separation distance as identified at 2.8.1. For generic road tanker delivery for storage tanks see Part 2 Chapter 10 .

BUND CONSTRUCTION

2.8.13. The design and construction of bunds for tanks up to 25 cubic meters capacity is to be in accordance with CIRA Report No 163.

BUND WALL

2.8.14. Bund walls must be impervious to liquid and designed in accordance with current building design standards to withstand a full hydrostatic head for the primary storage containment systems they surround and have sufficient strength to contain any spillage or fire-fighting water. Walls shall not normally be higher than 1.5 m to ensure adequate natural ventilation of the bunded area, ready access for fire-fighting and good means of escape. Intermediate lower bund walls are recommended to divide tank into groups to contain small spillages and to minimise the surface area of any spillage, as this has a significant effect on the maximum size of any fire that may occur. Impact protection, such as crash barriers, must be provided where necessary, e.g. adjacent to vehicle manoeuvring areas. The total capacity of tanks in a bund shall be in accordance with current building design standards.

2.8.15. The bund wall shall not be constructed too close to the tank. Minimum separation distances between tank and bund wall shall be of sufficient distance to prevent Jetting.

(Jetting – a phenomenon associated with the failure of the Primary container which results in an escape of F&L with sufficient force that it projects over the “bund” wall).

BUND FLOOR

2.8.16. The floor of the bund shall be constructed in accordance with current building design standards and where necessary must be sloped to prevent minor spillage remaining below any tank.

BUND DRAINAGE

2.8.17. Historically it has been common practice to provide a valved outlet in bund walls to permit rainwater to be drawn off without the need for pumping. **This is a poor design feature and the provision of lockable valves does not overcome this problem.**

2.8.18. The Oil Storage Regulations (England & Wales) (SI 2954 / 2001) (Scotland) (SSI2006/133) state that the secondary containment base and walls shall be impermeable to water, and its base and walls shall not be penetrated by any valve, pipe or other opening, which is used for draining the system.

2.8.19. The use of a drain connection in the bund wall is not allowed. ***Rainwater*** shall be collected in sump in the base of the bund. ***Rainwater*** shall be removed from the bund regularly (dependant on weather/ climatic conditions), to ensure that the bund capacity detailed in 2.8.11 is to be maintained. The removal of ***Rainwater*** can be carried out manually, via manually self priming pumps, or with a fail to safe automatic pumping system which monitors the oil and water interface and automatically activates to pump out water only. ***Rainwater*** removed from bunds shall be disposed of appropriately to ensure that no pollution occurs.

2.8.20. Bunds shall be inspected regularly for signs of damage; and water in the bund; and checked visually by the operator at least weekly.

2.8.21. If oil or a mixture of oil and water is found in the bund (dependant on quantity); it may be evidence of loss of integrity of Primary containment. Irrespective of quantity, the person with custody or control of the oil shall be responsible for removing the liquid and disposing of it in accordance with current Hazardous waste regulations.

SIGHT GLASSES

2.8.22. Sight glasses are the most common type of contents indicator for smaller proprietary prefabricated fuel storage tanks (standby generator tanks, contractor tanks).

Use of sight glasses shall be limited to storage tanks with capacities of less than 3500L and for use with class II fuels only.

If fitted to storage tanks, sight glasses shall:-

a. Be located in the secondary containment.

b. Be properly supported so they cannot come loose.

c. Be fitted with a valve that automatically closes when the sight glass is not in use.

d. Valves fitted to sight glasses shall not be kept open when not in use.

e. Valves shall only be opened when taking contents readings.

SECTION 2 – ELIMINATION OF WATER FROM STORAGE TANKS

2.8.23. The presence of water in storage tanks can give rise to microbiological contamination, and the 'leaching out' of additives. Every effort is to be made to eliminate water in storage tanks. To ensure that water in fuel tanks is kept to a minimum, the following procedures are to be applied:

a. Tanks fitted with automatic water detection and an integrated water removal systems, or an automatic tank gauge (ATG), compliant with *STANAG 7011*, is to be checked for water once a month.

b. Tanks fitted with an ATG, compliant with *STANAG 7011*, are to be checked for water once a week. Where the tank has not issued or received fuel during the previous week, or where local conditions preclude weekly water checks from being conducted, the frequency of checks may be extended to a period not exceeding one month.

c. Tanks which are not fitted with an ATG are to be checked for water whenever the tank contents are dipped. If water is detected in a tank that is not fitted with an automatic water detection system which incorporates an integrated water removal system, a works service request is to be raised for its immediate removal. The results of all water checks are to be recorded and stock adjustments made in accordance with JSP 886.

d. Filter Water Separators (FWS), fuel monitors and low points in the pipework where fitted with drain points and used for the issue of fuel in the preceding 24 hrs, are to be checked for water prior to use. Any water found is to be drained off prior to operation of the equipment.

SECTION 3 - LEVEL MEASUREMENT

2.8.24. **Ullage**. Tanks are to have a 'maximum working level' which will provide a certain working ullage when the tank is full. In horizontal cylindrical tanks this ullage is to be 250 mm (10 in) from the highest point of the tank; in vertical tanks the maximum working level is to be fixed to 150 mm (6 in) below the maximum height of the tank shell, or the foam inlet (if fitted) whichever is the lower. The maximum working level of the tank is to be shown on the appropriate tank calibration chart, and the dip measurement corresponding to this level is to be displayed at the dip hatch. This level is not to be exceeded.

2.8.25. **Automatic Tank Gauging**. High level, High- High level, Low level, Low – Low level automatic tank gauging and tank overfill protection levels shall be designed installed, and maintained in accordance with current construction standards (*Spec 044 Measurement DIO)*.

2.8.26. **Manual Dipping.** Where gauging is done by dip rods, these must not be of ferrous or aluminium construction. A suitable dip tube must be provided, with the dipping rod substantially smaller in diameter than the dip tube to minimise measurement errors. The bottom of the tank should be protected by a wear pad. Dipping must not be done through open manholes. Reference should be made to Part 2, Chapter 2.

2.8.27. The frequency of tank dipping for accounting and leakage purposes is covered in *JSP 886 Vol 6, Part 2, Ch 7, Sect 2, Page 111*. If tanks are fitted with Automatic Tank Gauging (ATG) accurate to +/- 1 mm and +/- 0.5 ° C (see *STANAG 7011*) the meter readings can be used for accounting purposes negating the need for a physical dip of the tank contents for that purpose.

2.8.28 **Dipsticks/Gauge Sticks**. If the accuracy of a dipstick is in doubt, OC F&L is to be informed and the dipstick is to be passed to the MMO, AP (Pet) for verification. If the dipstick is found to be inaccurate it is either to be repaired or replaced.

2.8.29. **Filling, Sampling and Dip Hole Covers**. All filling, sampling and dip hole covers are to be replaced tightly after use and locked with suitable padlocks. All openings other than vents and dipping hatches where no fixed gauging device is fitted are to be closed when tanks are being filled. Gaskets on covers are to be kept in good repair and replaced when necessary.

SECTION 4 - FIXED TANK INSTALLATIONS

2.8.30. This section provides guidance on both above ground & underground fixed tank installations used for bulk storage of Fuels & Lubricants.

2.8.31. This section does not apply to:

a. Flammable liquids which present special hazards requiring specific storage conditions, such as ethylene oxide, peroxides, and other liquids which entail a risk of rapid decomposition, polymerisation or spontaneous combustion.

b. Mechanical Transport Fuelling Installations for which reference should be made to Part 3, Chapter 1.

c. LPG and other substances which are gases at ambient temperature and pressure but are stored as liquids under pressure; LPG is covered in JSP 319.

2.8.32. Above ground fixed tanks shall comply with the secondary contaminant caveats as detailed in Part 2 Chapter 8.

2.8.33. **Source**. This Chapter is an abridged version of HS (G) 176 The Storage of Flammable Liquids in Tanks. HS (G) 176 should be consulted and applied in full unless modified by the paragraphs in this Chapter?

STEEL TANKS

2.8.34. The Engineering Authority for above ground and underground fixed tank Installations is DIO Bulk Petroleum Section. Specifications are detailed in *DWS functional Standard 05 Specification for Specialist Works on Petroleum Installations – Mechanical.*

GRP TANKS

2.8.35. The Engineering Authority for fixed tank Installations is DIO Bulk Petroleum Section. Above and below ground GRP tanks must be designed and built to Functional *Standard 05 Specification for Specialist Works on Petroleum Installations - Mechanical, DWS.*

COMPATIBILITY WITH LIQUID CONTENTS

2.8.36. The material used in the construction of the tank or, where appropriate, the tank lining, must be compatible with the chemical and physical properties of the Flammable Liquid, to ensure that no interaction occurs which might cause failure of the tank or contamination of the product.

CORROSION PROTECTION

2.8.37. Tanks and their associated fittings and pipework must be suitably protected against corrosion in accordance with current construction standards. *Functional Standard 05* gives guidance on the various methods that may be used; stainless steel pipework and fittings are not painted. The coating of underground tanks must be checked with suitable fault detection equipment once the tank is in position. Cathodic protection may be used as an additional protection. Tanks must be fitted with a means of removing water that has accumulated inside them.

ABOVE-GROUND TANKS

2.8.38. The proposed site shall be checked to ensure the ground is suitable for the intended loading in accordance with current construction standards. Tanks shall be securely anchored or weighted to avoid flotation from flood water or from spillage of liquid into the bund.

TANKS RAISED ABOVE GROUND LEVEL

2.8.39. Fixed tanks should normally be discharged by pump, as pumped flow is generally easier to control than gravity flow. However, some types of pump, e.g. centrifugal, present little resistance to flow when not in use, so adequate valving shall always be provided. If gravity discharge is used, tanks shall be raised no more than is necessary for adequate flow, to minimise the difficulty of stopping the flow under fire conditions in accordance with current approved design / construction standards. Horizontal tanks shall be raised off the ground by the minimum amount to provide clearance for convenient operation and maintenance of valves. Isolating valves which can be quickly closed in an emergency must shall be fitted close to the tank.

UNDERGROUND [SEMI BURIED] STORAGE TANKS (UST) - ENVIRONMENTAL CONSIDERATIONS

2.8.40. Steel tanks must no longer be installed underground unless there is a specific military requirement. Underground tanks must be on a firm foundation and securely anchored or weighted to avoid floatation from flood water or a high water table.

2.8.41. Environment Regulators can influence the siting and construction of F& L storage and related activities through their role as statutory and advisory consultees during the development planning process. Underground Storage is inherently more risky than above ground for the following reasons:-

a. Routine visual inspection of the facility is not possible.

b. Detection of leaks relies on some form of remote monitoring (if fitted) and;

c. Should leaks occur, they bypass the inherent protection from the soil layer.

2.8.42. Sub water-table storage is considered even less acceptable, since this environment increases the risk of damage to the infrastructure and pollutants can be introduced directly to groundwater as well as the possibility of UST “floating” from flood water or due to a high water table. The Groundwater Directive *(80/68/EEC)* and Groundwater Regulations prohibit the direct discharge of List 1 substances (includes mineral oils and hydrocarbons) to groundwater. On this basis, Environment Regulators consider the storage of pollutants in sub water-table areas to be unacceptable.

2.8.43. Environment Regulators will object to the construction of new UST in a Source Protection Zone 1 (SPZ1) area over Principal and Secondary Aquifers. Siting of UST outside SPZ 1 areas will also be objected; unless there are genuine and overriding reasons why:-

a. The activity cannot take place on unproductive strata.

b. The storage must be underground for public safety of for security reasons. If so, the risks must be properly mitigated.

2.8.44. Environment Regulators (EA, SEPA) have published respective Groundwater Protection Codes of Practice for the storage of petroleum / liquid hydrocarbon in underground storage tank facilities. These Codes of Practice identify 4 key elements which help to prevent pollution of groundwater these are:-

a. The undertaking of **Assessment of Risk** to groundwater.

b. The provision of appropriate **Engineering Requirements.**

c. The implementation of suitable **Management Systems and Controls.**

d. The preparation of suitable **Emergency Plans and Procedures.**

2.8.45. These Codes of Practice outline good operational and management practices throughout a UST facilities' lifetime and should therefore be addressed during design and construction, commissioning, operation, and decommissioning.

PROTECTION OF USTS

2.8.46. Where underground tanks are likely to be subject to loadings from above ground (e.g. from traffic) they must be protected by a reinforced concrete slab or other adequate cover in accordance with current construction standards. Alternatively the area around the tank must be fenced off, with the perimeter of the tank clearly marked. In all cases the vessel cover and fitting must be protected against damage or tampering*. (HSG 176)*

SUPPORT AND BACKFILL

2.8.47. Tanks shall be installed in accordance with current construction standards. (*DMG14 Mechanical Transport Fuelling Installations, DEO.HSG 176)*

TANK CONNECTIONS AND FITTINGS

2.8.48. Tank filling, emptying connections and openings for dipping must be designed and installed in accordance with current build standards, and be located at **least 4 m** from any buildings, boundaries, process units, source of ignition, opening, trench, depression or drain. The connecting point for above-ground tanks shall be sited within the tank bund or secondary containment facility. Connecting points must be close to the tanker stand so that only one short flexible connecting hose is necessary. Safe means of access to the connections must be provided.

2.8.49. Couplers must be capped when not in use, preferably with a lockable cap. Methods of operating isolation and control valves must be indicated by labels or signs where necessary. Spillage from making and breaking connections must be contained by a drip tray or a low still, or be drained to a safe place.

2.8.50. The end of the filling line must extend into the tank below the lowest level of the liquid, to minimise the generation of static electricity from splash filling. To prevent siphoning, the line must be self-draining. Where separate lines are used for filling and emptying, a liquid seal can be maintained ending the discharge line at least 150 mm above the bottom of the filling line. To minimise the risk of leakage it is preferable for lines to enter the tank at the top. This may not however always be reasonably practicable, particularly for large vertical tanks. All dip rods and tubes must be earthed and where appropriate an earthing lead for connection to a road or rail tanker must be fitted.

VENTING

2.8.51. During normal tank operation, the pressure in the tank may vary. Pressures may increase during filling or if the ambient temperature rises. Conversely pressures may drop during emptying or with temperature falls. The tank venting system should provide:

a. normal pressure relief
b. normal vacuum relief
c. emergency pressure relief

2.8.52. Traditionally vents discharged into the atmosphere but there is increasing environmental pressure for vapour emission controls. Vapour recovery systems are now a legal requirement for bulk petrol storage installations (Class 1) MTFI Part 3 Chapter 1.

2.8.53. Venting on fixed installations shall be installed, and maintained in accordance with current construction standards and shall have sufficient segregation to comply with DSEAR regulations see Part 2 Chapter 1.

2.8.54. It is essential that the pressure control devices are correctly installed, maintained and sized in accordance with Engineering Authority procedures. an appropriate code or standard such as:

a. *BS EN 14015:2004 Specification for the design and manufacture of site built, vertical, cylindrical, flat-bottomed, above ground, welded, steel tanks for the storage of liquids at ambient temperature and above.*

b. *API 2000 Venting atmospheric and low-pressure storage tanks (non-refrigerated and refrigerated)*

VALVES

2.8.55. All valves shall be shall be designed, installed, and maintained in accordance with current construction standards. *(Functional Standard 05 Specification for Specialist Works on Petroleum Installations - Mechanical DWS*). Each pipeline connected to a tank must be provided with a suitable shut-off valve in accordance with the Engineering Authority procedures which is fire-safe in accordance with current construction standards and be located inside the bund wall and close to the tank. The filling line must also be fitted with a shut-off valve outside the bund wall and close to the filling connection, and any line used only for filling and which enters the tank at the bottom may also be provided with a non-return valve. Other valves may be necessary depending on process conditions, such as automatic double block and bleed systems to prevent back flow of process materials into the storage tank or additional isolation valves to allow safe shutdown in an emergency, as prescribed by the Engineering Authority. It is recommended that important valves are labelled to indicate their function. Tank drainage valves must be blanked off when not in use. Tank draining is generally supportive to a maintenance activity and the site AP Pet should be consulted for procedures.

PUMPS

2.8.56. Pumps shall be designed installed, and maintained in accordance with current construction standards *(Spec 043 - Pumps for Bulk Fuel Installations, DIO)*.

SOURCES OF IGNITION

2.8.57. There must be no means of igniting explosive atmospheres within hazardous areas associated with storage tanks. Where maintenance is necessary it must be done by trained personnel in accordance with *JSP 375, Volume 3, Chapter 5, Petroleum Appendix 10*.

ELECTRICAL INSTALLATONS

2.8.58. Electrical installations must be designed installed, and maintained in accordance with current construction standards and comply with the requirements of the hazardous area in which they are located.

INSTALLATION BONDING AND EARTHING

2.8.59. All parts of the storage installation must be bonded together and earthed to avoid the accumulation of static charges which could cause sparks to occur. The maximum value of resistance to earth must be 10 ohms. Means must be provided for disconnecting the earthing facilities for periodic test measurement. (*Defence Works Functional Standard – Design & Installation Guide for Specialist Works on Petroleum Installations – Electrical-p26)*

2.8.60. **Static Electricity**. To reduce the risk arising from static electricity when Class I or II petroleum products (see *Def Stan 01-5/2* and Part 2, Chapter 13 which do not contain anti-static additives are pumped through pipelines, careful control is to be exercised over the rate of flow. The initial rate of flow should not exceed 1 m/second under these circumstances. This applies particularly when starting to fill empty tanks, where the input nozzle is not covered by at least 150 mm (6 in) of product within the pipeline. The free fall of fuel is to be avoided whenever possible.

VEHICLES

2.8.61. All MHE vehicles which need to operate within Zone 2 BFI and packed stock areas associated with storage tanks must be protected to Zone 2 standards.

LIGHTING

2.8.62. Working areas associated with storage tanks, including loading and unloading points, must be adequately lit when in use. All light fitments installed in hazardous areas shall be suitably certified and maintained for the zone in which they are located. The average luminance at ground level and on stairs, access platforms etc must be at least 50 lux. This must be increased to 100 lux where perception of detail is required, for example to read level gauges. *(DMG 14 MTFI) (HSG 176 BFI)*

COMMUNICATIONS

2.8.63. Radios or telephones used within the hazardous areas of fuel installations must be intrinsically safe. Although radios might be the standard means of communication for fuel installations, each fixed installation must be equipped with an accessible telephone, marked “Emergency Telephone”, within 100 m of the installation. The telephone must be connected to the local emergency switchboard, and must be capable of communicating with the Petroleum control rooms and with the emergency services.

MARKING OF TANKS AND FITTINGS

2.8.64. Refer to Part 1, Chapter 4.

SCHEMATIC DIAGRAMS

2.8.65. A schematic diagram showing the installation layout and valve numbering is to be mounted and displayed in a prominent position in the pump house or other suitable location on the installation. All valves in the installation are to be numbered using a disc no smaller than 100 mm (4 in) in diameter, mounted adjacent to the valve hand wheel. The schematic diagram is to correspond exactly with the layout and numbering of the tanks, valves and other permanent apparatus.

FIRE WALLS

2.8.66. Where a firewall is required it must be at least the height of the tank, with a minimum height of 2 m, and must normally be sited between 1 and 3 m from the tank. It may form part of the bund wall or a building wall. A firewall should, however, normally be provided on only one side of a tank, to ensure adequate ventilation. The wall must be long enough to ensure that the distance between the tank and a building, boundary, process plant or source of ignition is at least the appropriate distance in Table 2.8.1 or Table 2.8.2, measured around the ends of the wall. *(HSG 176 paragraph 129)*

BULK F&L STORAGE IN BUILDINGS

2.8.67. Only in exceptional circumstances should bulk storage tanks be sited inside buildings. DIO - Hd Mechanical Systems PTS must be consulted, particularly if installation below ground level is proposed.

BULK F&L STORAGE IN WORK AREAS

2.8.68. Flammable liquids shall not formally be stored in enclosed process areas. However where such liquids need to be held in day tanks the DIO- Hd Mechanical Systems PTS must be consulted.

MODIFICATIONS TO FIXED INSTALLATIONS

2.8.69. Any proposed modification affecting the mechanical or electrical integrity of the storage installation must be carried out in accordance with the appropriate Engineering Authority to a standard at least equal to the original construction standard. Upon modification all subsequent maintenance procedures shall be amended and the complete installation shall be certified as fit for purpose by the Engineering Authority to the Operating Authority - including amended operating procedures. Consideration must also be given at the planning stage to hazards that the modification may introduce. The work must be overseen by a competent person, who must authorise the installation as being fit for purpose on completion of work (see Part 1, Chapter 5).

DECOMMISSIONING OF TANKS

2.8.70. Tanks which are to be taken out of use must be made safe. The method will vary with the location of the tank, the product it has contained and whether it is to be taken out of use permanently or temporarily. The necessary first steps (which in generally apply also to pipework) are as follows:-

a. The tank must be isolated from any process, plant or storage vessel. Shut-off valves by themselves are not adequate. Either pipe sections must be removed or spade pieces fitted.

b. The tank must be emptied as much as possible.

c. All tank openings (except vents) must be blanked off.

For temporary and permanent decommissioning reference should be made *to JSP 375, Volume 3, Chapter 5, Petroleum Appendix 10*. Further reference may be made to Part 1, Chapter 2.

FIRE PRECAUTIONS

2.8.71. For details of specific precautions and equipment see Part 2 Chapter 5.

INSPECTION AND MAINTENANCE

2.8.72. Storage tanks and all associated infrastructure, plant, and equipment, must be properly maintained as detailed by the Engineering Authority and MMO. The MMO shall demonstrate to the Operating Authority that the Bulk F&L storage facility and all associated infrastructure, plant, and equipment are maintained in accordance with current legislative standards. The Operating Authority shall operate the Bulk F&L storage facility and all associated infrastructure, plant, and equipment in accordance with the Engineering Authorities operating procedures and inform the MMO of any unservicability as soon as possible. *Defence Works Functional Standard 07. Defence Estate, DWS Specification 005.*

SECTION 5- SITING AND SEPARATION

OVERHEAD CONDUCTORS

2.8.73. Wherever possible all installations are to be arranged that there are no overhead conductors (electrical or telephone lines etc.) which at their maximum horizontal swing pass within 3 m of the vertical projected upward from the perimeter of the hazardous area (dispensers, vent pipes, tanker stand & dispensing area). Exceptionally, and only after agreement with the Engineering Authority (DE, 170 Gp RE) and the Operating Authority the site may be located beneath suspended overhead conductors provided that precautions are taken to avoid danger from falling cables and the possibility of stray currents induced in the metal work.

2.8.74. Where an overhead line passes over an area within 3 m of the hazardous area associated with the dispensing equipment; to allow for any deflection of the line, an electrically bonded and earthed metal canopy should be created over the hazardous area and extended for a further 3 m laterally beneath the overhead line.

SEPARATION DISTANCES FOR ‘SMALL’ TANKS

2.8.75. For the purposes of this guidance ‘small’ tanks are considered to be tanks with a diameter of less than 10 m. Table 2.8.1 shows the minimum recommended separation distances for single ‘small tanks’. The distances are based on what is considered to be good practice and have been widely accepted by industry. The minimum separation distance is the minimum distance between any point on the tank and any buildings, boundary, process unit, or fixed source of ignition.

Tank Capacity (m^3)	Separation distance (m)
Less than or equal to 1	1*
Greater than 1 and less than or equal to 5	4
Greater than 5 and less than or equal to 33	6
Greater than 33 and less than or equal to 100	8
Greater than 100 and less than or equal to 250	10
Greater than 250	15

Table 2.8.1 Minimum recommended separation distances for single 'small' tanks, from site boundaries, buildings, process areas and fixed source of ignition. *(HSG176)*

*But at least 2 m from doors, plain-glazed windows, or other openings or means of escape. Also not below opening (including building eaves and means of escape) from an upper floor, regardless of vertical distance.

SEPARATION DISTANCES FOR GROUPS OF 'SMALL' TANKS

2.8.76. Small tanks may be placed together in groups. A tank is considered as part of a group if adjacent tanks are within the separation distances given in Table 2.8.2. The aggregate capacity of the group should be no more than 8000 m^3 and the tanks should be arranged so that they are all accessible for fire-fighting purposes.

2.8.77. The recommended minimum separation distances between individual tanks in a group are given in Table 2.8.2. If a serious fire develops involving one tank in a group then it is unlikely that these between-tank separation distances will prevent damage or even destruction of the adjacent tanks. However, they should allow sufficient time for emergency procedures to be implemented and for people to be evacuated from areas threatened by the incident.

Tank Capacity (m^3)	Recommended separation distance between tanks
Less than or equal to 100 m^3	The minimum required for safe construction and operation
Greater than 100 m^3 but less than 10 m in diameter	Equal to or greater than 2 m

Table 2.8.2 Minimum between-tank separation distances for groups of 'small' tanks *(HSG 176)*

2.8.78. For the purpose of determining separation distances from site boundaries, buildings, process areas and fixed sources of ignition, a group of small tanks may be regarded as one tank. The minimum recommended separation distances for groups of small tanks are given in Table 2.8.3. The minimum recommended separation distance between adjacent groups of small tanks is 15 m.

Tank Capacity (m^3)	Separation distance (m)
Less than or equal to 3	1*
Greater than 3 and less than or equal to 15	4
Greater than 15 and less than or equal to 100	6
Greater than 100 and less than or equal to 300	8
Greater than 300 and less than or equal to 750	10
Greater than 750 and less than or equal to 8000	15

Table 2.8.3. Minimum recommended separation distances for groups of 'small' tanks from site boundaries, buildings, process areas and fixed source of ignition. *(HSG 176)*
*But at least 2 m from doors, plain-glazed windows, or other openings or means of escape. Also not below opening (including building eaves and means of escape) from an upper floor, regardless of vertical distance.

SEPARATION DISTANCES FOR 'LARGE' TANKS

2.8.79. The minimum recommended separation distances for 'large' tanks are given in Table 2.8.4. The table is based on the IP Fire precautions at petroleum refineries and bulk storage installations: model code of safe practice part 19.

Factor	Minimum separation from any part of the tank
Between adjacent fixed-roof tanks	Equal to the smaller of the following: (a) the diameter of the smaller tank; (b) half the diameter of the larger tank; (c) 15 m; but not less than 10 m
Between adjacent floating-roof tanks	10 m for tanks up to and including 45 m diameter 15 m for tanks over 45 m diameter The spacing is determined by the size of the larger tank
Between a floating-roof tank and a fixed-roof tank	Equal to the smaller of the following: (a) the diameter of the smaller tank; (b) half the diameter of the larger tank; (c) 15 m; but not less than 10 m
Between a group of small tanks and any tank outside the group	15 m
Between a tank and the site boundary, any designated non-hazardous area, process area or any fixed source of ignition	15 m

Table 2.8.4 Minimum separation distances for 'large' tanks. *(HSG 176)*

SEPARATION DISTANCES FOR HIGHER FLASHPOINT F&L

2.8.80. IP Class II products with a flashpoint greater than 32°C will not normally produce a flammable atmosphere unless they are stored at ambient temperatures above their flashpoint.

2.8.81. When the ambient temperature exceeds the flashpoint of the product the requirements of this chapter will apply in full.

2.8.82. In Tables 2.8.1 – 2.8.4 the separation distance from boundaries, buildings, process areas and fixed sources of ignition can be reduced from 15 m to 10 m for tanks above 250 m^3.

2.8.83. The minimum separation distances for a tank containing higher flashpoint liquids are:

a. From another tank containing a higher flashpoint liquid; the minimum needed for safe construction and operation.

b. From a tank containing a low flashpoint; in accordance with Tables 3.5.1. - 3.5.4

2.8.84. For Bulk Petroleum Installations, with a capacity of over 150,000 litres for the storage of Class III product, the preferred approach is to follow the criteria in this chapter for tank separations i.e. apply the same rules as products with a Flash Point in the range 32 to 55°C. This allows some operational flexibility in the depot if lower flash point products are required to be stored in the longer term. If there are specific cases where a dispensation is required from these rules, this can be considered by the Design Authority.

2.8.85. For installations with a capacity below 150,000 litres comprising tanks of 50,000 litres or less, the separation distances from buildings and site boundaries, and tank spacing can be set by the competent designer to achieve practical operation and maintenance activities. Note that there should be a practical distance for bunds from fences and buildings, a distance of 2 m is suggested as a practical minimum.

HAZARDS TO PEOPLE BEYOND SITE BOUNDARY

2.8.86. The siting of installations must take account of the hazard to people beyond the site boundary. Where new works/ extensions to existing facilities are to be proposed, the necessity for planning clearance from the local planning authority will need to be determined. If planning clearance is required, then the local planning authority will consider the proposal not only in relation to the site itself, but in relation to the adjoining land. If the installation is subject to the COMAH and/or MACR, additional consideration should be given to the prevention and limitation of the effects of major accidents.

BURIED, SEMI-BURIED OR MOUNDED TANKS

2.8.87. The location and spacing of buried, semi-buried or mounded tanks is governed by constructional and operational convenience only. However, the distance from any underground tank to any building line must be at least 2 m, to avoid undermining the building foundations. This distance must be increased to 6 m for a basement or pit, to minimise the risk of vapour accumulation. *(HSG 176)*

SECURITY

2.8.88. When not in use, all manhole covers, dip hatch covers, sampling hatches, inlet and outlet points and dipsticks are to be securely locked. When not in use the keys to these locks are to be kept in safe custody under local arrangements. Where tank openings and dipsticks are located within a secure building the requirement for the individual openings to be locked may be waived by the unit officer responsible for fuels.

2.8.89. To prevent trespassing or tampering, storage areas and areas used for loading or unloading tankers must be enclosed by a substantial fence at least 1.8 m high, either welded mesh or chain link fencing. Security-standard fencing is only appropriate where anti-sabotage protection of operational facilities is needed. At least two separate exits must be provided, although one is sufficient if the distance from any part of the storage area to the exit is not more than 24 m, measured around the tanks and any other obstructions. Exits must open outwards, must not be self-locking, and must be easily openable from inside when the area is occupied. They must be kept locked when the area is unoccupied, with access to the keys restricted to authorised personnel. (*HSG 176)*

SECTION 6 - PIPELINES

2.8.90. This section provides policy on the following pipeline systems:

a. Airfield cross-base.

b. Oil fuel or petroleum supply depot to jetty.

c. Airfield hydrant.

d. Subsea.

e. Floating.

f. Jetty.

2.8.91. This does not apply to pipelines constructed for GPSS or TFHE/ JOFS.

2.8.92. The Engineering Authority for pipework, valves, fittings and incorporated equipment within airfield Bulk Fuel Installations, Petroleum Supply depots or Oil Fuel Depots is DIO Bulk Petroleum Section. Specifications are detailed in *DWS functional Standard 05 Specification for Specialist Works on Petroleum Installations – Mechanical.*

2.8.93. The Engineering Authority for pipework or fittings within Motor Transport Fuelling Installations is DIO Bulk Petroleum Section. Specifications are detailed in *DEO (W) Design and Maintenance Guide 14 Mechanical Transport Fuelling* installations.

2.8.94. The Engineering Authority for valve, fittings and incorporated equipment design and fabrication requirements for use on cross-base, hydrant and depot to jetty pipelines is

DIO Bulk Petroleum Section. Specifications are detailed in *DWS Functional Standard 05 Specification for Specialist Works on Petroleum Installations – Mechanical.*

2.8.95. Pipeline identification is to be in accordance with Part 1, Chapter 4

2.8.96. The design and installation of subsea pipelines is of a specialist nature and is only to be undertaken in conjunction with a specialist consultant.

PIPEWORK LAYOUT

2.8.97. Pipework shall be selected and installed in accordance with *Functional Standard 05 Specification for Specialist Works on Petroleum Installations - Mechanical, DWS.* Pipes should be routed to restrict their contents to a minimum and be laid out so as to cause the minimum inconvenience to access to tanks, grass-cutting operations etc. The route must minimise the risk of physical damage, particularly from vehicles. The use of barriers or bollards may be appropriate. Piping should preferably be above ground and routed away or protected from excessive heat or cold. Piping supports must be designed to suit the piping layout in accordance with current construction standards and where appropriate the design must allow for differential movement between tanks and pipework, e.g. due to temperature changes in heated tanks or to settlement. The designer must also consider the need for pressure relief / thermal relief systems. Supports located near tanks must be protected to a 2-hour standard of fire resistance.

UNDERGROUND PIPEWORK

2.8.98. Dependant on environmental considerations by Environment Regulators and groundwater sensitivity, Plastic or GRP materials can be used for buried pipework. Joints must be kept to a minimum and to minimise leakage should be welded rather than flanged or screwed, particularly for joints underground. It is recommended that current good practice would be to use double skinned pipework. The pipeline must be laid in a shallow trench lined with concrete or masonry and backfilled with concrete or with a suitable inert non-corrosion material such as sand or pea gravel. Adequate corrosion protection must be provided. If concrete backfill is not used, load-bearing covers or sheaths must be provided where necessary.

2.8.99. **Submarine Hoses**. The hoses are to be in accordance with the Oil Companies International Marine Forum: Guide to Purchasing, Manufacturing and Testing of Loading and Discharge Hoses for Offshore Moorings.

2.8.100. **Floating hoses.** Hoses are to be in accordance with the Oil Companies International Marine Forum: Guide to Purchasing, Manufacturing and Testing of Loading and Discharge Hoses for Offshore Moorings.

2.8.101. **Floating hoses; Buoyancy**. Although the hoses are inherently buoyant additional floats may be required to be fitted during installation and for towing purposes. The manufacturer is to advise on the necessity and location.

2.8.102. **Floating hoses; Conductivity**. All hoses are to be electrically continuous, note that the hose string must be isolated from the vessel.

OPERATOR CONSIDERATIONS

2.8.103. For all pipelines; Design, Material specifications, Coatings, Fill materials, Electrical continuity, cathodic protection and Thermal relief, should be considered as a minimum requirement during design and construction in accordance with current design, building, maritime (ISGOTT) and environmental protection standards.

2.8.104. **Aviation Fuel**. All materials in contact with aviation fuel are to be MOD approved by both the relevant Fuels Quality Assurance section and the Engineering Authority to ensure that the fuel does not react with the material and vice versa.

2.8.105. Bulk Fuel Installations shall be fitted with pipework and valving to enable receipt of fuel from the cross-base pipeline to pass through a filter/water Separator prior to entering a storage tank.

2.8.106. **Testing and Draining Facilities**. The design of the pipeline shall take into account testing and draining requirements in accordance with current test and maintenance requirements.

SECTION 7 - OPERATION OF FILTER WATER SEPARATORS, FUEL MONITORS AND DIFFERENTIAL PRESSURE RECORDING

2.8.107. The following information is provided for guidance. Detailed instructions are issued by the equipment manufactures, in service managers and Authorised Person Petroleum AP (Pet).

2.8.108. Differential pressure gauges are installed on filter vessels to display the differential pressure across the filter elements. This information is used to determine when the filter elements are blocked and require changing. If DP readings are taken regularly and displayed graphically a trend can be observed and any deviations can then be fully investigated on the condition of the filter pack. Standards for Differential Pressure Gauges are to be in accordance with STANAG 3583.

2.8.109. Filters Water Separators (FWS) are designed to stop the transmission of particulate matter and free water. When they do so they become less permeable and resistance to fuel flow increases with a consequent rise in differential pressure. A rapid rise in differential pressure indicates that:

a. The filter has removed contamination.

b. The fuel was contaminated.

In this situation the high DP readings will require the filter elements to be changed and an investigation into cause of the contamination. Under no circumstances should the filter elements be operated when the DP of the vessel exceeds the manufacturer's recommendations.

2.8.110. It should be noted that the actual DP reading indicated by the gauge is the measured pressure across the vessel at the actual flow rate. This pressure requires correction as the maximum DP allowance is dependant on flow rate. This information is normally supplied by the manufacturer in the form of a graph and should be referred to in order to establish the Corrected Differential Pressure. A typical Filter Water Separator performance graph is illustrated below and annotated with two of the following examples in the use of the chart.

a. A flow rate of 1200 litres/min (264 Imp Gal/min) flow rate will give a maximum Differential Flow Pressure of approx 0.75 Bar (10.5 PSI) before a filter element change is required.

b. Where as a flow rate of 1600 litres/min (352 Imp Gal/min) flow rate will give a maximum Differential Flow Pressure of approx 1 Bar (14.5 PSI) before filter element change is required.

2.8.111. Filter Water Separator elements should be changed when:

a. When the Differential Pressure (DP) across the filter exceeds 1 BAR (15 PSI) at (or corrected to) the maximum operating flow rate through the filter vessel. See Para 2.8.110 above for this procedure and guidance.

TYPICAL COALESCER ELEMENT PERFORMANCE TABLE

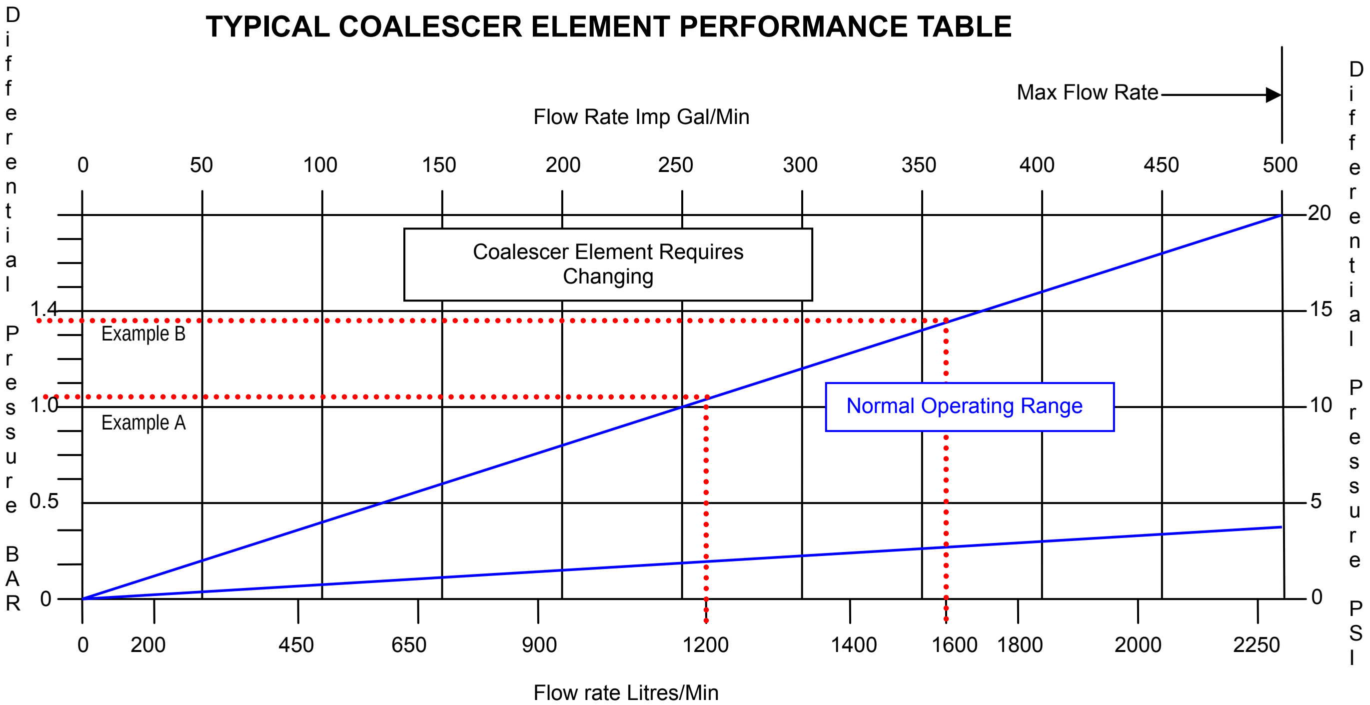

Figure 2.8.5- Coalescer Element Performance Chart

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Part 2

Chapter 9 (Sponsor FGSR- Hazard)

GUIDANCE ON OPERATION OF OIL WATER INTERCEPTOR / SEPARATORS (OWI) (OWS) ON MOD ESTATE

SECTION 1 - INTRODUCTION

2.9.01. Oil Water Interceptors / Separators (OWI) are below ground chambers (either enclosed tanks or open to atmosphere chambers) that are installed “in-line” into rainwater drainage systems where refuelling and maintenance activities occur on the MOD Estate, (BFI, MTFI, aircraft maintenance areas, BFCV parks).

Note. Canopy and building roof drainage may be discharged directly to a watercourse without treatment; as long as they do not receive any extraneous contamination.

2.9.02. The outflow from OWI is either to controlled waters; or to a foul sewer. Dependant upon the outflow conditions will dictate the classification of OWI design and performance; and ultimately the type of permit to discharge consent required. The responsibility for ownership of the permit to discharge consent; and maintenance responsibility of the OWI lies with Project Aquatrine RPC.

SECTION 2 - THEORY OF OPERATION

2.9.03. The most common type of OWI on the MOD Estate is the gravity separation system. F&L contaminated rainwater is gravity fed into the inlet chamber of the OWI, where it is mixed below the static liquid contained within the OWI. **For the OWI to operate correctly it is imperative that they must be always charged with fresh water.** Silts and sand will immediately settle within the first chamber of the OWI. The contaminated water flows over the first baffle into the separation chamber where it is contained by design of the higher second baffle. The lighter density F&L droplets rise to the surface within the separation chamber, (Stokes Law). To improve the efficiency of separation some OWI are installed with inclined plates which increase the coalescing rate of F&L. The larger the droplets of F&L, the faster they rise to the surface. **For OWI to operate correctly, contaminated water should never be poured directly into OWI. The turbulent action will produce fine droplets of F&L that will remain in suspension, and not separate out.** The remaining water passes under the second baffle at the base of the separation chamber into the outlet chamber, where it exits via the discharge point. **For OWI to operate correctly, the sediment and collected F&L must be removed from the OWI periodically.**

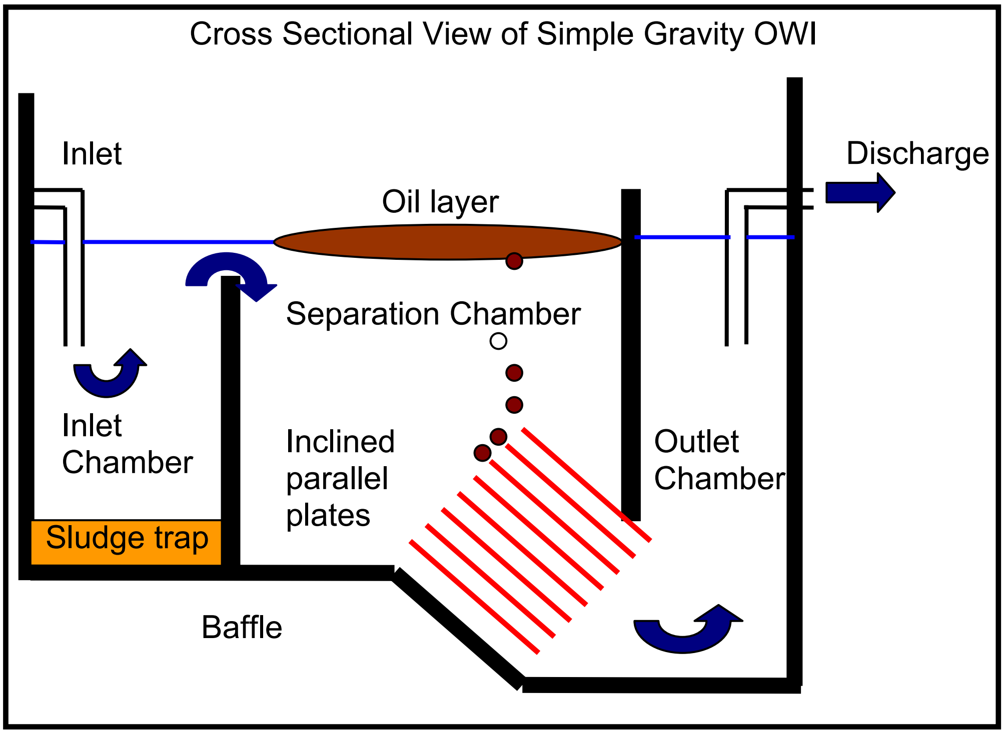

Fig 2.9.01 OWI principle of operation

DETERMINATION OF OWI

2.9.04. OWIs are used over a wide variety of situations on the MOD Estate to fulfil a number of different requirements. The type of OWI required is dictated on site specific conditions. Operators need to consider if the primary purpose of an OWI is to separate rainwater with slight F&L contamination; or if the OWI is required to contain major F&L spillages? OWI are commissioned, and therefore capacity is determined by:-

a. The requirement to primarily treat contaminated rainwater runoff from impervious areas - drainage area feeding the OWI (e.g. BFCV parks, MTFI, BFI issue and receipt stand).

b. The likely occurrence and size of a F&L spillage, and the need to protect the surrounding area.

c. The OWI performance (discharge to controlled water, foul sewer).

OWI CLASSIFICATION

2.9.05. The 2 classifications of OWI are as follows:-

a. **Class 1 OWI.** This OWI is designed to discharge a concentration of less than 5mg/L of oil in water under standard test conditions. This type of OWI is required for discharges to surface water drains, whose ultimate release is to controlled waters. A permit (consent) to discharge to controlled water will be required from the Environment Regulator. Management of Permits shall be maintained by the Project

Aquatrine Service Provider, but shall be provided to the Operating Authority on request as supportive evidence for the Operating Authority's' EMS.

b. **Class 2 OWI.** This OWI is designed to discharge a concentration of less than 100mg/L of oil in water under standard test conditions. This type of OWI is suitable for dealing with discharges to foul sewers. Permits (consents) to discharge to Foul sewer will be required from the sewage provider. Management of Permits shall be maintained by the Project Aquatrine Service Provider, but shall be provided to the Operating Authority on request as supportive evidence for the Operating Authority's' EMS.

SECTION 3 - TYPES OF OWI

2.9.06. **Full Retention Separators.** These OWIs treat the full flow that can be delivered by the site drainage system. "Full Flow" is defined as the flow rate of rainwater on the individual site generated by a rainfall intensity of 65mm/hour (storm periods). This type of OWI should be considered where there is regular contamination of F&L and a foreseeable risk of significant fuel spillages (MTFI / BFI issue and receipt points, BFCV parks, aircraft refuelling and maintenance hardstanding areas). These can be constructed as Class 1 or Class 2 OWI.

2.9.07. **Bypass Separators.** These OWIs fully treat all flows for the area served by rainfall rates of 6.5mm/hour. Flows above this rate are allowed to bypass the OWI. This type of separator should be sited where the risk of spillage is slight and only small spillages can occur. **They should not be sited where F&L spillage is foreseeable.** These can be constructed as Class 1 or Class 2 OWI.

2.9.08. **Forecourt Separators** is a terminology used to describe OWI on liquid fuel dispensing sites (MTFIs).These OWIs **shall be a Full Retention Separator design.** They must be large enough to serve the catchment area of the site; and the site catchment area must be designed to direct all runoff towards the drainage system in order for the OWI to work efficiently.

WASHING / FIRE TRAINING ACTIVITIES

2.9.09. All washing, cleaning and fire training activities use cleaning and foam agents (detergents and proteins) and are CODs and BODs. These activities should be carried out in a designated area clearly marked on site and in any plans. These chemicals form emulsions when in contact with waste water and F&L, therefore any F&L will not separate out. **Under no circumstances should waste water from these activities be discharged through a forecourt type OWI.** This type of effluent should be discharged to the foul sewer or contained in a sealed tank for off site disposal in accordance with the permit (consent) to discharge.

OWI OPERATION STRATEGY AND SIZING

2.9.10. Operators need to consider what are the most significant consequence, and therefore the main purpose of the OWI? For BFIs and MTFIs, the primary concern may be that of spillages from road tankers / BFCV, than that of rain water runoff with slight F&L contamination. Therefore amount of F&L spilled, area of impermeable area present, and amount of rainwater estimated to fall on impermeable area will all affect the efficiency and throughput of an OWI. (Too much "neat" spilled F&L and or/ too much rainfall carrying small quantities of spilled F&L will swamp an insufficient sized OWI)

THROUGHPUT / FLOW RATE / NOMINAL SIZE CALCULATION

2.9.11. OWIs should be allocated a Nominal Size (NS) in litres/second according the maximum flow that can be treated to give, under test conditions, an oil concentration of up to 100mg/L (Class 2) or, up to 5mg/L (Class 1) E.g. A Class 1 NS 20 OWI will achieve a concentration of 5mg/L in the discharge at a flow rate of 20 Litres / second. Nominal Size (NS) is calculated as follows:-

a. **NS** for an OWI with a catchment Area A = 0.018 x A (in m^2) for **full retention OWI**. (Equation 1)

b. **NSB** for an OWI with a catchment Area A = 0.0018 x A (in m^2) for **bypass OWI**. (Equation 2).

c. The capacity for silt storage should also be calculated in both full retentions and bypass OWI.

d. Silt capacity (Equation 1) x 100 or (Equation 2) x 100. The silt capacity for Bypass OWI should not be included in the main oil separating chamber.

SECTION 4 - OWI OIL STORAGE CAPACITY CALCULATION

2.9.12. Oil storage capacity is defined as the volume of separated F&L that can be stored in the OWI without any of the stored F&L entering the inlet or outlet of the OWI. Oil storage volume (V) calculated as follows:-

a. V (litres) = **NS** x10 for **full retention OWI**

b. V (litres) = **NSB** x15 for **bypass OWI**.

c. However, forecourt type full retention OWI should consider the BFCV / road tanker compartment size that could possibly spill during issues / receipts on BFIs, MTFIs and on BFCV parks if tanker transfers occur.

2.9.13. The current industry standard for forecourt type full retention OWI F&L storage capacity is 7600 L. This is also the basis for calculating the MTFI / garage forecourt drainage and containment for tanker / BFCV delivery areas. (Discharge rate of 44 Litres

/second for 3 minutes over a 2m wide section of channel without the delivery area overflowing = 7920L).

2.9.14. Although the likelihood of the loss of the entire load from a full compartment of a road tanker / BFCV during issue / receipt is considered to be remote, the possibility of a large spillage occurring during delivery / receipt is a foreseeable event and should be taken into account during MTFI / BFI BFCV park design. As a level of mitigation for larger BFCV (CST) receipts / delivery, the tanker delivery area, drain system downstream of the tanker delivery area, and the full retention OWI could be used as a ***short term /first aid /initial response storage solution*** for spills greater than the original designed OWI capacity. This should be determined by conducting a Pollution Risk Assessment Part 5 Chapter 3 and be incorporated into the USRP Part 5 Chapter 7

2.9.15. Full retention OWI sited on high operational areas (BFI, MTFI issue receipt points, and BFCV parks) must be fitted with automatic closure devices that prevent F&L escaping from OWI when the quantity of F&L exceeds the OWI F&L capacity (V). Any automatic closure device should also have an alarm system fitted that alerts the operator / responder locally and / or remotely when level of F&L reaches 90% of the F&L storage volume (V).

SECTION 5 - MAINTENANCE

2.9.16. The Environment Agency / SEPA/ EHNI Pollution Prevention Guideline No 3 (Use and Design of Oil Separators in Surface Water Drainage Systems -PPG 3) describe the responsibilities on the use and maintenance of OWIs.

2.9.17. As a minimum, every 6 months or in accordance with manufacturers' instructions OWI should be physically inspected for:-

a. Physical inspection for OWI integrity.

b. Qty of accumulated F&L and silt.

c. All electrical equipment (alarms).

d. Any coalescing devices – replace if necessary.

Note: High risk sites or heavily used sites may require more frequent inspections.

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Part 2

Chapter 10 (Sponsor – Hazard)

SAFE PRINCIPLES FOR ROAD / RAIL DELIVERIES AND RECEIPTS

SECTION 1- ROAD TANKER ISSUE / DELIVERY STANDS - GENERAL

2.10.01. Road Tanker delivery stands used to supply F&L to bulk storage tanks (standby generators, district heating systems, BFIs etc) shall be located in a safe, well-ventilated position in the open, and have a clear and unobstructed forward escape route.

2.10.02. On site competent staff trained in the delivery and emergency procedures should supervise all deliveries. Physical measures to be put in place include (but not exhaustive) are:-

a. A notice shall be prominently displayed detailing safe delivery and emergency procedures *(USRP)* at the delivery point.

b. The delivery point should be clearly marked with the static tanks contents and maximum capacity, and should be secured when not in use.

c. Where supervision for tanker delivery is not provided, the road tanker driver should be specifically trained in dealing with an emergency at the delivery stand. A record of training (COC) will be required to support the evidence of competence within the installation.

d. Suitable PCS should be made available at the delivery stand, based on the Pollution Risk Assessment Part 5 Chapter3 and all staff (including delivery drivers) should be trained on its correct use.

e. Use non-return valves and sealed connections where appropriate, and protect filling points from overfilling by an appropriate independent High Level alarm refer to Part 2 Chapter 8.

f. Wherever possible the delivery pipe length should be as short as practicable.

g. Static tank contents shall be measured before road tanker delivery to ensure available tank capacity refer to Part 2 chapter 8.

h. The minimum recommended distance of a filling point from occupied buildings, site boundary, and fixed sources of ignition is 10m, or distance calculated from the DSEAR risk assessment Part 2 Chapter 1 which ever the greater.

i. Drainage of Road Tanker Delivery Stands shall be as stated in Part 2 Chapter 10.

2.10.03. The loading / unloading area and the access road shall preferably be dedicated to tanker use only. The delivery stand shall provide sufficient space (not less than 15 m long and 5 m wide). If this is not practicable, barriers to control access and signage shall be used to control access by other vehicles and pedestrians during transfer operations. A separate parking bay for road tankers waiting to load / unload is advisable so that documents can be checked with minimum interference to traffic flow.

2.10.04. Road tankers shall not wait on public roads or busy internal roads. The stand shall be substantially level to ensure full extraction of product during delivery. If the delivery stand is in close proximity to the tank, then adequate protection should be provided to the tank against vehicular impact damage.

2.10.05. The delivery stand shall be constructed of a suitable impermeable surface to hydrocarbons and be capable of withstanding the axle weight of the road tanker.

2.10.06. If the road tanker delivery stand is located outside bulk fuel storage areas (BFIs MTFIs where compliant road tanker off loading facilities and drainage systems, including OWI already exist), then a suitable appropriate risk assessment Part 5 Chapter 3 shall be carried out. As a minimum, the drainage system shall be designed to minimise the surface area of any spillage, and be isolated from surface water drainage systems. Lighting requirements for delivery points is at Part 2 Chapter 8.

SECTION 2 MTFIs / BULK FUEL INSTALLATIONS / ROAD TANKER ISSUE / DELIVERY STANDS

2.10.07. Safe access to equipment and safe means of escape shall be provided for work above ground level. For top loading of vehicles access gantries with stairs or ladders will usually be necessary. Gantries shall be made of fire resisting materials and where necessary shall include means of access to the top of the tanker vehicles.

2.10.08. Gasolines and kerosenes can generate an electrostatic charge and precautions against incendive sparks shall be taken. Reference shall be made to Pt 2 Chapter 8. An earthing connection for the vehicle shall be provided. For additional protection an interlock may be fitted to prevent operation of the control valve or loading pump until the earth connection is made.

2.10.09. To minimise the risk of over-filling, tankers and fuellers shall be loaded by pump using a calibrated flow meter incorporating a trip to stop the pump and preferably close a shut-off valve when a pre-set quantity has been delivered. A quick-action shut-off valve or pump stop control shall be provided at the loading point, and use of an overflow alarm and automatic cut-off is recommended. Where high-level alarms are fitted, they shall be correctly set and maintained. To reduce the likelihood of spillage, self-sealing couplers on the hose connections shall be used.

2.10.10. Precautions shall be taken against spillage due to vehicles being moved with the hoses still connected. This can be done by providing barriers across the tanker stand; brake inter-locks on the vehicles are standard on Service tankers and fuellers. In addition, the warning notices shown below shall be prominently displayed in a position facing the vehicle cab.

DELIVERY STANDS AND TRAFFIC AREAS

2.10.11. **For MTFIs only.** Road tanker delivery stands and traffic areas shall be impermeable to hydrocarbons and be sized to accommodate the largest tanker with tractor unit plus sufficient margin around the vehicle to contain splashing in the event of a spill. Delivery stand gradients and perimeter drains where used shall be designed to accept a discharge at a rate of 16 litres / s for a period of seven minutes over a 2m wide section of channel without overflowing.

2.10.12. Grating should be sufficiently sized to allow run-off to be intercepted positively and freely enter the channel. The grating design should not allow the flow of discharge to pass across the main body of the grating. Continuous open slots to allow discharge to enter the channel, should intercept the flow.

Note: Under no circumstances should any liquid run – off be allowed to leave the site in an uncontrolled manner.

2.10.13. **For MTFIS & BFIs OFDs.** The road tanker delivery stand and traffic areas shall be impermeable to hydrocarbons and be capable of holding any spilled residue until such time as the drainage system can accept and convey the spillage to the OWI. See Part 5 Chapter 1 for short term spillage storage mitigation.

2.10.14. Roadways shall be laid out to provide easy access to and from all parts of the installation. A one-way traffic system should be adopted whenever possible, particularly in areas where vehicles are loaded and unloaded. Vehicles must not be expected to reverse in order to load or discharge, and in any case they must not have to reverse to exit.

2.10.15. Roads shall be designed to enable all-weather access to tanks for fire-fighting purposes. Where 2-way traffic is encountered the width of the road shall be sufficient to allow 2 vehicles to pass. Single-track roads shall be provided with lay-byes. Curvatures, contours, bearing strengths, junctions and clearance heights shall accommodate the largest vehicles, including emergency vehicles, likely to use the roads.

2.10.16. Working areas associated with storage tanks, including loading and unloading points, must be adequately lit when in use. All light fitments installed in hazardous areas shall be suitably certified and maintained for the zone in which they are located. The average luminance at ground level and on stairs, access platforms etc must be at least 50 lux. This must be increased to 100 lux where perception of detail is required, for example to read level gauges. *(DMG 14 MTFI).*

BONDING OF VEHICLES TO FIXED INSTALLATIONS

2.10.17. Fuels dispense and receipt points shall be provided with a bonding cable. The bonding cable shall be connected to the fixed earthing network, which in turn will be connected to the dispense / receipt pipeline. The resistance from the end of the bonding cable to earth shall be lees than 10Ω. (*Defence Works Functional Standard – Design & Installation Guide for Specialist Works on Petroleum Installations – Electrical- p26*

a. For NATO installations the requirements for technical points in accordance with *STANAG 3756* apply as a minimum.

SECTION 3 - OPERATING PROCEDURES - LOADING AND UNLOADING OF BULK FUEL CARRYING VEHICLES (BFCV)

2.10.18. All BFCVs are to be correctly marked for the product being carried as detailed in JSP 800 Volume 4b, *"Dangerous Goods by Road, Rail and Sea"*.

2.10.19. If Manifold Equipment Fuel Dispensing (MEFD) is to be used, *User Handbook Army Code 60290* is to be followed. A Convoy Commander's Brief for Convoy Refuelling is at Section 8.

2.10.20. In the absence of BFCV specific operating procedures that should be available in Equipment / Platform operating manuals. The following generic actions shall be taken when BFCVs are being loaded or unloaded; in addition to the general precautions detailed in Part 2 Chapter 8

a. Immediately on entering a civilian or MOD installation inclusive of a Deployed Bulk Fuel Installations (DBFI) the driver is to report to the site control point/office for the relevant instructions in:

(1) Emergency Procedures.

(2) Loading Operations.

(3) Traffic Control Systems.

b. It is the BFCV driver's responsibility to carry out the following actions:

(1) Ensure the vehicle is positioned so it is able to exit the installation without reversing or carrying out a complicated manoeuvre in the event of an emergency.

(2) Ensure that the vehicle is taskworthy with the correct equipment as found at Annex A.

(3) Earth and Bond the vehicle to the installation.

(4) Ensure that the vehicle master switch is off once the vehicle is parked in the relevant position (unless required to drive pump).

(5) Vehicle fire extinguishers are to be placed 5 m upwind and the relevant hazard warning signs are displayed upon the approach to the vehicle location.

c. Before any operations commence the driver and installation competent person are to confirm the Quality, Quantity and Grade (QQG) of the product being loaded/unloaded in both the BFCV and the receiving / issuing tank

d. All operations are to be in constant visual supervision of a certified competent person. Pumpsets and delivery hoses are not to be left unattended during operations.

e. It is important that any temporary bonding connections that are made should not be liable to accidental breakage.

f. Before receipt from a civilian BFCV takes place, all seals on the manifold are to be inspected to ensure that the load has not been tampered with.

g. Where fuel is being transferred between two BFCVs, they are to be bonded together. Where applicable, vehicles are to be earthed. The operation is to take place in a designated area, which is fit for purpose as described in this chapter) and shall not to take place within 15 m of other vehicles.

h. BFCV dedicated solely for the storage, issue and receipt of AVGAS are not required to be fitted with FWS. The need for a mesh screen filter remains extant.

Note: At any kerbside facility or terminal with a Vapour Balancing System (Vapour Recovery), the vapour hose is to be connected prior to the fuel transfer hose. On completion of the operation, the fuel issue hose is to be disconnected prior to the removal of the vapour hose.

PUMPING OF GASOLINE - BFCV

2.10.21. The pumping of Gasoline is a common practice within the MOD. However, the pumping of Gasoline is not permitted at civilian petrol station forecourts where all deliveries are to be made by gravity discharge.

COMPLETION OF OPERATIONS - BFCV

2.10.22. On completion of all operations the following actions are to be taken in the order shown:

a. Confirm transfer quantities and complete the relevant paperwork.

b. Close all valves and vehicle vents.

c. Disconnect and stow away all hoses.

d. Disconnect SCULLY or like system.

e. Close and secure manlids and dip hatch covers.

f. Lower top hamper safety handrail.

g. Mop up and dispose of any spillage in line with installation instructions.

h. Replace fire extinguishers back on the vehicle.

i. Disconnect and stow all bonding and earthing cables.

TOP LOADING OF BFCVs

2.10.23. Bottom loading is the safest and preferred method for filling BFCVs. If a BFCV is required to be top loaded at an operational BFI only, the site operator must ensure that the loading arm is lowered to the bottom of the tank compartment. The fuel delivery rate is to be reduced until the product level covers the bottom of the loading arm by a minimum of 150 mm. This will ensure that any static build up is minimised. Normal flow rate can then be adopted. Before any operations are started there must be a detailed risk assessment carried and the overhead refuelling arm must correctly earthed, supported with an in date earth certificate.

Note: On no account are BFCVs to be top loaded using the refuelling nozzles from MTFI's or from BFCVs.

BFCV DOCUMENTATION

2.10.24. All BFCVs are to carry (in addition to the driver's documents - see *JSP 800, Volume 4b)* the following documentation readily available at all times.

a. Instructions in Writing.

b. F/Mov 1042 – Dangerous Goods Note.

2.10.25. Further information on documentation and mandatory equipment is found in JSP 800 4b.

SECTION 4 – BFCV FIELD OPERATIONS

2.10.26. On exercise or operations, recce and siting is to be carried out by a competent person for the following operations:

a. BFCV to BFCV transfers.

b. Convoy refuelling.

2.10.27. Rainfall need not stop an operation however, manlid covers are to be closed to a 45° angle and the operation monitored to avoid contamination of the product by water**.**

2.10.28. All operations are to cease during electrical storms due to the risk of fire, explosion and injury to personnel. In these conditions it advised, where possible, that all personal withdraw to a distance of 50m from the operating area.

2.10.29. All operations are to cease if injury to personnel or a pollution incident occurs.

BFCV CONVOY COMMANDERS REFUELLING BRIEF

2.10.30. When Convoy refuelling, the following procedures' (in conjunction with the relevant refuelling equipment operating procedures) are to be followed:

a. Point out the extent of the Hazardous Area around the refuelling equipment. The operator may impose a restricted area of up to 15 m in order to permit safe refuelling operations.

b. Vehicles engines are to be switched off.

c. Where fitted equipment master switches are to be switched off.

d. Where fitted radios and other electrical equipment (e.g. ECM), must be switched off. Local security orders may override this in operational circumstances.

e. There is to be no smoking or naked lights.

f. All personnel are to act in a responsible manner. Care is to be taken to avoid pollution, in the event of any spillages they are to be cleaned up immediately.

g. The correct bonding procedure, as demonstrated by the refuelling operator, is to be carried out.

h. Drivers are to refuel their own vehicles.

i. Vehicles that do not require fuel are to be directed around the area to avoid congestion.

j. The convoy commander is to witness the dipping of the tanks or the checking of the meter readings of the refuelling equipment, before and after the operation. Then sign for the difference as the quantity received by the convoy on the relevant paperwork.

SECTION 5 - BFCV EMERGENCY PROCEDURE

2.10.31. In the event of an emergency involving a BFCV it is vital that immediate and effective action is taken. An example of an effective emergency procedure is found at Annex B as taught by the Defence Petroleum School and Defence School of Transport.

Note: All incidents and breaches of regulations witnessed are to be reported in accordance with JSP 800 4b, Chapter 1.8 (DG Non-Compliance Report).

SECTION 6 - RAIL FACILITIES ISSUES AND DELIVERIES

2.10.32. Rail transfer facilities must be located at least 15 m from any railway line in regular use. Sufficient means must be provided to control and contain any spillage.

2.10.33. Rail tracks must be laid straight and level. Where a gradient is unavoidable it must be no more than 1 in 400, and for a dead end must slope down towards the buffers. The approach of other rail traffic must be prevented by closing and locking barriers or points. If the siding is part of an electrified track system the siding must be electrically isolated from the rest of the system and bonded to the site main earth. The track and the line-side equipment must be maintained to the appropriate Railtrack standard.

2.10.34. The requirements on equipment, electrostatic charging and methods of filling shall also supply to rail facilities can be found Part 2 Ch 13. In addition, where a common header pipe is used to allow simultaneous unloading of two or more rail tank cars, the connection branches to each tank car shall be provided with quick-action manually-operated stop valve and non-return valves, to prevent back-feeding. Remote pump controls shall be provided at intervals along the siding. Remote pump controls shall be provided at intervals along the siding. Filling arrangements shall be such that the train shall not be capable of movement until loading is complete and all filling arms are withdrawn.

2.10.35. A locomotive shall not approach within 9 m of a hose connection in use unless the locomotive is protected against acting as a source of ignition, to Zone 2 standards.

2.10.36. In addition to Normal Safety Precaution (NSP) during the loading or discharging of RTCs; the following additional actions are to be taken.

2.10.37. All machinery and equipment used for the shunting and handling of IP Class I and II products is to be of a safe standard. There is to be no shunting within 15 m of the RTC during any fuelling operations.

2.10.38. Before any operations take place the RTCs are to be uncoupled from any non-petroleum rolling stock on the siding and the brakes are to be fully applied. It should also be confirmed that the RTC(s) to be loaded are in date with regard to their periodic inspection regime.

2.10.39. During fuelling operations all approaches to the siding are to have a red warning flag displayed by day and at night by a red warning light. The safety distance for the positioning of the warning flag or lights may be different dependent on the theatre of operations or exercise, local authority requirements are to be applied to where appropriate.

2.10.40. The person in charge of the operation is to ensure that all precautions are taken to avoid accumulation of static electricity. The rail track and loading gantry are to be earthed, swivel joints between sections of pipeline and hoses are to be bonded across to ensure electrical continuity throughout their length. Ensure that the rail car is earthed; normally the car is earthed through the wheels and the rail track. If the resistance to earth exceeds 10 Ohms then earthing conductors must be used. Ensure that the fill pipe is correctly bonded to the rail car prior to connection.

2.10.41. Extreme care is to be taken when opening or closing manlid covers on RTC. The manlid is not to be allowed to fall heavily on the tank when being opened or closed.

2.10.42. Before any operations commence fire appliances are to be laid out in a position upwind and readily available.

2.10.43. All personal on site are to be fully conversant with site fire orders, the pollution prevention spillage plan, the correct operation of all fire fighting equipment's and Pollution Control Sorbents (PCS).

2.10.44. For NATO installations the requirements for terminal points in accordance with *STANAG 3756* apply as a minimum

RAIL FACILITIES RECONNAISSANCE AND USE AGREEMENTS

2.10.45. It is possible that the unit will be given permission to negotiate direct with the landowner regarding its use. Payment for the use of the site and any damages is not to be agreed without written consent from the appropriate Formation Headquarters.

2.10.46. A request is to be made to the local authority for permission to use the installation and the provision for civil, fire and emergency service cover. As a provision prior to granting permission for the use of the site, the local authorities may insist on a demonstration of the user units fire fighting and pollution prevention management systems.

2.10.47. When a civilian installation/depot is to be operated by MOD personal the installation/depot operating instructions are to be implemented.

2.10.48. A recce of the proposed loading/discharge site is to be undertaken prior to deployment. The recce party is to include a trained Petroleum Officer or SNCO that will be responsible for the management of the site.

2.10.49. Once the recce is completed and a suitable site has been selected a request to use the site is to be submitted to the relevant service Formation Headquarters.

SECTION 7 – OPERATING PROCEDURES LOADING AND UNLOADING OF RTC

2.10.50. **Loading**. The following actions in addition to those already stated are to be taken when loading an RTC:

a. Bottom loading of RTC is strongly preferred. Where tanks are not loaded through bottom loading connection, filling is to be by means of an internal filling pipe, in the tanks together with a screw connection to the filling hose. Where such filling pipes are not fitted the filling hose or pipe is to be lowered thought the manlid to almost the bottom of the tank. Filling is to be at a reduced rate until the level of fuel in the tank covers the end of the filling pipe by a minimum of 150 mm. On no account are RTC to be nozzle filled from the top.

b. Immediately upon completion of loading all manlids are to be secured, closed and sealed as required.

2.10.51. **Unloading**. The following actions in addition to those already stated are to be taken when unloading a RTC:

a. Before unloading all vent pipe apertures are to be examined to ensure they are not damaged or obstructed.

b. The receiving tank or BFCV is to be dipped to ensure there is sufficient ullage to receive to quantity of fuel being issued. Before the unloading commences a sample from each RTC is to be taken and examined for colour, water and solid matter.

c. Upon completion of unloading the RTC is to be examined to ensure all tanks are completely empty. The manlids covers are to be securely closed and all outlets including vent pipes are to have their caps replaced and secured.

SECTION 8 – RAIL FACILITIES SEPARATION DISTANCES FOR HIGHER FLASHPOINT F&L

2.10.52. IP Class II products with a flashpoint greater than 32^{o}C will not normally produce a flammable atmosphere unless they are stored at ambient temperatures at or above their flashpoint. For higher flashpoint F&L, the recommended separation distance between road and rail transfer facilities and buildings may be reduced to 5m. There is no requirement for a separation distance between the locomotive and the filling hose. When the ambient temperature is at or exceeds the flashpoint of the product the requirements of this chapter will apply in full.

SECTION 9 – RAIL FACILITIES DOCUMENTATION

2.10.53. When goods are offered for transportation under the regulations concerning the International Carriage of Dangerous Goods Rail (RID), a consignment note containing specific particulars about the substances or articles being consigned must be completed by the consignor. The document used by MOD is the F/Mov 1042 – Dangerous Goods Note. When using this form, the UK regulations quote in the “Consignor Declaration” at the top are to be struck through and “RID” inserted.

2.10.54. All details regarding the required documentation for the transport of dangerous goods by rail can be found in JSP 800 Volume 4b ‘*Dangerous Goods by Road, Rail and Sea*’.

SECTION 10 – RAIL FACILITIES MARKING AND LABELLING

2.10.55. The relevant marking and labelling of RTCs transporting dangerous goods by rail can be found in JSP 800 Volume 4b *'Dangerous Goods by Road, Rail and Sea'.*

BIBLIOGRAPHY: ROAD TANKER / RAIL CAR ISSUES & RECEPITS

1. The Safe Operation of Refuelling Facilities. Environment Agency Pollution Prevention Guidelines (PPG) 7

2. The Storage of Flammable Liquids in Tanks. HSG 176

3. Design, Construction, Modification, Maintenance and Decommissioning of Filling Stations. APEA IP 2nd Ed Mar 2005. (The Blue Book)

BIBLIOGRAPHY: BFCV OPERATIONS

1. JSP 800 Volume 4b - Dangerous Goods by Road, Rail and Sea

BIBLIOGRAPHY: RTC OPERATING PROCEDURES

1. JSP 800 Volume 4b - Dangerous Goods by Road, Rail and Sea

PACKED F&L / BULK FUEL CARRYING VEHICLE CHECK SHEET

Driver and Crew Details					
Unit: Title/UIN					
Driver: Rank/Name/Number					
Attendant: Rank/Name/Number					
Driver		Checked	**Attendant** (where applicable)		Checked
Drivers Licence			Drivers Licence		
Proof of Identity			Proof of Identity		
ADR Certificate	In date		ADR Certificate or other proof of awareness training	In date	
	For Class			Specify other proof of training	
	Tanks/Packs				
	Signed				
Certificate of Competence	In date		Certificate of Competence	In date	
	For Equipment			For Equipment	
Remarks:					

Vehicle and or Trailer Details					
Vehicle			**Trailer**		
Registration Number			Registration Number		
Certificate of Approval	For this vehicle		Certificate of Approval	For this trailer	
	In date			In date	
Remarks:					

Tank Details (where applicable)			
Tank Plate or Test Certificate Number		Expiry Date	
MLRVV Run out Date		Leak Test Expiry Date	
Function Test Expiry Date		Bonding Checks Expiry Date	
Remarks:			

Vehicle and Crew Equipment (where applicable)					
Fire Extinguishers	2kg Dry Powder		Instructions in Writing	Correct Version	
	2 x 6kg Dry Powder			In colour	
Orange Plates	Front and Rear		Each side and Rear	Class placards	
	HIN and UN Number			EHS mark	
Test and Check	Master Switch		Battery Cover	Fitted	
	Cab circuit breaker			Secure	
Minor Spill Kit	Drain Blocker - Square		PPE for each crew member	Hi-viz jacket	
	Drain Blocker - Rectangular			Safety Torch	
	Absorbent Compound			Goggles	
	Bag Hazardous Waste			POL Gloves	
Wheel Chock or Chocks			2 x Self standing warning signs		
Sodium Chloride Ophthalmic Eyewash			Brush with handle		
Shovel			First Aid kit		
Remarks:					

Note: For equipment NSNs see JSP 800 Vol 4b Chapter 8.1. Units are to ensure AESP's for the relevant BFCV are also adhered to.

BFCV EMERGENCY ACTION PLAN

In the event of an accident or emergency

In the event of an accident or emergency that may occur or arise during carriage, the members of the vehicle crew shall take the following actions where safe and practicable to do so:

1. Apply the breaking system, stop the engine and isolate the battery by activating the master switch where available.

2. Avoid sources of ignition, in particular, do not smoke or switch on any electrical equipment.

3. Inform appropriate emergency services, giving as much information about the incident or accident and substances involved as possible.

4. Put on the warning vest and place the self-sealing warning signs as appropriate.

5. Keep the transport documents readily available for responders on arrival

6. Do not walk in or touch spilled substances and avoid inhalation of fumes, smoke, dusts and vapours by staying upwind.

7. Where appropriate and safe to do so, use the fire extinguishers to put out small/ initial fires in tyres, brakes, and engine compartments.

8. Fires in load compartments shall not be tackled by members of the vehicle crew.

9. Where appropriate and safe to do so, use on-board equipment to prevent leakages into the aquatic environment or the sewage system and to contain spillages.

10. Move away from the vicinity of the accident or emergency, advise other persons to move away and follow the advice of the emergency services.

11. Remove any contaminated clothing and used contaminated protective equipment and dispose of it safely.

Part 2

Chapter 11 (Sponsor Army HQ)

SAFE PRINCIPLES OF BFCV PARKS - FACILITIES

SECTION 1 - GENERAL

2.11.01. Bulk Fuel Carrying Vehicles (BFCV) is the generic term for any vehicles or equipment which come under the ADR definitions of "*tank-container*", "*portable tank*", "*demountable tank*" or "*fixed tank*". The following service vehicles are classed as BFCVs:

Rear Line Support Tankers

a. 32,000l Semi General Support Tanker (GST)

b. 20,000l Close Support Tanker (CST)

c. Airfield Support Tanker (AST)

i. Trucks Ground Fuel 5,000l

ii. Trailer Tanker Fuel

d. Aircraft Re-fuellers:

(1) Tactical Aircraft Re-fueller (TAR).

i. 15,000l TAR

ii. 4,000l TAR

(2) Trucks Fuel Servicing (TFS).

(3) Airfield Re-fueller:

i. Long Capacity Aircraft Re-fueller (LCAR)

ii. Mobile Airfield Hydrant Fuel Dispenser (MAHFD)

(4) Air-portable Fuel Dispensing Vehicles (AFDV).

Front Line Support Tankers

e. Unit Support Tanker 7,000l (UST):

f. Unit Bulk Refuelling Equipment (UBRE), 4 & 8 Tonne.

g. Fuel Dispensing Rack 9,500l (FDR).

2.11.02. All BFCV's are to be treated as if they were full of product unless they have been gas freed in accordance with 2320-A-100-522 Gas free vehicles are to be treated as new or unused vehicles. they are to be clearly marked as 'Gas Free'. Note: *All Fuel Identification Signs, Hazard Markings and Instructions in Writing are then to be removed or covered up completely.*

2.11.03. This chapter applies to BFCV parks within unit lines. Where operational the application of the following sections , Unit Commanders can conduct risk assessments as appropriate.

SECTION 2 - DESIGN AND CONSTRUCTION

DESIGN

2.11.04. The design of new, or modification of existing installations, is to follow the criteria contained in this chapter and current Defence Estates Guidelines (for details refer to DIO Publications). The modification of existing installations must consider, where reasonably practicable, the cost and/or feasibility of improvements based against the hazards/risk presented by non/or partial compliance with these regulations, established by a risk assessment. The same balance of risk is to apply to semi-permanent installations, which may not meet the full criteria in this chapter (for details refer Part 4, Chapter 3). Risks assessments are to be initiated by the Facility Manager and specialist advice sought from the regional Fire Officer, Command Fuel Authority/Inspectorate and when applicable 170 (Infra Sp) Engr Gp.

2.11.05. The safe system for the organisation for modification and maintenance work on BFCV Parks is shown in Part 2, Chapter 4.

SITING

2.11.06. The siting of new BFCV parks or refurbishment of an existing facility is to be subject to a properly constituted Siting Board. Siting Boards are to be convened in accordance with Part 1, Chapter 2, Section 3.

HARDSTANDING

2.11.07. The area of hard standing is to be provided in accordance with *JSP 315*. The scale is for 2.25 x the floor-plan area for each vehicle[1] plus an area for manoeuvring. Consideration should be given to providing an additional area for transiting or visiting vehicles and if required a designated bulk fuel transfer area.

2.11.08. The surface should be of concrete or other material impervious to hydrocarbon products. This may not be possible whilst deployed on operations or in field conditions and the Head of Establishment is to ensure that appropriate Risk Assessments care carried out.

[1] [1] Example 9 Tonne MM Unit Support Tanker = 2.55 m x 9.16 m x 2.25 = 52.56 m^2

SAFETY DISTANCES

2.11.09. In all instances there is to be a safety distance around the hardstanding, extending outwards 10 metres in all directions. No facilities, vehicle parking areas or buildings, including control rooms, are permitted within this safety distance.

2.11.10. A 45 metre safety distance applies to living accommodation and public highways in the case of living accommodation; this distance is not to be reduced. In the case of public highways, the Siting Board may on occasion, and only in conjunction with a risk assessment, give dispensation to reduce the 45 metre safety distance, down to a minimum of 10 metres.

DRAINAGE

2.11.11. To minimize the surface area of any spill, the ground of the park is to be sloped towards catchment drain(s). Risk mitigation procedures for OWI sizing and spill containment should be used (See Part 2 Chapter 9 for OWI design and operation). Where it is intended to routinely park loaded BFCV and/or carry out the transfer of fuel between bulk fuel vehicles, the risk assessment for a semi-permanent park should take these higher risk factors into account whilst assessing the requirement for containment of potential spillages.

2.11.12. User units have a responsibility to ensure that DIO maintain, service and routinely inspect/clean the interceptor. In addition to this, units are to inform the RPC/ Aquatrine ALR / responsible MMO when significant spillages have occurred or when they suspect there is a need to have the separator emptied. This requirement is to be included in the Unit's Spillage Response Plan (USRP) in accordance with Part 5, Chapter 9.

LIGHTING ARRANGEMENTS

2.11.13. Where required and unless otherwise specified, illumination is to be in accordance with JSP 315 scale 27 Serial 17b i.e. 20 Lux.

SECURITY

2.11.14. To deter unauthorized access, a 1.8 metre high chain link fence should enclose the BFCV Park incorporating two means of vehicular entrance/exit. Where this is not feasible the unit is required to produce a risk assessment. Entrance/exit gates must open outwards, must not be self-locking. Securing mechanisms must be operable utilizing a single action device, without resorting to the use of a key. They must also be capable of being bolted or held open. The park perimeter fence should be positioned no less than 10 metres from the edge of the BFCV hard standing if it forms part of the camp perimeter and no less than 2 metres when it does not.

EMERGENCY SHOWER

2.11.15 In order to enable contaminated clothing to be quickly and safely removed avoiding ignition from static electricity, a deluge shower is to be installed. If possible showers should be sited at, or close to the entrance of the park. Where this is not possible, alternative arrangements are to be made in conjunction with the production of a risk assessment.

COMMUNICATIONS

2.11.16. There is to be an effective means of both raising the alarm and giving warning in case of fire. It should be audible to all those likely to be affected by the fire. Advice should be sought from the establishment Fire Officer. If a phone is not fitted, there must be access to a phone within a reasonable distance, which is to be clearly signposted.

HAZARD WARNING SIGN

2.11.17. The extent of the hazardous area must be clearly indicated on all approaches. A risk assessment is to be conducted to determine the positioning and number of signs required similar to the signs shown at Fig 2.11.1. For installations located overseas, notices in the language relevant to the host nation must be provided.

Figure 2.11.1- Hazard Warning Sign - dimensions: 1000 mm x 600 mm weather-resistant material.

TRAFFIC FLOW

2.11.18. Under normal circumstances a one way traffic system incorporating an exit and access gate is to be provided. Where this requirement is not feasible it will be necessary to impose restrictions. These restrictions will be based on the outcome of a risk assessment and consideration is to be given to the following:

a. The inclusion of emergency exits for personnel, if the distance of travel to exit the park exceeds 24 metres.

b. If a single vehicle exit is routinely used, the width of the entrance and approach route may need to be increased to allow two-way traffic flow. This will be determined from the results of a risk assessment.

c. Road markings indicating traffic flow .

d. The design must allow for parked vehicles to be driven to the nearest/safest exit without the need to manoeuvre/reverse, in the event of an emergency.

EARTHING/BONDING

2.11.19. Bulk Transfer areas are to be equipped with purpose built fixed earth points.. Fixed earth points are not required outside of this area. BFCV's stored/ parked in the BFCV Park are to utilise fitted CES items.

SECTION 3 - OPERATION

HAZARDOUS AREA

2.11.20. The hazardous area extends to 10 Metres beyond the physical boundaries of the BFCV Park. The following items/ activities are not permitted within this hazardous area:

a. Smoking and naked flames.

b. Studded footwear.

c. Tracked vehicles.

d. Mobile or portable phones unless constructed and certified in accordance with ATEX 95 Directive 94/9/EC.

e. The use of portable equipment that contain dry batteries such as transistor radios, portable recording equipment. Where the use of such equipment is necessary, this can be authorised by the unit commander based on a risk assessment.

f. Consumption of food or alcohol.

g. The removal of contaminated clothing.

h. Hearing Aids(unless they have been certified as intrinsically safe and that the user has been briefed not to change or expose batteries inside the hazardous area).

CONTROL OF ACCESS

2.11.21. Access to BFCV Parks is restricted to those persons who are required to enter its confines by way of their duties. Where personnel have not received a mandatory safety brief prior to commencing work they are to be supervised by a competent person at all times.
2.11.22. When unoccupied, gates are to be locked with access to keys restricted to authorised personnel. The Head of Establishment is to publish the organisational arrangements if access to the facility is required during silent hours.

2.11.23. The organisation is to instigate the control of contraband within the hazardous area.

HOUSEKEEPING

2.11.24. Vegetation within the hazardous area is to be maintained and should not present a fire hazard. Isolated deciduous trees may be left, provided overhanging foliage is cut back. Coniferous trees are not permitted within the extent of the hazardous area.

2.11.25. Where weed killers or other de-foliates are used for the control of vegetation, they are to be of a chlorate free type and leave no flammable residue.

2.11.26. Waste, contaminated pollution control sorbents and any other material used for cleaning purposes must be removed from the hazardous area, immediately after use.

2.11.27. Skips, bins or other containers, used for the storage of contaminated materials, are not to be sited within the hazardous area.

PARKING

2.11.28. Banks-men who are familiar with layout of the facility are to guide vehicles into parking bays; vehicles must not overhang the edge of the hard standing.

2.11.29. Vehicle parking and safety distances employed within BFCV parks are to be in accordance with Annexes A & B to this chapter.

PACKED F&L STORAGE

2.11.30. The practise of storing packed F&L and other associated products within the BFCV Park, is to be discouraged. Where this is not possible due to area limitations on the available real estate, the area is to be subject to a risk assessment. The results of the risk assessment are to ensure that:

a. The facility is served by separate entrance and exit points

b. Vehicle movement is not impeded

c. Other items are not stored within 15 metres of BFCV's

d. Entrance and exit points are not blocked

e. Sufficient fire fighting media is provided in excess of that required for vehicles

VEHICLE REPAIRS

2.11.31. The risk of fire and explosion whilst carrying out repairs to BFCVs is high. Repairs to BFCVs electrical systems or repairs that involve hot work are not permitted within the BFCV Park.

CONTAMINATED CLOTHING

2.11.32. Contaminated clothing should be removed as soon as possible. Before removing contaminated clothing, operators should ensure they have taken the necessary precautions to guard against electro-static discharge. Clothing contaminated with Class 1 or Class 2 products should only be removed after saturating with water using the Drench Shower. The removal or changing of clothing inside the Hazardous Areas is prohibited.

FUEL TRANSFERS

2.11.33. Transfer of fuel between two BFCVs is only to be carried out in a designated area within the BFCV Park. The transfer area is to be marked and a safety distance of 15 metres is to be established around the two BFCVs from any other vehicle. Irrespective of existing fire cover the operator is to ensure that the vehicles fire extinguishers are placed 5 metres upwind from the transfer area. Both vehicles are to be earthed and bonded together.

AMMUNITION

2.11.34. The storage or carriage of ammunition is forbidden inside the hazardous area.

SECTION 4 - PROVISIONS FOR STORAGE

2.11.35. The Head of Establishment is to ensure that all reasonably practicable measures have been taken to guard against the risk of Fire, Explosion and damage to the environment. As a minimum, the following measures are to remain extant at all times.

FIRE PRECAUTIONS

2.11.36. A Comprehensive Site Specific Fire Plan and FFE requirements for a BFCV Park can be found at Part 2, Chapter 5.

FIRST AID

2.11.37. Provisions for emergency first aid treatment are to be made. in conjunction with appropriately trained and qualified personnel. First aid points (including eye wash facilities) are to be established and their locations are to be clearly identified.

TOILETS, WASHING AND CHANGING FACILITIES

2.11.38. Welfare facilities are to be provided The facility is to be within 50 metres of the BFCV Park entrance/exit point and scaled in accordance with JSP315

PERSONNEL PROTECTIVE EQUIPMENT (PPE)

2.11.39. The Head of Establishment is to ensure measures are taken to inform, instruct and train personnel in the following areas:

a. The risks the PPE is designed to protect against, and its limitations.

b. The correct use of PPE and its purpose.

c. The action required by personnel to ensure that the exposure to hazard is avoided.

2.11.40. It is incumbent on the Head of Establishment to provide the correct PPE and to take all reasonable steps to ensure that it is correctly used and inspected in a accordance with JSP 375.

2.11.41. It is incumbent on the Head of Establishment to provide suitable storage for PPE when not in use. It is to be:

a. Protected from the hazard for which it was provided, and other hazards that may damage it or cause it to become hazardous.

b. Ensure that it is kept in a clean hygienic condition.

2.11.42. It is the responsibility of all employees to ensure that they:

a. Make full and proper use of PPE.

b. Take all reasonable steps to ensure that it is properly stored in the accommodation provided for it.

c. Report immediately any damage to the PPE.

POLLUTION

2.11.43. A Pollution Control Plan is to be provided for the BFCV Park, in accordance with Part 5, Chapter 2. Copies of the plan are to be readily available and understood by all persons who are required to enter the facility. The Pollution Control Plan for the facility is to be included in the Unit's Spillage Response Plan (USRP).

2.11.44. Pollution control sorbents (PCS) are to be readily available. These should be contained in a suitable storage container and marked 'POLLUTION CONTROL

POINT'(PCP). PCP's are to be provided at a scale of one for the first 8 BFCVs and one for each additional 8 or part there of. PCPs are to be sited not less than 15 metres from any BFCV in an easily accessible position. Each PCP should contain the following:

a. Contents, instruction leaflet and BFCV park pollution plan.

b. 100 Litres of loose absorbent.

c. 20 Flat pads.

d. 4 Oil seal/tube pads.

e. 2 Stiff brooms.

f. 2 Shovels.

g. 2 large drip trays

h. 6 Disposable polythene sacks and ties.

RISK ASSESSMENTS

2.11.45. Dangerous Substances Explosive Atmosphere (DSEAR) and Control of Substances Hazardous to Health (COSHH) risk assessments are to be carried out, the results of which must be readily available. Safety Data Sheets for the products stored in the BFCVs must also be readily available.

INSTRUCTIONS IN WRITING

2.11.46. When vehicles contain product within the storage tank or classed as nominally empty, The Instructions in Writing are to be displayed at all times. Where vehicles have been gas freed the Instructions in Writing must either be removed or placed in a securely closed container marked "Not relating to dangerous goods carried".

2.11.47. Where it is necessary to de-couple articulated BFCV's, the Instructions in Writing must be removed from the cab and securely attached to the trailer unit in a suitable weatherproof enclosure. They should remain clearly visible in a prominent position.

EMERGENCY ACTION POINT

2.11.48. Units should establish an emergency action point. This should be located close to the entrance point to the park. No closer than 15 metres from the nearest parked BFCV. It should include the following.

a. Hazard Warning Sign. (Fig 2.11.1.)

b. Pollution Control Point (PCP).

c. Fire Extinguisher.

d. Notice Board, suitably weather proofed, displaying the following:

(1) Site specific comprehensive fire plan.

(2) Pollution Control Plan.

(3) DSEAR and COSHH Risk Assessments, with Safety Data Sheets.

SAFETY DISTANCE

2.11.49. Vehicle parking and safety distance employed within the BFCV parks are to be in accordance with Annexes A & B to this chapter.

Note: All distances quoted are the minimum to be applied: the boundary is deemed as the edge of the hard standing area.

BIBLIOGRAPHY

1. HS(G) 140 - The Safe Use & Handling of Flammable Liquids.

2. HS(G) 176 - Storage of Flammable Liquids in Tanks.

3. JSP 315 - Services Accommodation Code (Scale 27 Mechanical Transport Accommodation).

4. JSP 375 – 'MOD Health & Safety Handbook'.

5. JSP 800 - Road Transport Regulations.

6. JSP 418 – The MOD Sustainable Development and Environment Manual.

7. AESP 2320-A-100-522 The Degassing, Cleaning, Examination & Repair of Refuelling Equipment.

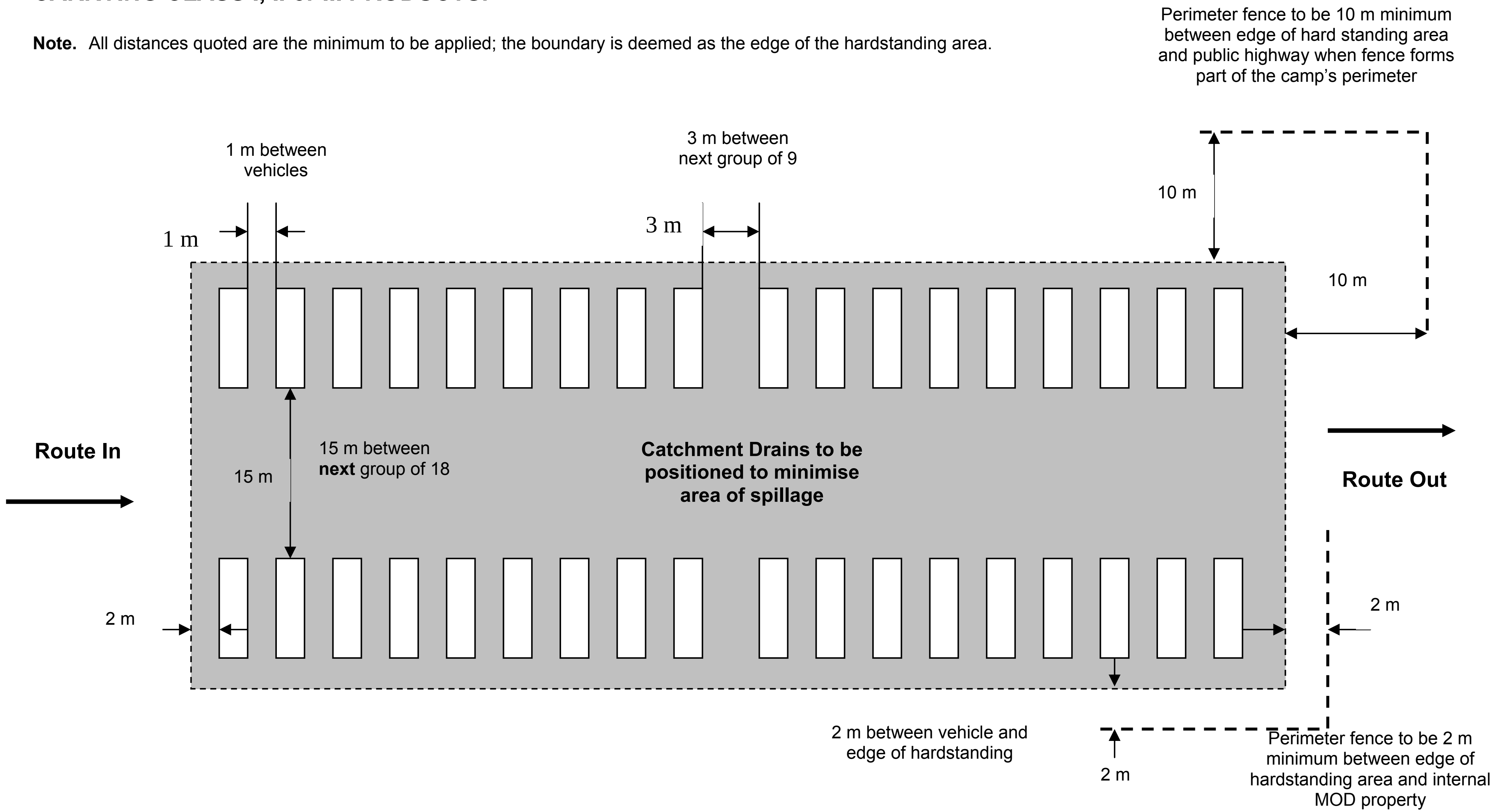
8. AC 60737 Army Departmental Fire Prevention and Fire Fighting Regulations.

9. 2006DIN07-006 Released Feb 06 – Wheeled Tanker Interceptor Work Around Solution.

10. Directive 1994/9/EC -Minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres.

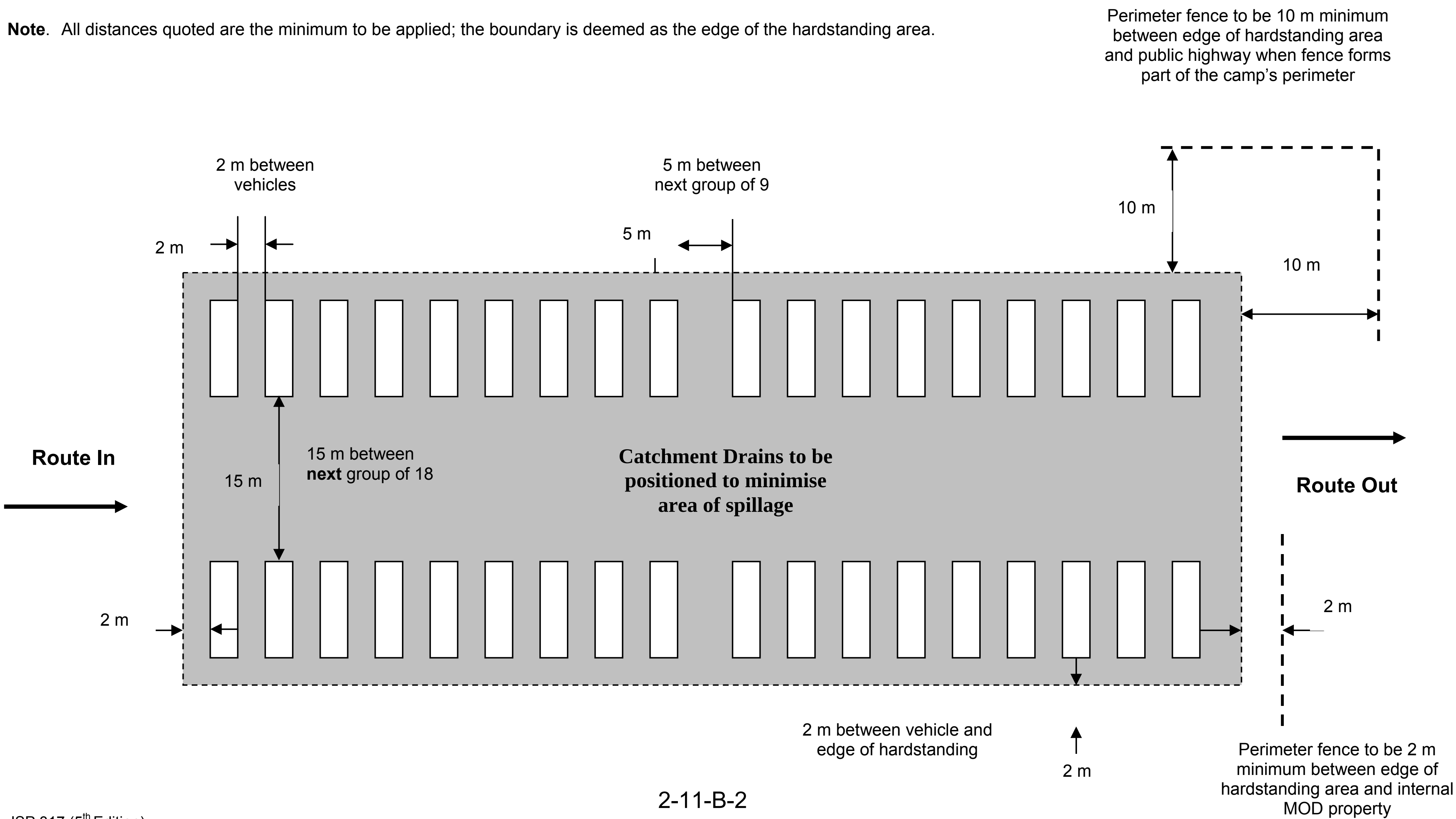
SAFETY DISTANCES REQUIRED FOR THE STORAGE OF FRONT LINE SUPPORT TANKERS CARRYING CLASS I, II or III PRODUCTS.

Note. All distances quoted are the minimum to be applied; the boundary is deemed as the edge of the hardstanding area.



SAFETY DISTANCES REQUIRED FOR THE STORAGE OF REAR LINE SUPPORT TANKERS CARRYING CLASS I, II or III PRODUCTS.

Note. All distances quoted are the minimum to be applied; the boundary is deemed as the edge of the hardstanding area.



Part 2

Chapter 12 (Sponsor DES SE FGSR Sc)

QUALITY CONTROL AND MAINTENANCE OF FUELS, LUBRICANTS AND ASSOCIATED PRODUCTS

SECTION 1 – GENERAL

2.12.01. This chapter and the associated annexes outline the basic requirements and actions to be taken to preserve product quality by the application of good housekeeping and effective stock management at each stage in the supply chain.

2.12.02. The aim of effective quality assurance and control is to ensure the integrity and quality of the product from its receipt to the point of issue and use.

2.12.03. To achieve this aim all personnel employed on the storage and handling of Fuels, Lubricants and Associated Products are responsible for ensuring that measures designed to protect products from contamination and deterioration are taken.

2.12.04. The potential for contamination to occur during the transfer and distribution of bulk liquid fuels and lubricants is high, but a number of measures can be taken to minimise the risk to an acceptable level.

2.12.05. The main cause of contamination of fuels and lubricants is a result of bad housekeeping, where most potential causes of failure can be eliminated or minimised.

2.12.06. The major factors that contribute to loss of product quality and integrity are:

a. **Water**. Contamination by water may result in the product being unusable or cause a significant loss of performance.

b. **Solids**. The contamination of product by solid contaminants may affect fine filters and damage sensitive components.

c. **Cross contamination**. Cross contamination from other products may result in the product being unusable or cause a significant loss of performance.

d. **Deterioration**. Deterioration from inadequate storage, microbiological contamination and /or age are common causes of product failure.

2.12.07. Basic quality control measures to be followed to maintain product quality can be summarised as the following:

a. Check that the product and grade is correct on receipt and that the documentation is complete.

b. Ensure that any product received is clear, and free from suspended matter and water.

c. Regularly remove accumulated water from storage tanks.

d. Observe proper maintenance procedures for all facilities.

e. Ensure the correct use and placement of filtration equipment.

f. Implement effective stock control and management processes to ensure that product is not stored for too long a period.

g. Submit representative samples for test in a timely manner.

h. Quality control for aviation fuels and associated additives is of particular importance. The use of copper, or alloys containing more than 4% copper, fittings or components must also be avoided when handling, sampling and transporting fuels and additives, as copper can adversely affect the performance of treated fuels in some critical tests.

AREAS OF RESPONSIBILITY

2.12.08. **Contractors**. The contractor is responsible for ensuring that all fuels, lubricants and associated products are supplied in accordance with the procurement specification, the requirements of *Defence Standard 91-66* and any other contract requirements associated directly or indirectly with the quality and traceability of the product.

2.12.09. **Receiving Officers**. The Receiving Officer is responsible for ensuring that the product is supplied in accordance with the contract requirements and that the quality and integrity of the product has not been compromised at or before the point of receipt. They are also responsible for ensuring that the product integrity is maintained on receipt into storage.

2.12.10. **Depot and Storage Units**. Officers in Charge are responsible for ensuring that:

a. The quality and integrity of product held is maintained.

b. All stock issued is fit for purpose and has sufficient time left before the retest date to allow consumption by the user before a retest is due.

2.12.11. **User Units**. Officers in Charge are responsible for ensuring the quality and integrity of products held in their unit and that stock rotation is conducted to avoid life expiry of stock held. Packed fuel can continue to be retested to establish whether life extension is appropriate if stock held is economical to test. Other products will only be considered for life extension if there is an Operational requirement, or when it is necessary to maintain contingent stocks of product with a shelf life of less than one year.

2.12.12. **Service Authorities**. The DF&FS is the nominated Service Authority and is responsible for:

a. Co-ordinating, developing and maintaining quality assurance policy and procedures.

b. Providing advice on petroleum technology to Service users, equipment suppliers and design authorities.

c. Identifying approved test laboratories for analysis of samples pertaining to routine Quality Assurance monitoring in accordance with JSP 317, and to facilitate investigation into product quality arising from service defects.

d. The DF&FS can be contacted:

Fuels, Lubricants & Gases Technical Manager
DF&FS,
MOD Abbey Wood,
Elm 2C, Bristol,
BS34 8JH,
UK

e. Tel: 0306 79 83591

2.12.13. **Test Laboratories**.

a. Samples, taken from units of the Royal Air Force, Land Forces and PJHQ shall be forwarded to Intertek, Sunbury Technology Centre for examination:

Intertek Testing Services (UK) Ltd (ITS)
Sunbury Technology Centre
Unit 'A' Shears Way
Brooklands Close
Sunbury-on-Thames
Middlesex
TW16 7EE
UK

Tel: 01932 732100

Note: Units are to notify DF&FS FLG Tech Mgr prior to submission of samples to ensure appropriate analysis is conducted to the required priority.

b. Samples, taken from units of the Royal Navy shall be forwarded to Intertek Testing Services Fuels & Lubricants Centre:

Fuels and Lubricants Centre
Building A-7
Cody Technology Park
Ively Road
Farnborough
Hampshire
GU14 0LX
UK

Tel: 01252 397421

2.12.14. DES Ships MPS-MES-TSF4 is the technical service authority for the Royal Navy and is responsible for:

a. Providing technical expertise and advice on fuels, lubricants, fuel systems equipment, centrifuges/pre-filters and coalescers.

b. Monitoring all naval fuels and lubricants analyses.

c. Pre Up-keep Material Assessments (PUMA).

d. Pan PT In-service support issues, safety advice, assistance on marine propulsion systems. Steam & Fuels Group contacted on Tel 0117-9133373, Abbey Wood Mil Net 9352 33373.

SECTION 2 - RECEIPT OF PRODUCT - GENERAL REQUIREMENTS FOR BULK DELIVERIES

2.12.15. Before any product is transferred into storage the following actions must be taken:

a. All storage tanks to be used must be suitable for the product and if empty, certified clean. If they contain product it must be of the same grade, free from contamination and within specification and retest date.

b. All filters, connections and associated pipe work must be checked to ensure cleanliness, correct connection and operation. All hatches are to be secured to avoid the ingress of water and other contaminants.

c. The use of copper, or alloys containing more than 4% copper in fittings or components must also be avoided when handling, sampling and transporting fuel additives as copper may adversely affect the performance of any treated fuels in some critical tests.

d. There is sufficient ullage within the storage tank to accept the delivered volume.

RECEIPT OF BULK FUEL - SETTLING TIMES

2.12.16. As a matter of routine, all fuel should be left to settle for a minimum of 24 hours. In operational circumstances this may not be achievable. Therefore, the following guidance is given:

a. Fuel filtered into storage is to be left to settle for a minimum of 2 hours. In the case of jet fuel; the filtration must be a coalescer filter and a water separator.

b. Fuel that has been filtered in and is to be filtered out of a bulk storage tank does not require a settling time; the filtration must be a coalescer filter and a water separator.

c. Fuel that can not be filtered into a storage tank will require the following settling times:

(1) Class 1 Product will require 45 minutes per metre in depth.

(2) Class 2 & 3 will require 3 hours per metre in depth.

RECEIPT OF FUEL BY ROAD OR RAIL TANKER

2.12.17. On arrival all tanks and compartments are to be sampled in accordance with the requirements at Annex A and each sample checked for the correct grade of product and quality as described below.

2.12.18. **Aviation Fuels.** Before discharging a road or rail tanker, samples shall be taken from the outlet pipe of each compartment and examined for appearance, solid contamination and free water. If contaminated, further samples shall be taken; this may be repeated up to five times. Should the final sample fail the visual test the consignment shall be rejected.

2.12.19. Subject to a satisfactory visual test, the density of the sample corrected to 15°C shall be determined. If the value varies by more than 3 kg/m^3 to that given on the accompanying suppliers documentation the product shall not be discharged until the discrepancy has been resolved.

2.12.20. Conductivity checks shall be made where the fuel contains Static Dissipator Additive (SDA). The minimum conductivity should be 100 pS/m.

2.12.21. If the checks are satisfactory and the requirements at paragraph 2.12.17 have been carried out the product may be transferred to storage.

2.12.22. When mixed loads are delivered, the transfer of the load shall be in the sequence given at Annex B, paragraph 1. Change of grade and any flushing requirements shall be observed.

RECEIPT OF FUEL BY BARGE OR SHIP

2.12.23. Upper, middle and lower samples are to be taken from each tank and/or compartment to be discharged in accordance with Annex A and the samples checked for the correct grade of product and unchanged quality as described below.

2.12.24. **Aviation fuel**. If the ullage in any compartments differs greatly from the loading manifest. You are authorised to investigate and report any unsatisfactory explanation to a higher level and not to discharge the fuel.

2.12.25. Each vessel compartment shall be checked for free water using water detecting paste and the results recorded. If substantial amounts of water is found in any compartment, it shall not be discharged.

2.12.26. Samples shall be collected from each compartment in accordance with Annex A. where a control check shall be carried out. The control check shall include a minimum of density, appearance and flash point. The appearance result should be clear and bright and free from solid contamination and free water. The flash point should be within 3°C of the results on the supplier's documentation. The density should be within 3 kg/m^3 of the results reported on the suppliers documentation.

2.12.27. If satisfactory results are obtained and there is sufficient ullage to accept the product, then it may be discharged.

2.12.28. Receipts into bulk tankage shall be sampled and sent for recertification testing. The tank(s) that have been discharged into shall be quarantined and sampled. The sample (s) shall be sent for recertification testing.

RECEIPT OF FUEL BY SINGLE PRODUCT PIPELINE

2.12.29. Ensure the valves, filters and connections at the off take point are correct and functioning and the requirements at paragraph 2.12.17 have been implemented.

2.12.30. Flush the sample point and sample container, and take samples in accordance with Annex A at the start, middle, and end of the transfer, and at any change of batch. Check that the sample is clear and bright and free from undissolved water and particulate matter. If water or particulate is detected, flush and resample. Subject to a satisfactory visual test, the density of the samples corrected to 15°C shall be determined. The value shall not vary by more than 3 kg/m^3 to that given on the accompanying supplier documentation. Conductivity checks shall be made where the fuel contains Static Dissipator Additive (SDA), where the minimum conductivity shall be 100 pS/m.

2.12.31. If the sample testing is unsatisfactory the Defence Fuels & Food Services (DF&FS), at paragraph 2.2.12, is to be informed immediately and transfer of product to storage is to be stopped.

RECEIPT OF FUEL BY MULTI-PRODUCT PIPELINE

2.12.32. Normally supplies of product are not made directly to MOD sites through multi-product lines. If however, there is a need to do so, the requirements of *Def Stan 91-66* are to be followed. The requirements for the receipt of fuel by single product pipeline are to be followed with sampling frequency increased to every two hours. Samples from the receiving bulk tanks shall be taken in accordance with Annex A and sent for recertification testing.

RECEIPT OF AVCAT FSII (F-44)

2.12.33. AVCAT/FSII is the aviation fuel used by all RN aircraft embarked in HM Ships and by some RN aircraft operating from RN Air Stations. It has a minimum permissible flash point of 61°C to comply with safety requirements for storage in HM ships.

2.12.34. Full information specific to the embarkation of AVCAT/FSII is given in BR 3321.

EMBARKATION OF MARINE FUEL ONTO RN SHIPS

2.2.35. Embarkation of marine fuels onto RN ships can pose particular problems and specific procedures are recommended to ensure that the quality and integrity of the fuels are preserved. Full information and guidance for the embarkation of DIESO F-76 and commercial marine gas oil is given in BR3009.

TESTING AND SAMPLING OF MARINE FUEL DURING EMBARKATION

2.12.36. For further details on testing and sampling of marine fuel during embarkation, refer to BR 3009.

RECEIPT OF BULK LUBRICANT, FSII AND AL-34 DELIVERIES FROM A CONTRACTOR

2.12.37. On arrival all tanks are to be sampled in accordance with Annex A and the samples visually examined. If the check is satisfactory, the product and the requirements at paragraph 2.12.17 have been implemented the product can be transferred to storage.

2.12.38. Water or particulate contamination is observed, a further sample is to be taken.

2.12.39. Re-sample is satisfactory; the product can be transferred to storage. If the re-sample is still contaminated, the delivery shall be rejected.

2.12.40. Where mixed loads are supplied the procedure at Annex B shall be followed.

REQUIREMENT FOR PACKED FUEL AND LUBRICANT RECEIPTS

2.12.41. Before acceptance, all consignments shall be checked for damage, leakage, security of closure, correct package and correctness of markings in accordance with Annex D.

2.12.42. Where packed stock cannot be stored in approved covered storage, care must be taken to minimise the effects of rain, condensation, heat, and sunlight in accordance with Part 2, Chap 7.

STOCK CONTROL

2.12.43. Audits are to be carried out to ensure effective stock rotation and to identify correct stock levels in accordance with Annex E.

SECTION 3 - STORAGE OF PRODUCT AT DEPOTS, BFIS AND UNITS

2.12.44. Once deliveries of products are taken on charge at depots or BFIs, the responsibility for quality assurance and segregation lies with the accepting unit. Details of which shall be laid down in the unit's standard operating procedures (SOPs).

2.12.45. The provision of suitable storage is crucial to good product management to ensure that the product is fit for purpose after a period of storage. Where dedicated storage is unavailable, every precaution must be taken to minimise the problems associated with the storage of products in adverse conditions and also to reduce any environmental impact that may be caused by spillage or leakage of the product.

2.12.46. The segregation of aviation and ground products is essential where they are stored at the same depot or unit. All fuel facilities shall be identified with the product and grade as detailed in Annex D.

2.12.47. Local procedure for auditing the activities involved with the segregation, storage and handling of products held shall be prepared and agreed by the relevant Service Authority in accordance with Annex E.

FUEL HELD IN BULK STORAGE

2.12.48. All product quality problems can occur during storage and particularly when the product is stored in bulk. Contamination by water, particulates and micro-organisms, cross contamination and ageing of products can all be prevented by following sound procedures and practices.

2.12.49. Cross contamination is controlled by rigorous application of segregation techniques. Regular audits and inspections of the facilities are to be carried out as in Annex E. All changes-of-use and pipe work modifications are to be approved by the Service Authority before they are carried out.

2.12.50. Contamination by water can occur in a number of ways. Condensation in part-filled tanks, separation of water from newly arrived fuel deliveries, ingress of water through hatches and corroded tanks. Regular removal of accumulated water is the single most important activity that will maintain product quality. All bulk aviation fuel tanks are to be checked for the presence of water each day the tanks are in service and at least once a week when they are not. The tanks are also to be checked after periods of heavy rain or snow and when water is removed. Keeping tanks filled to 90% (See Para 2.12.20) of their working capacity significantly reduces contamination from condensation.

2.2.51. Biological contamination arises from the inoculation of the fuel water interface with agents such as *hormoconis resinae*. The most effective control against microbiological contamination is the regular removal of water from tank bottoms. Water removed from tank bottoms is to be checked for the presence of microbiological activity as described in Annex N . If contamination is suspected, the DF&FS shall be consulted on further action at 2.12.12.

2.12.52. Solid contamination arises from the ingress of sand and/or dirt, corrosion products from the storage system and rubber and fibre from damaged pump-seals etc. Strainers, filters and filter-water separators fitted to the system remove solid contamination. When evidence of pump or seal debris is found during filter checks the source of the debris must be investigated to avoid major damage to the component and avoid further contamination problems.

2.12.53. Contamination of RAF fuels or lubricants should be reported using the RAF F&L Contamination report in Annex F.

2.12.54. The frequency of testing for fuels held in bulk (Permanent, Non-permanent and mobile) storage is detailed in Annex G.

STORAGE OF MARINE FUEL ON-BOARD RN SHIPS

2.12.55. The quality control of Marine fuels onboard is detailed in BR 875 for RFA Vessels and in BR 3009 for RN Ships.

STORAGE OF FUEL SYSTEMS ADDITIVES HELD IN BULK STORAGE

2.12.56. No aluminium or aluminium alloy based fittings or components must be used when handling, sampling and transporting AL-61, the fuel soluble lubricate improving additive for aviation turbine fuels. AL-48, a mixture of AL-61 and AL-41, as the AL-61 reacts with aluminium. The presence of a white sediment or haze is indicative of contamination and the source must be identified and the problem rectified.

2.12.57. The use of aluminium or aluminium alloy based fittings or components shall be avoided when handling, sampling and transporting AL-41, the Fuel System Icing Inhibitor (FSII), as this may absorb aluminium. Whilst not causing an adverse reaction with AL-41, it may be subsequently mixed with AL-61 and cause problems.

2.12.58. Water is soluble in AL-41 and AL-48, where visual examinations of these products will not identify the presence of water contamination. AL-41 and AL-48 shall either be stored in air tight containers/tanks with moisture resistant breathers. If containers need to be opened for sampling or inspection, contact with air must be minimised.

2.12.59. Samples of AL-41 and AL-48 shall be sent for recertification every 6 and 18 months respectively as in Annex A.

STORAGE OF LUBRICANTS AND ASSOCIATED PRODUCTS HELD IN BULK

2.12.60. Although bulk storage for these products is on a much smaller scale than fuel, the same problems of contamination will arise. Water contamination in lubricants is of particular concern as it can cause additive depletion with possible loss of performance, where this can only be ascertained by extensive laboratory examination.

2.12.61. Where products are stored in external tanks, water checks are to be made weekly or after heavy rain, snow or replenishment.

2.12.62. The increased viscosity and the colour of many lubricants over that of fuels make visual examination for water and solids difficult. Care should be taken to avoid mixing air into lubricants when taking or transferring samples as the air may give the samples a hazy appearance.

2.12.63. If cross contamination is suspected, a representative sample must be sent to the nominated laboratory and the product is to be quarantined. Units are to notify DF&FS FLG Tech Mgr prior to submission of samples to ensure appropriate samples are taken, and to ensure the appropriate analysis and priority is assigned.

Note: Quality checks are to be made at the minimum intervals given in Defence Standard 01-5, Table 2.

STORAGE OF PACKED PRODUCT – GENERAL

2.12.64. All packed stocks should be segregated by product, batch and date-of-fill or, if previously re-lifed, the due retest date.

2.12.65. All aviation products shall be fully segregated from ground products and held in different compounds unless prior agreement has been given by the Service Authority. Strict quarantine procedures are applied to aviation fuel stocks.

STORAGE OF FUEL AND FUEL ADDITIVES PACKED IN BARRELS

2.12.66. Barrels should be stacked in accordance with instructions given in Part 2 Chapter 7.

2.12.67. Quality checks on fuel and fuel additives packed in barrels are to be made at the same intervals as dormant bulk fuel stocks, see paragraph 2.12.49, and the sample drawn in accordance with Annex A.

2.12.68. Aviation turbine fuels (F-34 and F-35) shall not be packed in Jerricans apart from fuel used for ground use (Single Fuel Policy). This should be marked Diesel KT as per Fig 1.4.1 and shall not be used for aviation.

STORAGE OF GROUND FUEL PACKED IN JERRICANS

2.12.69. Jerricans should be stacked in accordance with instructions given in Part 2 chapter 7 Para 59.

2.12.70. Quality checks are to be made on depot-filled stocks at the same intervals as bulk stocks and samples drawn in accordance with Annex A.

2.12.71. Stocks of fuel filled at unit level are not subject to these checks as they are to be consumed within 3 months of filling.

STORAGE OF LUBRICANTS AND ASSOCIATED PRODUCTS

2.12.72. Annual visual checks are to be made on the product to see if contamination and/or degradation of the product has taken place. In particular, evidence of additive separation should be assessed. Quality checks are also to be made at the minimum frequency for retest of products given in Table 2 of *Defence Standard 01-5*. The condition of the packing and marking shall also be observed at the time of the inspection and any defects shall be rectified and reported to DF&FS.

SECTION 4 - ISSUE AND USE OF PRODUCT

ISSUE AND USE - GENERAL

2.12.73. Before any issue of product to the users, the person making the issue is responsible for ensuring that:

a. The product is as requested.

b. The product is within specification.

c. The packaging is sound and correctly marked.

d. There is sufficient time remaining before the retest date for consumption at the requesting unit normal usage rate.

2.12.74. Users are to check that the product is:

a. The one specified for the equipment.

b. The product is in life (the retest date has not been exceeded).

c. The package and any tamper-evident seals and closure are intact.

ISSUE AND USE OF FUEL FROM BULK STORAGE

2.12.75. Where receipts of fuel have been made to a tank, the contents of the tank must be allowed sufficient time to settle before any issues are made as noted in paragraph 2.12.16.

2.12.76. Before fuel is issued, the product and grade shall be confirmed with the recipient. Additionally all associated pipe work; couplings, filters, water separators and floating suction are to be checked for correctness of operation.

2.12.77. Before loading, each compartment of the receiving fuel carrier tanks shall be inspected to ensure that it is suitable for the product, clean and in a fit state to receive the product. Where the previous load was a different grade or product, the change of grade procedure at Annex B shall have been instituted.

ISSUE OF AVIATION FUEL FROM BULK FUEL INSTALLATION TO BFCV AND TFHE/JOFS (THAT ARE USED TO REFUEL AIRCRAFT)

2.12.78. Before fuel is issued to refuelling equipment, the following checks must be made both to the issue tank and the refuelling equipment. The checks are to be made on every day that issues are made and every day that the vehicle or equipment is to be used for refuelling or de-fuelling aircraft.

2.12.79. The following checks are to be made before the start of fuelling operations:

a. The product and grade is correct.

b. The product is within test date.

c. The density of the fuel from bulk tank has been determined at the time of delivery is in accordance with Annex H, where it is within 3 kg/m^3 to that given on the suppliers documentation.

d. The product in the refuelling equipment is free from water and other contamination in accordance with Annex I, testing the tank drain point after flushing to remove free water and dirt

e. The Millipore test described in Annex K has been carried out on the refuelling equipment within the last three months with a result of less than 1mg/litre obtained.

f. The conductivity of the bulk fuel tank has been checked at the time of delivery in accordance with Annex L. The conductivity shall also be checked at monthly intervals, if no further additions of fuel have been receipted into the bulk tanks. If the conductivity is not within 50 pS/m and 600 pS/m, than advice from DF&FS Tech Mgr, Part 2 Chapter 12 Para 12d refers.

g. All safety and handling requirements have been correctly instituted; all dust and blanking caps are serviceable and in position on refuelling nozzles, and filtration equipment, where fitted, is functioning correctly.

2.12.80. On change of shift personnel, it should be established that the above checks have been carried out.

2.12.81. Contamination checks will also be carried out if the equipment has not refuelled an aircraft within 3 hours of the contamination checks being carried out. The contamination checks are as follows:

a. Density in accordance with Annex H.

b. Appearance check in accordance with Annex I.

c. Water detection in accordance with Annex J.

2.12.82. Additional equipment specific requirements are at Para 2.12.79.

ISSUE OF AVIATION FUEL FROM BFCVs NOT TO AIRCRAFT

2.12.83. BFCV tanks are susceptible to temperature cycling which can lead to water contamination through condensation. A low level of fuel increases the risk of condensation forming. It is recommended that all BFCVs be kept at all times at least 90% of their maximum operating capacity at the end of the operating period / day to minimise the amount of water formed by condensation. Thereby reducing the risk of microbiological contamination and also depletion of the Fuel System Icing Inhibitor (FSII) in the fuel.

2.12.84. Samples are to be taken from the sump of the carrier tank. In addition to the requirements of paragraph 2.12.75 an appearance test in accordance with Annex I is to be carried out:

a. Each time the vehicle receives fuel from any source, and after a minimum settling time of 10 minutes.

b. Where a BFCV has been out of use for a period of 10 days the contamination test is to be carried out on the 11th day and is repeated at ten day intervals during the period for which the vehicle is not in use.

ISSUE OF AVIATION FUEL FROM HYDRANTS SYSTEMS

2.12.85. Samples are to be drawn as at Annex A from the filter / separator drain valves from the hydrant dispensing vehicle.

2.12.86. Appearance checks in accordance with Annex I and water detection in accordance with Annex J shall be made following a de-fuelling operation prior to the system being used for refuelling.

2.12.87. For Hybrid systems connected to a refuelling vehicle, the additional requirements at paragraphs 2.12.73 and 2.12.74 shall apply.

2.12.88. For Hybrid systems with integral fuel tanks, the checks required at paragraphs 2.12.73 to 2.12.77 shall be carried out after the tank has received fuel from any source.

ISSUE OF AVIATION FUEL FROM APFC's

2.12.89. Samples are to be taken from the bleed valve as at Annex A.

2.12.90. The contamination tests as described in Annex I and Annex J are to be made before bringing a new APFC into use.

ISSUE OF AVIATION FUEL FROM TFC's

2.12.91. Samples are to be taken through the dip tube as at Annex A.

2.12.92. The contamination tests (Annex I and Annex L) shall be made on each receipt from any source before the fuel enters the tank.

2.12.93. Additional contamination tests are to be made following maintenance of the fuelling system involving the disconnection and reconnection of any element within the system and before bringing a new TFC into use.

ISSUE OF AVIATION FUEL FROM DRUMS

2.12.94. Before the fuel is issued, all drums are batched and checked to ensure that they are the required grade and within their retest date.

2.12.95. Each drum must be checked for contamination by drawing a bottom sample with a thief as described in Annex A.

2.12.96. The following procedures are to be carried when testing drums:

a. Before this sample is drawn, the drum is to be stood on end with the head at the top and wedged so that the larger bung closure is directly over the lowest point of the drum.

b. The area around the closure is then cleaned and the bung removed.

c. The end of a dip rod is lightly smeared with water finding paste (ref. 6850-00-0014194) and the rod inserted to the lowest point of the drum.

d. If, when the rod is removed, the paste shows a positive water reaction the drum is not to be used for refuelling.

e. If the test is negative, a bottom sample is withdrawn and the water capsule and visual examination test is carried out as described in Annex I and Annex J.

f. If the tests fail, the drum is not to be issued for use.

g. If satisfactory, the drum is to be resealed and issued for use.

2.12.97. Contamination checks (in accordance with Annex I and Annex J) are to be carried out every day on fuel which is dispensed from drums. Before the first refuelling of the day, by sampling one drum at random from the batch of drums to be used. When a new batch of drums is brought into use or where a batch of drums has been refilled from any source under service control. In both cases, one drum drawn at random shall be sampled.

REFUELLING AIRCRAFT

2.12.98. General guidance on refuelling aircraft is given at Part 3, Chapter 3 and reference should be made to these instructions. The following paragraphs are specifically related to ensuring the quality of fuel supplied.

2.12.99. Immediately before transferring fuel to aircraft, where the fuel contained in the vehicle delivery pipe work and filter vessel has been displaced. The following procedures are carried out:

a. Draw a minimum of a 1 litre of sample from downstream of the filter.

b. Carry out a visual check of the sample as per Annex I.

c. Carry out a water detection test as per Annex J.

d. If either test fails, a second sample should be immediately be drawn. If the presence of water or solids is confirmed, the refuelling process is to be stopped and the equipment is to be quarantined.

2.12.100. For refuelling equipment where a sample cannot be taken downstream of the FWS. A sample may be taken from the tank drain point after draining any free water and dirt. The process found at 2.12.99 is to be carried out, if the presence of water or solids is confirmed, the fuelling shall be stopped and the service authority informed.

Note: If for operational reasons this sample cannot be taken immediately before refuelling, then the test may take place up to 3 hours before refuelling.

2.12.101. Before transferring fuel to an aircraft, MOD Form 7765 (Aviation Fuel Register) must be completed and signed. It is the sole responsibility of the vehicle driver or equipment operator to undertake and sign as having completed the density check and, where applicable, the contamination checks in accordance with paragraphs 2.12.73 to 2.12.78.

2.12.102. The operator is also responsible for ensuring that the fuel contained in the equipment is that shown by the fuel grade markings on the equipment.

2.12.103. **Strategic Transport Air-to-Air Refuelling (ST AAR) only**. The operator is to confirm verbally to the tradesman refuelling the aircraft that the fuel is correctly identified by the fuel grade markings on the equipment and that MOD Form 7765 has been completed and signed.

2.12.104. Tradesman refuelling the aircraft is to ensure the fuel offered is the correct type for the aircraft.

2.12.105. Hydrant system operators must further ensure that the fuel grade markings displayed at the hydrant dispense point and on the hydrant dispenser are the same.

2.12.106. Hydrant system operators shall also carry out the water detection test every 15 minutes during the refuelling in accordance with Annex J.

REFUELLING FROM DRUMS, TFC's AND APFC's

2.12.107. The refuelling operator is to ensure that the fuel grade markings displayed on the container are the same as those on the other elements of the fuelling system.

2.12.108. The refuelling operator is to ensure also that the correct type of micro filter or FWS is positioned between the drum and the aircraft. Where an APFC is in use, the FWS is to be placed as close as possible to the aircraft to be refuelled without causing an obstruction hazard.

DEFUELLING AIRCRAFT

2.12.109. De-fuelling of aircraft, either fixed or rotary wing may occur under two different scenarios. These scenarios although broadly similar do differ dependent on the type of operation to be undertaken and are identified as being either a load adjustment or maintenance de-fuel.

2.12.110. To protect the quality of fuel in the refuelling equipment from being contaminated by fuel off-loaded from an aircraft, the quality and grade of fuel contained in the aircraft tank shall be established before de-fuelling begins:

a. The grade of the fuel in the aircraft must be established from the two previous uplifts.

b. If the aircraft contains a mixture of the fuel types F-34 and F-44, then the defuel shall be classed as F-34.

c. If one or other of the previous two fuellings was with F-35 (Jet A-1) then the FSII content is to be determined as per Annex C. If the resultant FSII content is found to be less than 0.07 % vol then the fuel shall be classed as F-35. If greater than 0.07 % vol then the fuel may be classed as F-34.

d. A sample shall be taken from each aircraft drain point for a visual (Annex I) and water (Annex J) check. If the drain sample has a sulphurous odour or any free water present is not clear, then a check shall be performed to determine if microbiological activity is present. If microbial activity is detected then the fuel shall be put to waste.

e. If the fuel is not from the parent units storage facility and the quality of the fuel is deemed to be suspect, then any off-loaded fuel must be segregated, quarantined, sampled and subjected to laboratory analysis. Only if the laboratory analysis is clear may the fuel be released for use.

2.12.111. **Load Adjustment**. This procedure is only applicable following a fuel uplift where the aircraft has been over fuelled in error, or when the fuel load is considered excessive following a change to the intended operation of the platform. Load adjustments are normally performed shortly after fuelling and any product returned should where possible be de-fuelled into the original refuelling vehicle. At locations operating a hydrant system the de-fuelling should only be accomplished by use of a dedicated de-fuelling bowser.

2.12.112. Load adjustments are only permitted where there is a certainty that all the fuel on board the aircraft is of the same grade. In addition, load adjustments shall only be undertaken having obtained satisfactory quality checks in accordance with Annex I and Annex J for visual appearance and water.

2.12.113. In the event of a load adjustment being undertaken, the volume of de-fuelled fuel shall not exceed;

a. shall not be greater than 10% of the fuel uploaded, and

b. shall not be greater than 10% of the capacity of the bowser

Note: Load adjustments in excess of a & b shall be treated as a maintenance de-fuel.

2.12.114. Provided the conditions of a and b are met the de-fuelled fuel may be delivered to any other aircraft provided that the bowser is first filled to capacity from station storage, is subjected to a flushing procedure of the refuelling hoses in accordance with Annex M and that satisfactory contamination checks in accordance with Annex I and Annex J are completed on the bowser.

2.12.115. **Maintenance defuels**. Where the quantity of fuel to be defueled from the aircraft exceeds 10% of the quantity uploaded/bowser a capacity maintenance defuel shall be performed.

2.12.116. Before commencing a maintenance defuel the checks outlined in 2.12.108 shall be performed. It is imperative that any water found in the fuel tank drains shall be clear. In cases where the water drain is not clear or a pungent sulphurous odour is detected, a check shall be performed to determine if microbiological activity is present.

2.12.117. If the quality of the fuel is not suspect following the checks performed at 2.12.108 it may be delivered to another aircraft provided that the bowser is first filled to capacity from station storage, is subjected to a flushing procedure of the refuelling hoses in accordance with Annex M and that satisfactory contamination checks in accordance with Annex I and Annex J are completed on the bowser or returned to storage if it is anticipated that the fuel will not be used within a short space of time.

2.12.118. If the quality of the fuel off-loaded is considered suspect, it shall not be returned to any aircraft or returned to bulk storage unless it can remain fully segregated from use. If returned to storage every effort must be taken not to contaminate further fuel supplies or infrastructure. The fuel will need to be recertified and checked for microbiological contamination before it can be released from quarantine and issued to any aircraft.

2.12.119. Where a bowser has contained fuel of suspect quality, it shall be drained and inspected internally for cleanliness and absence of any remaining fuel. All drain points shall be purged to clear pipework and components (filters, pumps, hoses etc.) of all fuel. It is imperative that all suspect fuel is removed from the bowser so as not to contaminate further supplies. The filter elements are to be replaced and the bowser filled to capacity. 1000 litres should be delivered at maximum flow rate through each hose back into a storage tank containing at least 20,000 litres of fuel of the same grade.

ISSUE OF GROUND FUELS FROM MTFI'S AND BFCV'S

2.12.120. MTFI's and BFCV convoy re-fuelling areas are both storage and issue points. The products held are to be managed as in bulk storage but with the proviso that stocks are consumed within six months.

2.12.121. When new deliveries of fuel are made to a tank, the tank contents shall be allowed to settle in accordance with paragraph 2.12.16.

2.12.119. Tank filling pipes and delivery pumps are to be marked in accordance with Annex D. Where the grade or product is changed, the change of grade procedure at Annex B applies. Daily fuel and weekly water dips are to be made and any water removed.

2.12.122. Any evidence of abnormal water build up is to be investigated. The water drain offs from diesel tanks are to be examined for evidence of microbiological contamination as per Annex I.

2.12.123. A record of the results of the water dips shall be kept together with the frequency and volumes of the water drained off.

2.12.124. Filters are to be checked every six months and their condition recorded. Where there is evidence of build up on the filters, dead bottom samples should be taken and sent to the nominated laboratory for testing to determine if the tank requires cleaning.

2.12.125. Annual inspection samples are to be taken and sent for test to the nominated laboratory.

ISSUE OF BULK LUBRICANTS AND ASSOCIATED PRODUCTS

2.12.126. In addition to the general requirements at paragraph 2.12.70, before any product is issued, checks for water and particulate contamination are to be made from samples taken, before, during and at the end of filling.

2.12.127. Where any product is transferred to Jerricans and barrels, these containers must be clean, dry and free from internal and external rust. These containers must also bear the correct product marking and fill date.

2.12.128 Equipment used for refilling container must be cleaned and flushed with the product to be filled. Where the equipment is used to fill more than one product, the change of grade procedure at Annex B is to be followed.

ISSUE OF PACKED LUBRICANTS AND ASSOCIATED PRODUCTS

2.12.129. Before any product is issued for use, the issuing unit must comply with all the requirements in respect of package integrity, retest dates and package markings as well as the general requirements at paragraph 2.12.70.

2.12.130. Before any lubricant or associated product is used, the user must ensure from the package markings and the equipment or equipment manuals that the product is correct for the application.

2.12.131. The user shall check that any seals and closures are intact, there are no leaks in the container and all dirt and moisture is removed from the vicinity of the closure and container head before opening.

2.12.132. When replenishment is carried out in adverse conditions such as rain, snow or wind, action must be taken to avoid the ingress of dirt or water.

ISSUE OF PACKED AVIATION LUBRICANTS AND ASSOCIATED PRODUCTS

2.12.133. An additional check on container marking should be made when engine lubricants are being used. The presence of the approval number of the lubricant must be confirmed.

2.12.134. Where replenishment of aircraft engine lubricant or hydraulic fluid is carried out by means of the Risbridger gun, only the replenisher gun identified for the specific grade of lubricant shall be used.

2.12.135. In no circumstances should hydraulic fluid replenishment guns be kept in the same area as replenisher guns used for synthetic turbine oils or removable corrosion preventives and gun cleaners.

2.12.136. Where ground rigs are used for servicing aircraft systems, only those products cleared for the aircraft system being serviced shall be used in the ground rig.

ISSUE OF PACKED GROUND LUBRICANTS AND ASSOCIATED PRODUCTS

2.12.137. The requirements at paragraphs 2.12.117 to 2.12.120 shall be followed.

2.12.138. If replenishments are made from part used containers, only those that are identified as containing the correct product and with securely fitted closures shall be used.

BIBLIOGRAPHY

1. DEF STAN 01-5 Fuels, Lubricants and Associated Products.

2. DEF STAN 05-50 Methods for Testing Fuels, Lubricants and Associated Products.

3. DEF STAN 05-52 Part 1 Markings for the Identification of Fuels, Lubricants and Associated Products. Containers 216.5 litres or less.

4. DEF STAN 05-52 Part 2 Markings for the Identification of Fuels, Lubricants and Associated Products. Containers over 216.5 litres and Pipelines.

5. DEF STAN 91-66 The Segregation, Handling and Quality Assurance of Petroleum Fuels, Lubricants and Associated Products.

6. STANAG 3149 Minimum Quality Surveillance of Petroleum Products.

7. STANAG 1110 Allowable deterioration limits.

8. BR 3009 Naval Oils Manual.

9. BR 3009(A) Naval Oils Manual, Volume 2, Fuel System Management Handbook.

10. BR 1029, Volume 16, Oil Fuel Manual.

11. BR 875 International Safety Manual.

12. BR 3321 Aviation and Motor Transport Fuel Systems in Ship

Annex A to
Part 2 Chapter 12
JSP 317

SAMPLING PROCEDURES

GENERAL REQUIREMENTS

1. All health and safety requirements identified in this JSP and in any product data sheets supplied by the manufacturer shall be adhered to when sampling petroleum and associated products.

2. All metallic sampling equipment shall be bonded to the tank structure prior to opening the tank sampling point. This bond shall be maintained throughout the sampling operation until the sampling point is closed. The resistance of the metallic connections to the tank shell shall not exceed 10Ώ. Metal chains shall not be used for suspending equipment as it is not possible to ensure electrical continuity across the links. Also, high resistivity synthetic polymer cord shall not be used, since charge may accumulate on it during the lowering operation as it slides through gloved hands.

3. Resistance may be measured using a meter: It is preferable to use an insulation tester (500 V minimum, e.g. megger) reading to at least 10 M Ώ. The high probe voltage of a megger helps reduce interference from hydrocarbon films and surface oxide coatings. However, any continuity tester capable of measuring 10 M Ώ resistance will give an acceptable indication of electrical continuity if used with adequate care and persistence. A good contact to each tested component is essential. In some cases paint or epoxy coatings may need to be removed.

4. If the ambient temperature is near or above the flash point of the fuel then the test procedure should not be performed unless fuel vapours are entirely absent or a meter is used that is certified safe to use in a hazardous area.

5. Unless essential, sampling should not be carried out during high winds, rain, snow or other adverse weather conditions. If sampling is undertaken under these conditions, there must be adequate protection against contamination by dust, sand, water, etc.

6. Where samples for microbiological examination are to be taken only glass or metal containers should be used.

7. Sample containers should be inspected before use and rejected if any dirt, rust or other material is present. It is essential that, before use, all sampling equipment and all sample containers are thoroughly cleaned by rinsing three times with the product to be sampled before filling with the sample.

8. When sampling volatile products such as gasoline, every care must be taken to prevent evaporation losses.

9. Where possible, sampling should be carried out when the fuel and air temperature are at their lowest, preferably early in the morning. The sample should not be transferred between containers more than is absolutely necessary and is to be closed to air as soon as possible.

10. Where the sample is contained in clear glass, it shall be protected from light.

11. When sampling bulk product it is essential to obtain a representative sample of the product and to identify any in homogeneity or contamination in stocks before issue.

12. Samples for homogeneity and product integrity testing shall be drawn from the upper, middle and lower positions in the tank using an "Any Level Bottom Sampler" (6695-99-255-0244) in conjunction with the supplied "Winder" (6695-99-257-8180). The procedure detailed in Annex P should be followed to obtain samples from the required depth:

a. The upper sample is taken at one sixth of the depth of the liquid in the tank.

b. The middle sample is taken at approximately half the depth of the liquid in the tank.

c. The lower sample is taken at five sixths of the depth of liquid in the tank but not lower than the draw-off level.

d. The composite sample shall be made up of equal portions of the upper, middle and lower samples. If samples are to be sent to for laboratory testing, upper, middle, lower, and composite samples are to be provided.

13. Dead bottom / bottom settling samples are taken from the lowest point of the tank to confirm the presence, or not, of water, sediment or microbiological contamination. These samples are also taken with an "Any Level Bottom Sampler" (6695-99-255-0244). (Note: this sampler is replacing the "Eagle" equipment previously used).

13. The sampler is lowered to the bottom of the tank so that it rests in a upright position on the tank bottom.

14. At this point the valve in the base is automatically activated to allow the liquid to enter the body of the apparatus and air is expelled through the non-return valve at the top of the sampler.

15. When the bubbles of air cease to rise the sampler is withdrawn from the tank and its contents transferred to a clean sample container.

SAMPLE SIZES

16. Sample sizes for normal examination and testing are:

a. Fuels bulk and packed: 5 litre sample (For RN non aviation fuels 1 litre samples only required).

b. Fuel additives, WTA, Antifreezes, Radar coolants and other liquids, bulk and packed: 1 litre sample.

c. Engine, gearbox, machinery and other oils, non-aviation hydraulic fluids, bulk and packed: 1 litre sample.

d. Greases: 3 kg

e. Semi solid lubricants are supplied in pack sizes less than 1kg, therefore it is appropriate to submit whole packs. The nature of such lubricants also makes it difficult to take samples that are representative of the entire contents of the pack.

f. Packed products net weight 1kg/1 litre or less: one whole pack.

g. Super clean and aviation hydraulic fluids:

(1). For packs of 5 litres and below: one whole unopened pack.

(2). Above 5 litres and from rigs and aircraft: special sampling bottles and sampling instructions are to be obtained from the nominated test laboratory.

h. Sample containers are to be filled allowing sufficient ullage (approximately 5%), tightly closed immediately after filling and sealed.

i. Avoid the use of wax or adhesive tapes as these can cause contamination.

j. After sealing, the sample containers are to be clearly marked with both an adhesive label and a tie on label.

k. These labels are to bear the following information:

(1) Name and address of dispatch unit.

(2) The addressee.

(3) Designation, grade and reference number of product represented by the sample.

(4) The local sample register number.

(5) The reference number and date of application for test and any covering letter or forwarding note.

(6) The total stock held by the unit.

(7) Tank/refueller ID. Date samples taken.

17. Unless previously agreed by the relevant Service Authority, strainers etc. shall not be used when obtaining samples.

SAMPLE CONTAINERS

18. For aviation fuel samples originating in the UK: Can, transit, fuel sample, disposable, 5 litre, UK use only (6640-99-886-2216) should be used. For samples originating outside of the UK, the sample container to be used for aviation fuel product samples is Can, transit, fuel sample, 5 litre, air transportable (8110-99-913-7719) and the associated transport container; Box, transport of can, transit, fuel sample, 5 litre (8115-99-462-1665). The sample container to be used for non-fuel aviation products is Bottle, glass, sample (6630-99-224-1099).

19. For lubricants, the sample containers: Can, screw cap, 1 litre (8110-99-125-5805) and Can, screw cap, 5 litre (8110-99-735-1576) should be used. Grease samples should be submitted in the container: Drum, shipping and storage, 1 litre (8110-99-139-9474). For ground fuels use 5 litre green can (8110-99-735-1576).

20. Fuel samples originating from the Royal Navy should be in accordance with advice given in BR 3009(A).

SAMPLING OF BULK PRODUCT SUPPLIED BY CONTRACTOR

21. When fuel is supplied by a contractor in bulk to any MOD establishment, it is essential to take samples of the product to ensure product quality and integrity before acceptance and transfer to MOD charge. Paragraphs 23 to 26 detail the sampling to be undertaken.

22. Sampling during bulk deliveries of lubricants shall be carried out as follows: A small amount of product is to be flushed through the sampling point(s). Delivery shall then commence. Samples shall be taken soon after the start of delivery, approximately half way through the delivery, and just prior to completion of delivery.

23. Bulk deliveries of lubricants, supplied for example direct to RN ships, should also be sampled and forwarded to the nominated laboratory for examination in accordance with BR 3009.

Note: Bulk deliveries of lubricants include both deliveries by road tanker and deliveries made using Intermediate Bulk Containers (IBCs).

ROAD AND RAIL TANKERS

24. If the tanker contains aviation fuel, the integrity seals on each compartment are to be checked and if any are broken, the contents of the affected compartment(s) shall not be accepted without the agreement of the Service Authority.

25. A 4.5 litre sample is drawn from the compartment outlet into a glass jar (ref 6630-99-224-1105). The sample is to be examined and tested in accordance with 2.12.16 to 2.12.18

BARGE AND SHIP

26. Sampling and testing is detailed in 2.12.19 to 2.2.25.

PIPELINES

26. Pipeline samples shall be taken from the sampling cock when product is flowing through the line. Details of sampling and testing is detailed in 2.12.20 to 2.12.23

SAMPLING OF BULK PRODUCT HELD IN STOCK

27. Bulk products held in stock shall be sampled at regular intervals to verify fitness for use and for re-life testing. Additionally, testing will be carried out if product contamination is suspected. The fitness for use testing shall be carried out prior to issue from stock. The

re-life sampling shall be made at the minimum interval identified for the product in *Defence Standard 01-5 Table 2*.

PERMANENT BULK STORAGE TANKS

28. Upper, middle and lower samples are taken for both fitness-for-use and re-life testing. Where the tanks have more than one sampling hatch, samples are to be taken at each hatch and these bulked to give the final upper, middle and lower samples. Where no contamination is observed in the individual samples and the relative density checks vary by 3 kg/m^3 or less, a composite sample shall be prepared from equal portions of the upper, middle and lower sample.

TEMPORARY BULK FUEL INSTALLATIONS

29. Samples will be taken through the following point on Temporary Bulk Fuel Installations:

a. TFC - the dip tube.

b. APFC - the bleed valve.

c. BFI Manifold or outlet pipes of other equipment before any filtration equipment.

PACKED PRODUCT

30. Water contamination tests are also obligatory before issue and use of packed aviation fuel.

31. When packed stocks are presented for sampling, they must be grouped by batch and samples selected at random from each batch.

32. Composite samples are prepared by taking equal portions of up to 4 individual samples.

BARRELS AND DRUMS

34. Before sampling, the barrel or drum is to be stood with the head up and any dirt, dust etc. removed from the head and closure. If a sample is required from the bottom of the drum, it should be allowed to stand for a minimum of 48 hours after moving.

35. The sample is drawn through the closure orifice by means of a sampling thief (ref. 6630-99-224-1098) using the techniques described below. It may be drawn from a specific level in the container or as an average or through sample. For detection of water the sample shall be drawn from the bottom of the container.

36. To draw liquid from a specific level, the thumb is placed firmly over the top of the thief to seal the top orifice and the thief lowered bottom first into to the desired level. The thumb is removed and sufficient time allowed for the thief to fill. The thumb is replaced, the thief withdrawn rapidly and its contents transferred to the sample container. This operation is repeated until sufficient sample is obtained.

37. To obtain an average or through sample, the thief is lowered into the container with the upper orifice open and at such a rate that the level of the liquid inside the tube remains the same as in the container until the thief reaches the bottom of the container. The upper orifice is sealed firmly by the thumb, the thief withdrawn rapidly and its contents transferred to the sample container. This operation is repeated until sufficient sample is obtained.

38. The sample containers to be used for aviation fuel products, for all ground products and product samples originating from the Royal Navy should be as given in paragraphs 18-20.

SCREW NECKED CANS: METAL AND PLASTIC

39. These cans are sampled as barrels and drums.

KEGS AND TINS ABOVE 3 KG NET WEIGHT

40. These containers are used for grease and semi fluid products that can harden or separate on the surface during storage. To obtain a representative sample, remove the top 15 mm of the contents and take the sample, ensuring that there is as little working (handling) of the grease as possible.

SAMPLES FOR AIRCRAFT ACCIDENT INVESTIGATIONS

41. In accordance with JSP 551 Vol 2, Appendix 3 to Annex C - Post Crash Management Checklist – Engineering, all refuelling should be suspended and relevant BFIs and BFCVs quarantined until guidance has been received from Authority Level K or delegated engineer.

42. To provide assistance to the Authority Level K or delegated engineer; Aviation Bulk Fuel Suppliers are to immediately inform aircraft custodians of aircraft that have received fuel from the suspect fuel issue point. Aviation bulk fuel suppliers are to immediately carry out the minimum contamination tests stated in 2.12.88. If facilities are available on site; then the range of testing is to be expanded accordingly such as CLA on site, FSII equipment, refractometer.

43. When an accident or incident which may be attributable to a malfunction associated with fuel, oil or hydraulic fluids occurs on aircraft, samples of the suspect products must be submitted immediately for accredited laboratory testing. When samples are sent to Intertek for testing, DF&FS FLG Tech Mgr is to be informed on Tel 03067983591 or FLG Tech 1 on 030679 83593. In silent hours the DF&FS Duty FLG Tech must be contacted on the following mobile number 07810771611.

43. The samples are to be taken from the aircraft, the refueller or dispensing equipment and the bulk tank or supply container.

44. For aviation fuel a sample should be taken from the last point of issue to the aircraft such as the hose end.

45. The sample containers should ideally be in accordance with paragraphs 18-20.

46. If such a sample container is not available advice should be sought from the Service Authority as to suitable alternatives.

47. The sample sizes are those given in paragraph 16 and samples are to be forwarded to the laboratory nominated by the Service Authority. Should the quantities of samples available be below those given in paragraph 16, the maximum volume available should be taken.

SAMPLING AND TEST EQUIPMENT FOR FUELS, LUBRICANTS AND ASSOCIATED PRODUCTS

Nomenclature of the item	NATO Stock Number (NSN)
Any Level Bottom Sampler (ALBTMS)	6695-99-255-0244
Winder (used in conjunction with ALBTMS)	6695-99-257-8180)
Bottle, glass (for oil and non flammable liquids)	6630-99-224-1099
Bottle, glass, container for transport	6630-99-224-1100
Box, transport of can, transit, fuel sample, 5 litre	8115-99-462-1665
Can, transit, fuel sample, 5 litre, air transportable	8110-99-913-7719
Can, screw cap 0.25 litre	8110-99-135-9062
Can, transit, fuel sample, disposable, 5 litre, UK use only	6640-99-886-2216
Can, screw cap 1 litre	8110-99-125-5805
Can, screw cap 5 litre	8110-99-735-1576
Capsule, water detector	6630-99-224-1108
Colour Standard Booklet	63C/6640-99-2253002
Conductivity Meter, Digital, Hand Held, Model 1152	63C/6630-01-1152398
Drum, shipping and storage, 1 litre	8110-99-139-9474
FSII Refractometer Test Kit B/2 (Complete)	6630-01-165-7133
Hydrometer, 0.690 to 0.840	6630-99-436-0895
Hydrometer, type d 0.700 to 1.000	6630-99-6670947
Jar, Hydrometer (1 litre cylinder)	63C/6640-99-4526724
Jar, glass, 5 litre, sampling tank wagons etc.	6630-99-224-1105
Millipore sampling kit	6630-99-224-5330
Millipore sampling kit adaptor	6630-99-224-5332
Paste, ullage	6850-99-942-3550
Paste, water finding	6850-00-001-4194
Syringe, water detector	6630-99-224-1107
Thermometer, 0-100 deg C	6685-99-620-0081
Thief, sampling	6630-99-224-1098

Table 2.12.A.2- List of equipment used for the process of testing fuel.

Annex B to
Part 2 CHAPTER 12
JSP 317

CHANGE OF GRADE

FUELS

1. The following table outlines the minimum actions to be taken where the grade of product either stored or transported is changed to another grade. Care must always be taken to ensure that following any such action the quality of the new product to be either stored or transported is not adversely affected in anyway.

2. This annex will deal with the change of grade for:

a. Fixed, deployable and mobile storage in relation to Military fuels

b. Waterborne transport, (tankers, barges and small vessels)

c. Bulk deliveries where loaded or unloaded using non-dedicated facilities.

d. When a non-dedicated transporter is used.

e. For the supply and delivery of mixed grades.

NOTE:

The change of grade of tanks that have contained AVGAS to any other product is not permitted without first having obtained approval from the Service Authority.

Unless prior agreement has been sought and obtained from the Service Authority and agreed local procedures approved, all aviation products shall be totally segregated from ground products. This segregation requires totally independent loading and off-loading facilities for bulk products.

During change of grade procedures, particular attention is to be given to draining sumps, filters, hoses, pipework and any other component likely to contain fuel.

That carrier tanks and all lines etc. of new or refurbished vehicles or those which are being returned from storage, are to be flushed before operational use to ensure any possible contaminant is removed. In all cases tanks, lines etc. are to be drained to fullest extent practicable, any residual fuel is to be removed by means of the sump drain cocks and the following action detailed in the table below is to be taken. For attached hoses then see Pt 2 Ch 12 Annex M, Care of Fuel Delivery Hoses, Nozzles and Pressure Couplings for Aviation Fuel for further information.

Before changing product from a ground fuel to an aviation fuel see signal HGLF/SE/8101 dated 1st December 2008 regarding cross contamination of aviation fuel with ground fuels containing FAME (a bio component of ground diesel).

PROCEDURES FOR CHANGE OF GRADE OF WHITE (CLEAN) PRODUCTS IN STORAGE TANKS, RAILCARDS, ROAD TANK VEHICLES AND REFUELLERS

Previous stored product ⇓ / New military grade product to be stored ⇒	Non- Leaded Gasoline F-67	Turbine Fuel Aviation (Kerosene Type) F-35 F-34	Turbine Fuel Aviation (High Flash Point Kerosene Type) F-44	Turbine Fuel Aviation (Wide Cut Kerosene Type) F-40	Heating Kerosene F-58	Diesel Fuel F-54	Diesel Engine Fuel Kerosine type F-63
Non-Leaded Gasoline F-67		tanks and railcars : II roadtankers and refuelling vehicles and APFC's: see Note 1	tanks and railcars : II roadtankers and refuelling vehicles and APFC's: see Note 1	tanks and railcars : I roadtankers and refuelling vehicles and APFC's : see Note 1	II	II	II
Turbine Fuel Aviation Kerosene Type F-35 and F-34	II		II	I	I	II	I
Turbine Fuel Aviation High Flash Point Kerosene Type F-44	II	I		I	I	I	I
Turbine Fuel Aviation Wide Cut Type F-40	II	II	II		II	II	II
Kerosene (heating), undyed F-58 without bio-components	II	I	II	I		I	I
Diesel fuel F-54	previous grade with < 15% biocomponent: I previous grade with >= 15% bio-component: II	roadtankers, refuelling vehicles and APFC's: NOT ALLOWED Note 1 other storage media : III	roadtankers, refuelling vehicles and APFC's: NOT ALLOWED Note 1 other storage media : III	roadtankers, refuelling vehicles and APFC's: NOT ALLOWED Note 1 other storage media : III	I		I
Diesel Engine Fuel – kerosene type F-63	I	II in cases where unapproved aviation fuel additives have been added to create F-63 flushing is required regardless of tank size.	II in cases where unapproved aviation fuel additives have been added to create F-63 flushing is required regardless of tank size.	II in cases where unapproved aviation fuel additives have been added to create F-63 flushing is required regardless of tank size.	I	I	
Naval Distillate Fuel F-75 and F-76	I	II	II	II	I	I	I

Table 2.12.B.1 PROCEDURES FOR CHANGE OF GRADE

There is no change of grade procedure required. New loaded product can be filled in storage or transport medium on condition that multi-product loading arms have been flushed with the new product.

In all cases, tanks, lines etc. are to be drained to their fullest practicable extent.
When draining railcars and tank vehicles, attention should be given to sumps, pumps, filters, hoses and other components that are likely to trap quantities of liquids.
Loading arms that have previously carried any FAME (Fatty Acid Methyl Ester) containing biodiesel with up to 5% FAME shall have as a minimum at least one (1) non bio/FAME containing product passed through them prior to the loading of aviation grade fuel. In case of FAME content between 5 and 15%: at least three (3) non bio/FAME containing products as intermediate before loading of any aviation grade fuel. In case of FAME content of 15% or more, the installation is unsuitable for loading aviation grade fuels unless thorough cleaning plus three intermediate products are pumped through it.
Manifolds and cargo and/or tank lines shall be cleared as best as practicable

The following change of grade procedures are to be taken as a minimum:

I Drain previous grade as best as practicable; fill with desired grade

II Drain previous grade as best as practicable; flush with the grade to be loaded, drain, fill with new grade
In the case of large storage tanks (greater than 100,000 litres) flushing may be omitted. Draining shall be accomplished by main suction line, followed by further product removal through the water drain off point to remove the previous product as best as is practically possible. The decision on whether flushing or draining of large tanks must be taken is the responsibility of the Technical Authority and shall be documented. Documents shall be archived for a minimum of 5 years or at least 20 fillings with the new product.

III In cases where the previous grade was a fuel with a FAME content of < 15 weight%: at least one (1) intermediate filling with non FAME containing grade is required, together with extra cleaning prior to the loading of jet-fuel
In cases where the previous grade was a fuel with a FAME content of >= 15 weight%: at least three (3) intermediate fillings with non FAME containing grades are required, together with extra cleaning prior to loading of jet-fuel
Extra cleaning shall include, but not be limited to a hot water wash (50-60°C), cold water rinse, drain dry and mop.

Note 1	Not applicable for roadtankers, refuellers and APFC's, ONLY DEDICATED transport and storage equipment is permitted.

Table 2.12.B.2 PROCEDURES FOR CHANGE OF GRADE

FLUSHING OF BFCV WHEN NEW, FOLLOWING CHANGE OF GRADE OR FOLLOWING IN-DEPTH REPAIR

3. Following the receipt of a new BFCV or one that has undergone Change of Grade or In-Depth Repair (IDR) the tanks/compartments, pumping equipment, filtration, pipework and hoses are to be flushed as follows:

Note: Flushing is to be carried out before fitting new coalescer filter elements.

a. Ensure all tank, compartments and pipework are empty of any fuel.

b. The colour coding symbols and HAZMAT/KEMLAR plates on the tank and associated pipework conform to the product that is now to be carried. All traces of the previous markings are to be removed. Issues shall not to be made from the refueller until the colour coding and placarding alterations have been completed.

c. Load sufficient fuel and circulate through the pump, filter housing and associated pipework to ensure that all contaminants are removed before operational use, the following quantity of fuel to the appropriate grade is to be used as a guide.

(1) Tank capacity: Greater than 5,001L
Flush with: 2,000L

(2) Tank capacity: 5,000L
Flush with: 1,000L

e. Drain off the contaminated fuel from the lowest drain cock, sump and sample points and dispose of appropriately. Check hose end strainers and filter housing for debris and dispose of appropriately.

f. When changing from ground fuels to aviation fuel the Fuel Water Separator elements shall be renewed.

LUBRICANTS

4. When deliveries of mixed loads of lubricants are made, the receiving officer must ensure that products *are unloaded in the order:*

a. *non*-additive oils

b. hydraulic oils

c. crankcase oils

d. gear oils.

The types of non-additive, hydraulic and other oils can be identified from descriptions given in the related product pages, Sections 1 to 6 of *Defence Standard 01-5*.

5. If crankcase or gear oils are to be unloaded at the same time as other products and the vehicle or facility does not have an alternative transfer system, the pump and line etc. used shall be flushed with the product before pumping to storage.

6. Where the delivery is a part load and the vehicle has unloaded either crankcase or gear oils earlier in its delivery schedule, the receiving officer must ensure that the vehicle pump and hoses etc. have been flushed with non-additive oil. Alternatively a separate pump/hose system, free from either crankcase or gear oils, should be used.

Annex C to
Part 2 Chapter 12
JSP 317

DETERMINATION OF THE CONCENTRATION OF FUEL SYSTEM ICING INHIBITOR (FSII) IN AVIATION FUELS USING A REFRACTOMETER

GENERAL

1. Fuel system icing inhibitors (FSII) are very soluble in water and can be easily lost from the treated fuel by contact with water during shipping and storage.

2. This property can be used to extract the FSII from a known volume of fuel by shaking the fuel with water and determining the amount of FSII extracted using a refractometer.

3. This test method is based on an established internationally recognised method, ASTM D5006, and is easily carried out using a test kit specifically developed for this purpose. Table 2.12.C.1 details the Stock Numbers for the complete test kit and for the individual components of the kit.

SAMPLING OF FUEL

4. The sample container should be rinsed with the fuel to be tested and a 500 ml sample for test should be withdrawn.

TEST PROCEDURE

5. The support stand should be set up and the separating funnel placed in the holder ensuring the tap at the bottom is closed.

6. An aluminium dish should be half filled with distilled or de-ionised water. Tap/drinking water should only be used as a last resort and with the authority of the DF&FS.

7. Using the graduated measuring cylinder, exactly 160 ml of the fuel should be taken from the sample previously withdrawn and should be placed in the separating funnel.

Note:

In some kits there may not be a graduated cylinder but the separating funnel will be marked with graduations and the fuel should be filled to the 160 ml mark.

1. Using a plastic pipette / syringe, take exactly 2 ml of water from the aluminium dish and add to the separating funnel. The stopper should be replaced in the separating funnel and this should be removed from the stand and vigorously shaken for 5 minutes ensuring that neither the tap or the stopper is removed. The separating funnel should be replaced in the stand and the contents allowed to settle for a further 5 minutes.

CALIBRATION OF THE INSTRUMENT

9. The refractometer must be zeroed to ensure an accurate determination. Open the cover of the refractometer's window and make certain it is clean. If the window does require cleaning, use clean water and a soft cloth. A few drops of water from the aluminium container should be placed on the window and the cover closed. The refractometer should be held horizontally ensuring there is a good light source, daylight or artificial light, where the test is being carried out.

10. Observe the position of the shadow line through the eyepiece. The eyepiece may be rotated to produce a sharp image. The shadow should be on the zero point on the graduated scale. If the line is not on the zero point, the plastic rod should be removed from the instrument's base and used to adjust the set screw in the base to ensure the shadow line is correctly on the zero point on the scale. After calibration, open the cover and clean and dry the window and cover.

DETERMINATION OF FSII CONCENTRATION

11. Carefully turn the tap on the bottom of the separating funnel so that a trickle of liquid can be collected in a clean and dry aluminium dish. A few drops will be sufficient and care must be taken to ensure that no liquid is taken from the upper layer in the separating funnel.

12. Using the same technique as in paragraph 10, transfer a few drops of the liquid in the aluminium dish removed from the separating funnel onto the refractometer's window. Close the cover and observe the position of the shadow line through the eyepiece. The scale labelled "M, DiEGMME" should be used and the % volume of FSII may be read directly from the scale.

13. The FSII content for incoming deliveries of AVTUR/FSII and AVTAG/FSII should be between 0.10% and 0.15% and between 0.12% and 0.15% for AVCAT/FSII. If the FSII content is outside of these limits, the test should be repeated and if still outside of these limits, this should be reported to the Service Authority. A sample of fuel should also be taken and forwarded to Intertek.

CLEANING OF THE APPARATUS

14. After the measurements have been completed, the liquids should be disposed of in accordance with local instructions and the separating funnel, pipettes etc. should be carefully washed in soapy water, well rinsed and dried. The cover and window of the refractometer should be cleaned with clean water and dried. The refractometer is a precision optical instrument and care must be taken to avoid damage to the eyepiece and window elements.

Item	Quantity	Stock Number
FSII Refractometer Test Kit B/2 (Complete)	1	6630-01-165-7133
Individual Components		
Carrying Case	1	4920-01-476-0748
Separating Funnel	1	6640-01-237-6125
Measuring Cylinder	1	6640-01-238-0357
Support stand	1	6640-01-239-2496
Bottle (60 ml)	1	6640-01-379-2178
Refractometer	1	6650-01-229-5751
Dishes	100	6640-01-236-6956
Pipettes/Syringes	5	6640-01-240-3826
Operating Instructions	1	Not Codified

Table 2.12.C.1 Stock Numbers

MARKING REQUIREMENTS

See Also, Part 1, Chap 4 "Product Identification System

FIXED INSTALLATIONS

1. Markings for product grade shall be in accordance with *Def Stan 05-52 Part 2*.

2. All pipelines shall be clearly marked with the grade of product carried.

3. Where pipelines are used for more than one product, the outlet and inlet shall be clearly marked with the grade of product being transferred. When the line is not in use, the inlet and outlet shall be identified as multi-product and with the product grade last transported.

AVIATION FUEL HYDRANTS

4. Each hydrant outlet shall be identified with the grade of product in accordance with *Def Stan 05-52 Part 2*.

GROUND FUEL KERBSIDE TANKS

5. Pumps are to be marked with the product grade in accordance with *Def Stan 05-52 Part 2*.

BULK STORAGE TANKS

6. All storage tanks shall be identified with the grade of product filled and details of due test dates and any restriction for use. The tank shall also be marked with the due date that the tank is next due for cleaning.

TRANSPORTERS

7. Markings for the product grade shall be in accordance with *Def Stan 05-52 Part 2*.

8. Transporters, demountable tanks and intermediate bulk containers shall be identified with the grade carried.

BULK SUPPLIES FROM CONTRACTOR PIPE LINE DELIVERIES

9. All contractors' pipelines etc. entering MoD facilities shall be marked in accordance with *Def Stan 05-52 Part 2*.

ROAD, RAIL, BARGE AND SHIP.

10. Each individual tank loading / off-loading point shall be identified, as for transporters, with the product grade carried.

PACKED PRODUCTS

11. The requirements for marking containers shall be those specified in *Def Stan 05-52 Part 1*, supplemented by any additional contract requirements.

12. For products which are identified by a Joint Service Designation, markings should be in this order:

a. NATO code (where this is appropriate).

b. Joint Service Designation (JSD).

c. Management code.

d. NATO Stock Number.

e. Product name (where required by the contract).

f. Contract number.

g. Batch number and filling date.

h. Re-inspection date.

i. Other non-statutory markings required by the contract or order.

PRODUCTS PURCHASED AS PROPRIETARY ITEMS

13. Where products supplied do not have a JSD but are supplied to UK or international standards, the product description is used.

14. Container markings on such products are specified in the contract conditions but must include the management code, NATO stock number, contract number, batch number, filling date and re-inspection date. The markings must be clearly shown and be separate from any commercial labelling.

JERRICAN MARKINGS

15. The markings required for Depot filled cans are identified in *JSP 317, Part 1, Chap 4*, Table 1.4.1 and Annexes A and B to Pt 1 Chapter 4 and are to be made with removable identification bands attached to the shoulder of the Jerricans.

16. The markings required for Unit filled cans are shown in *JSP 317, Part 1, Chap 4,* Table 1.4.2 and t Annexes A and B to Pt 1 Chapter 4 and are applied as in paragraph. 15. In no circumstances are the cans to be marked with the NATO code

REQUIREMENTS FOR QUALITY AUDITS ON F&L STOCKS

GENERAL

1. The objective of any audit is to improve both the effectiveness and efficiency of any system or operation. This is achieved by regular evaluation of the activities involved in maintaining the system or carrying out the operation.

2. Effective evaluation requires input from those being audited as well as those auditing.

3. As with any quality system, both internal and external audits need to be carried out at regular intervals. The internal audit is to concentrate on ensuring effective day to day maintenance of quality. The external audit will concentrate on the effectiveness and operation of the system.

4. Records of all audit activities are to be kept, together with any corrective action taken in respect of internal and external audit reports.

REQUIREMENTS FOR BULK PRODUCTS

5. Auditors are to check that, where applicable:

a. All relevant documentation issued in respect of the quality and serviceability of product held is readily available. This is to include, where applicable, records of receipts, issues, contractors release notes, samples drawn for test, test reports, details of quarantined and unserviceable products, quality assurance procedures, previous internal and external audit reports.

b. All tanks, pipe work, connections, filters and other fixed equipment are correctly maintained and identified. All associated gauges and measuring equipment is within its calibration date and is correctly identified.

c. Tanks and equipment such as filter water separators show due dates for inspection or cleaning and are clearly marked with the product grade.

d. Correct segregation of products has been undertaken. Where aviation fuels are received and stored in bulk, the positive segregation systems in place must be checked to ensure that they operate effectively.

e. All sampling equipment and materials required are serviceable. Equipment such as hydrometers, thermometers, conductivity meters and flashpoint apparatus are in calibration.

f. Where aviation fuel is stored or issued from bowsers, TFCs, APFCs and hydrant systems, log books etc. are to be checked and random entries verified. The checks should also include Millipore test frequency and tank cleaning.

REQUIREMENTS FOR PACKED PRODUCT

6. In addition to the checks at paragraphs 5a and 5e the other checks applicable to packed products are:

a. Stocks should be checked on a random basis to verify that they are correctly batched, stock rotation is effective and no out of date stock is held. The condition of the containers and markings should be checked, and the presence of defects and leaks reported where action is not pending to quarantine the defective items.

b. Where part used containers are held on units, checks are to be made to verify that the containers have been resealed correctly, the markings shown correspond to the product in the container and it is within the re-life period.

c. Where stocks are held in open storage, satisfactory measures have been taken to protect them from rain, heat and direct sunlight, and they are supported on suitable dunnage.

d. Quarantine areas have restricted access or, where this is not possible, each container of non-serviceable stock is clearly identified and marked unfit for use.

STORAGE OF 'IN USE' PACKED LUBRICANTS AND ASSOCIATED PRODUCTS

GENERAL

7. Subject to the criteria detailed at Part 2, Chapter 12, Para 69 being met, the end user of F&L products may hold stocks in or near to the working environment.

8. The control of F&L products held forward by sub-units in workshops and bays presents various degrees of risk ranging from the hazards presented by the products themselves, through to the potential for cross contamination of vehicle components or weapon, aircraft and other systems due to poor husbandry. Additionally, poor husbandry could lead to the inadvertent use of incorrect or life expired F&L products on or in equipment which could have catastrophic results.

9. It is important to recognise, in the forward environment, the distinction between stocks held in their primary packaging and 'in use'. Stocks held in primary packaging shall be accounted for and subjected to batch control and stock rotation in accordance with Annex G to Part 2, Chapter 12, Para 6, and segregated from 'in use' products.

10. Once the primary packaging of any packed F&L or associated product is breached, by the end user, it is classed as 'in use'.

REQUIREMENTS FOR THE CONTROL OF 'IN USE' F&L PRODUCTS

11. It is the responsibility of the sub-unit holding F&L products to maintain the good husbandry of the storage area as well as the integrity and quality of the 'in use' products. To achieve this, the following control measures are to be established:

a. Each approved storage building or locker for ‘in use’ products is to be controlled on a day-to day basis by nominated individuals and their deputies under the supervision of a SNCO. This is to be reflected in their Terms of Reference.

b. In addition to mandatory warning signs, each locker is to display an up-to-date contents list on which is to be annotated the batch number and life expiry dates of all products held.

c. Life expired products and products which are unidentifiable due to degradation of labels are to be segregated and quarantined from ‘in use’ stock pending disposal or investigation.

d. Sub-units holding ‘in use’ products are to carry out weekly locker checks which are to be recorded and made available to Quality audit teams.

e. NCOs of the Logistics (Supply) trades competent in the storage of F&L are to conduct random snap checks of all ‘in use’ F&L lockers and F&L stores held forward within an 18 month period. On units without immediate logistic support the OC sub-unit is to conduct random snap checks of all buildings and lockers containing F&L products. Records of such checks are to be retained and made available to Quality audit-teams.

REPORTING PETROLEUM CONTAMINATION INCIDENTS ON RAF UNITS & DETACHMENTS

1. The RAF policy for the reporting of petroleum contamination at all RAF units and detachments is detailed below.

DEFINITIONS

2. **Contamination**. Contamination is defined as a degradation of standard or specification of product.

3. **F&L Contamination**. Contamination of any petroleum product: fuel, oil or lubricant.

4. **Level 1 Contamination**. Contamination of a product where the specification is suspect but no foreign bodies have been introduced.

5. **Level 2 Contamination**. Contamination of a product by free or suspended water.

6. **Level 3 Contamination**. Contamination of a product by a solid contaminant.

7. **Level 4 Contamination**. Contamination of a product by a micro-biological contaminant.

8. **Level 5 Contamination**. Contamination of a product by another F&L product.

9. **Level 6 Contamination**. Contamination of a product by 2 or more of the above contaminants.

THE PURPOSE OF THE REPORT

10. It is essential that all units report F&L contamination in order to:

a. Alert the parent Command Headquarters and Engineering Authority as the contamination may have wider implications.

b. Indicate training/procedural weaknesses, in the handling and storage of such products.

c. Permit appropriate actions to be taken with the supplier of a contaminated product.

11. Units should note that it is not the aim of the reporting system to attach blame to individuals. When required, such assessments are made by courts or boards of inquiry.

F&LCONTAMREP Part I

12. Each F&LCONTAMREP Part I report should be given a unique serial number by the reporting unit. The report should be sent, by **signal** or **FAX**, within one hour of discovery to the focal points listed at paragraph 14. Reports should be sent **IMMEDIATE** or **PRIORITY** depending on the nature of the incident, but should not, normally require protective markings. The report format is:

a. **ALPHA – Location**. The location of the contamination, eg unit, installation/building number, off-base location.

b. **BRAVO – Contamination Date/Time**. The date and approximate time (local) that the contamination was discovered.

c. **CHARLIE – Assessed Level**. As defined in paragraphs 4-9.

d. **DELTA – Short Description**. A short description of the contamination.

e. **ECHO – Product(s)**. Enough information to exactly identify the product (including manufacturer and batch numbers where appropriate).

f. **FOXTROT – Volume Contaminated**. An initial assessment of the volume contaminated.

g. **GOLF – Contamination Checks**. What contamination checks have already been carried out and their results.

h. **HOTEL – Aircraft Contaminated**. Yes, No or Not Known to indicate whether contaminated product has been put into aircraft. If Yes or Not Known, numbers of aircraft likely to be affected.

i. **INDIA – Initial POC and Tel No**. The initial POC at the unit reporting the contamination.

F&LCONTAMREP PART II

13. Each Part II report should be given the same serial number as the earlier Part I report, and should be submitted by letter once the contamination has been cleared, or at intervals during the course of a long-term operation. Reports should be provided with protective markings where required and should contain the following information:

a. **Part I**. Changes to the Part I report, or information that would have been sent if no Part I was transmitted. If no changes are required then say so.

b. **Cause of Contamination**. As indication of the cause of contamination, from the list below:

(1) Category 1 – Act of God.

(2) Category 2 – Sabotage.

(3) Category 3 – Equipment Failure.

(4) Category 4 – Operator Error.

(5) Category 5 – Inadequate procedures. (Includes incidents where laid down procedures have been correctly followed but have proven inadequate).

(6) Category 6 – Third Party Damage.

(7) Category 7 – Not Known.

c. **External Agencies Involved**. List and describe the involvement of external agencies. These could range from assistance from other Service Units, to assistance from other agencies such as a nominated laboratory.

d. **Costs**. List and describe costs, excluding VAT, involved. At the very least, break down the costs as indicated below, and, if need be, detail the costs on attached sheets. The minimum level of detail is as follows:

(1) Cost of the product lost and that re-graded for other use.

(2) Contractors charges, whether off enabling contract, or whether on a specific contract.

(3) MOD/Service costs, at the rates used for external costing purposes. The aim of this field is to identify the likely costs if MOD manpower had not been available.

(4) **Costs of claims on MOD**. If this is not available then give a reference which will allow costs to be extracted from the relevant MOD Claims Branch.

e. **Recommendations or Lessons Identified**. Comment on the recommendations or lessons learnt.

f. **Formal Inquiry/Court Proceedings**. Indicate whether the incident has required a Unit or Board of Inquiry, and whether court proceedings have been initiated/completed. If an inquiry or court case has been completed, indicate the findings, and list the prosecutions.

14. F&LCONTAMREP distribution is as follows:

a. Air Command, A4 Ops Spt 1(Fuels), SMA-HQSTC, SIC NCA, FAX 01494 497249 or High Wycombe Mil Net 95221 7249

b. DF&FS FLG Tech Mgr is on Tel 03067983591 or FLG Tech 1 on 030679 83593.

15. F&LCONTAMREP Example. Below is an example of a F&LCONTAMREP Part I:

RAF LITTLEPUDDOCK F&LCONTAMREP 4/96

A. BFI 2.
B. 20 SEP 96, 0800.
C. LEVEL 4.

D. MICROBIOLOGICAL GROWTH.
E. F34 FSH.
F. 1,250,000 LITRES.
G. VISUAL CHECK, SOME FORM OF GROWTH SUSPENDED IN FUEL.
H. NOT KNOWN, 36.
I. FG OFF CLADOS, OC BSF, 0123-456-789.

Annex G to
Part 2 Chapter 12
JSP 317

THE FREQUENCY OF TESTING FOR FUELS HELD IN BULK (PERMANENT, NON-PERMANENT AND MOBILE) STORAGE

AVIATION FUELS

1. The frequency of testing for aviation fuels is detailed in Table 2.12.G.1. Dormant stocks are defined as fuel held in storage that have not received additional supplies of fuel (a receipt) in the preceding six months (three months for AVGAS).

Location of stock/disposition	**Product**	**Frequency**	**Testing Required**
PSD/BFI after receipt through single product pipeline or dedicated road tanker.	F-34 & F-44	On delivery	FSII Check
	F-35	No requirement	No testing required
	AVGAS 100LL	No requirement	No testing required
PSD after ocean tanker receipt.	F-34 & F-44	On delivery	B2 Tests as per STANAG 3149
	F-35	On delivery	B2 Tests as per STANAG 3149
	AVGAS 100LL	On delivery	B2 Tests as per STANAG 3149
Dormant stock in PSD/BFI tanks.	F-34 & F-44	1 Month (and thereafter 6 months – part of B2 testing below) 6 Months (and 3 months thereafter)	FSII Check B2 Tests as per STANAG 3149
	F-35	6 Months	B2 Tests as per STANAG 3149
	AVGAS 100LL	3 Months	B2 Tests as per STANAG 3149
Dormant stock in collapsible containers.	F-34 & F-44	3 Months	B2 Tests as per STANAG 314 9
	F-35	3 Months	B2 Tests as per STANAG 3149
	AVGAS 100LL	3 Months	B2 Tests as per STANAG 3149
Active stock in PSD/BFI tanks.	F-34 & F-44	No requirement	No testing required
	F-35	No requirement	No testing required
	AVGAS 100LL	No requirement	No testing required

Location of stock/disposition	Product	Frequency	Testing Required
Active stock in collapsible containers.	F-34 & F-44	No requirement	No testing required
	F-35	No testing required	No testing required
	AVGAS 100LL	6 Months	B2 Tests as per STANAG 3149
PSD/BFI Tanks after cleaning.	F-34 & F-44	After completion of cleaning	B2 Tests as per STANAG 3149
	F-35	After completion of cleaning	B2 Tests as per STANAG 3149
	AVGAS 100LL	After completion of cleaning	B2 Tests as per STANAG 3149
Dormant stock in refuellers (UK Bases).	F-34 & F-44	3 Months	B2 Tests as per STANAG 3149
	F-35	3 Months	B2 Tests as per STANAG 3149
Dormant stock in refuellers (Non-UK locations).	F-34 & F-44	6 Weeks	B2 Tests as per STANAG 3149
	F-35	6 Weeks	B2 Tests as per STANAG 3149

Table 2.12.G.1 shows the frequency of testing for aviation fuels.

SPECIAL REQUIREMENTS FOR AIRCRAFT OF THE ROYAL FLIGHT

2. Samples for microbiological testing are to be taken from the fuel tanks of the aircraft in the Comms Fl, on a routine basis, at three monthly intervals.

3. Microbiological testing is required on these aircraft because they use fuel without FSII for extended periods. FSII inhibits microbiological growth; therefore, these aircraft are at increased risk of contamination and are tested accordingly. Extended use of fuels without FSII is currently being investigated for other platforms, and extra testing is likely to be required.

GROUND FUELS

4. The frequency of testing for ground fuels is detailed in Table 2.12.G2. Dormant stocks are defined as fuel held in storage that have not received additional supplies of fuel (a receipt) in the preceding twelve months.

Table 2.12.G.2 shows the frequency of testing for ground fuels.

Location of Stock/Disposition	**Product**	**Frequency**	**Testing Required**
Bulk tanks on receipt	F-54 F-67 DIESO UK	On receipt	C Tests as per STANAG 3149 **See Note**
Dormant stock in bulk tanks	F-54 F-67 DIESO UK	12 months	B2 Tests as per STANAG 3149 **See Note**
Active stock in bulk tanks.	F-54 F-67 DIESO UK	No testing required	No testing required **See Note**
Bulk tanks after cleaning.	F-54 F-67 DIESO UK	After completion of cleaning	B2 Tests as per STANAG 3149 **See Note**

Note: Treat Dieso UK as F54 for testing purposes.

NAVAL DIESEL FUELS

4. The frequency of testing for Naval diesel fuels not on board ship is detailed in Table 2.12.I.3. Dormant stocks are defined as fuel held in storage that have not received additional supplies of fuel (a receipt) in the preceding twelve months. Naval fuels on board ship are covered in *BR 3009*.

Location of Stock/Disposition	**Product**	**Frequency**	**Testing Required**
PSD after ocean tanker receipt (Including returns from RFAs).	F-76	On delivery	B2 Tests as per STANAG 3149 also sulphur content and DFT.
Dormant stock in PSD/BFI tanks.	F-76	12 Months	B2 Tests as per STANAG 3149 also sulphur content and DFT.
PSD/BFI tanks after cleaning.	F-76	On delivery	B2 Tests as per STANAG 3149 also sulphur content and DFT.
Inter depot transfers (in	F-76	On delivery	C Tests as per STANAG 3149 and

segregated system).			DFT.
Issues from PSD to Ocean Tankers/RFAs.	F-76	On delivery	C Tests as per STANAG 3149 and DFT.

Table 2.12.G.3 shows the frequency of testing Naval diesel fuels

DETERMINATION OF THE DENSITY OF FUELS

PROCEDURE

1. When density measurements are to be made on fuels, the following equipment is required:

a. For aviation turbine fuel, hydrometer, stock no. 6630-99-436-0895, hydrometer jar, stock no. 63C/6640-99-4526724 and thermometer, stock no. 6C/1224.

b. For all other fuels: hydrometer stock no. 6630-99-6670947, the jar, stock no. 63C/6640-99-4526724 and thermometer, stock no. 6C/1224.

2. Samples are to be drawn as Annex A.

3. Before use all equipment must be clean and dry. The equipment may be cleaned by rinsing in the fuel to be tested and dried with a clean, dry, lint-free cloth. The hydrometers shall be examined to ensure that:

a. The etched line on the hydrometer stem corresponds to the arrow (or line) at the top of the paper scale. A fingernail can be used to detect the etched line position;

b. The bitumen weighting material has not flowed (causing the hydrometer to float non-vertically). Hydrometers shall not be left near heating appliances and should be stored vertically;

c. The glass is intact.

4. Rinse the hydrometer and jar with the sample and fill the jar to approximately three-quarters volume with the sample. Immerse the thermometer in the liquid for at least one minute, withdraw the thermometer and record the temperature reading immediately.

5. Lower the hydrometer gently into the liquid and gently spin the hydrometer by rotating the calibrated scale between thumb and finger. Allow the hydrometer to stop rotating, ensuring there is no contact between it and the jar wall, take and record the reading at eye level through the jar wall.

6. Convert the density reading obtained by applying the correction factor given in table 2.12.H.1. This is done by determining the temperature difference between the measured temperature and standard temperature of 15°C and multiplying the difference by the coefficient for density correction for the density range measured for the sample.

7. If the temperature of the sample is below the standard temperature, i.e. below 15 °C, or below the required temperature, the correction is subtracted from the reading obtained. If above, it is added to the reading obtained.

Example 1:

Observed density at 8 °C = 820.0 kg/m^3

Difference between measured temperature (8 °C) and Standard temperature (15 °C) = 7

Coefficient for density correction (from Table 4.2.J.1) = 0.68

Corrected density at 15 °C = 820.0 - (7 x 0.68)

= 815.2 kg/m^3

Example 2:

Observed density at 21 °C = 799.5 kg/m^3

Difference between measured temperature (21 °C) and Standard temperature (15 °C) = 6

Coefficient for density correction (from Table 4.2.J.1) = 0.70

Corrected density at 15 °C = 799.5 + (6 x 0.70)

= 803.7 kg/m^3

Note: The use of Table 2.12.H.1 also permits the estimation of density at temperatures other than the standard 15 °C by simply using the difference between the measured temperature and the required temperature in the above calculations.

TEMPERATURE CORRECTION COEFFICIENTS FOR DENSITY CORRECTION

Recorded Density in kg/m^3 (at Observed Temperature)	**Coefficient for Density Correction per degree C**
690 – 703	0. 86
704 – 717	0. 85
718 – 730	0. 83
731 – 742	0. 81
743 – 754	0. 79
755 – 765	0. 77
766 – 776	0. 76
777 – 787	0. 74
788 – 799	0. 72
800 – 812	0. 70
813 – 828	0. 68
829 – 860	0. 67
861 – 925	0. 65

Table 2.12.H.1shows a table for temperature correction

Note:

1. Previously, density determinations were quoted in g/cm^3, for example 0.773 g/cm^3, and all hydrometers were marked to show density values using these units.

2. Densities are now quoted as kg/m^3 as shown in this table.

3. Hydrometers using the new units are available but older hydrometers may still be in use. If a hydrometer is being used having the old scale markings, the density values must be converted. To convert from densities in g/cm^3 to densities in kg/m^3 the values should be multiplied by 1000, i.e. 0.773 g/cm^3 becomes 773 kg/m^3.

4. Providing the density values have been converted to correct unit – kg/m^3, the correction factors shown above may be used.

VISUAL TEST FOR FUELS

1. The first requirement in any sample testing is the visual examination of a representative sample. This is done by transferring the sample to a clean and dry glass jar (ref 6630-99-224-1105) and, in a clear light, viewing through the sample for evidence of the following types of contamination:

a. **Free Water**. Free water will appear as droplets on the side or bottom of the jar when the sample is swirled or as a layer below the fuel.

b. **Suspended Water**. Suspended water will appear as a haze or cloudiness in the fuel.

c. **Slime**. Where slimy products are present on the fuel surface or at the fuel water interface (for water bottom sample), samples should be dispatched for microbiological testing.

d. **Solid**. Solid matter will appear either as sediment on the bottom of the jar or a fine suspension. For dark fuels it can be difficult to observe and the sample should be viewed through the bottom of the jar as well as through the side and top.

e. **Cross Contamination**. Some fuels such as DIESO UK and AVGAS have distinctive colours whilst others such as AVTUR may vary from water white to straw coloured. It is difficult to detect minor contamination by colour, so samples of any suspect fuel must be sent for test to the nominated laboratory designated by the Service Authority.

2. Tables 2.12.I.1 and 2.12.J.2 flow-chart the stages to be followed and actions to be taken for the visual testing of fuels.

Table 2-12-I-1: Visual Examination - AVGAS

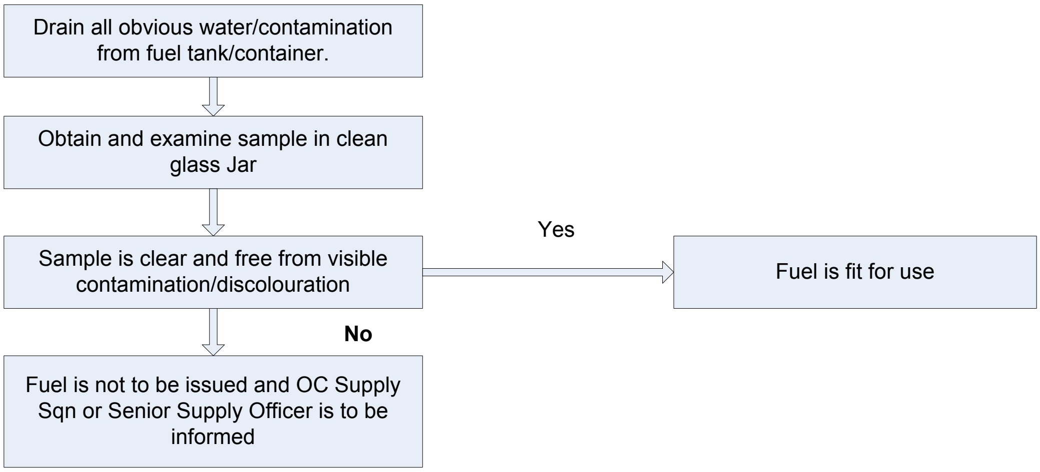
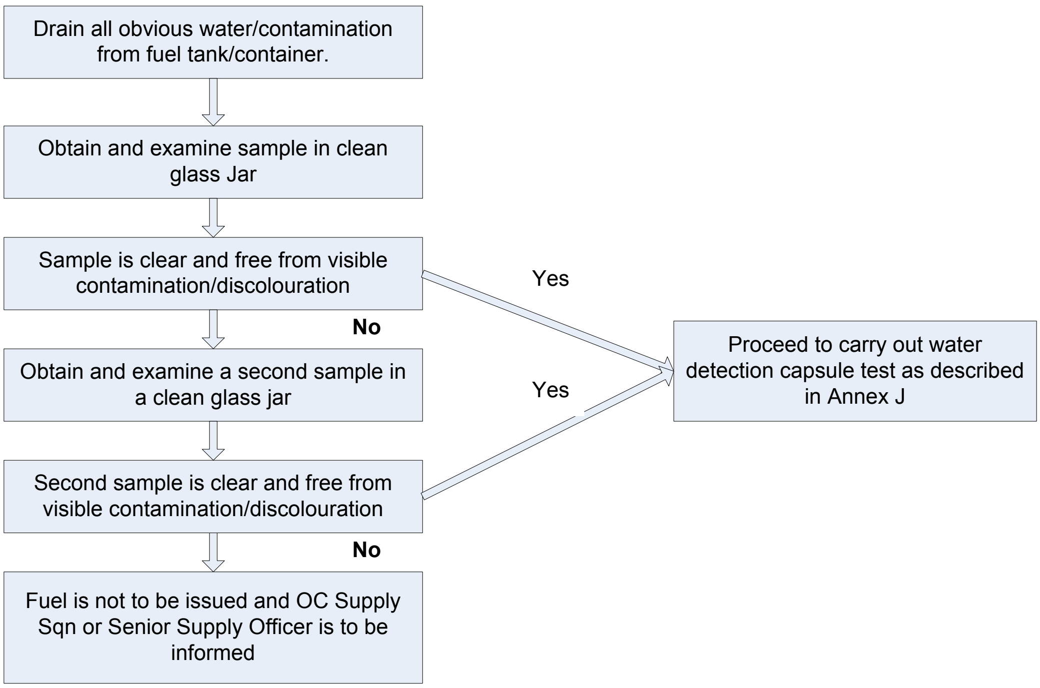


Table 2-12-I-2: Visual Examination – AVTUR, AVTAG AND AVCAT



WATER DETECTION TEST FOR AVIATION TURBINE FUELS

1. The water detector capsule is used to detect low levels of undissolved suspended water and should not be used to confirm the presence of a free water phase (normally found at tank low points). Detecting separated water in tank bottoms is best done with water finding paste.

2. As the test is very sensitive, care must be taken to ensure that external water contamination is avoided if the test is carried out in adverse weather conditions.

3. The equipment required for the test is:

 a. Jar glass, (ref 6630-99-224-11105).

 b. Syringe, water detector, (ref 6630-99-224-1107).

 c. Capsule, water detector, (ref 6630-99-224-1108).

4. Before commencing the test ensure:

 a. That the equipment is clean and dry.

 b. The water detector capsules are in life.

 c. The tube containing the capsules has been screwed firmly closed.

5. If the tube has not been correctly sealed check that the detector material in the selected capsule is a uniform yellow, if not, reject the capsule and select one that is uniform.

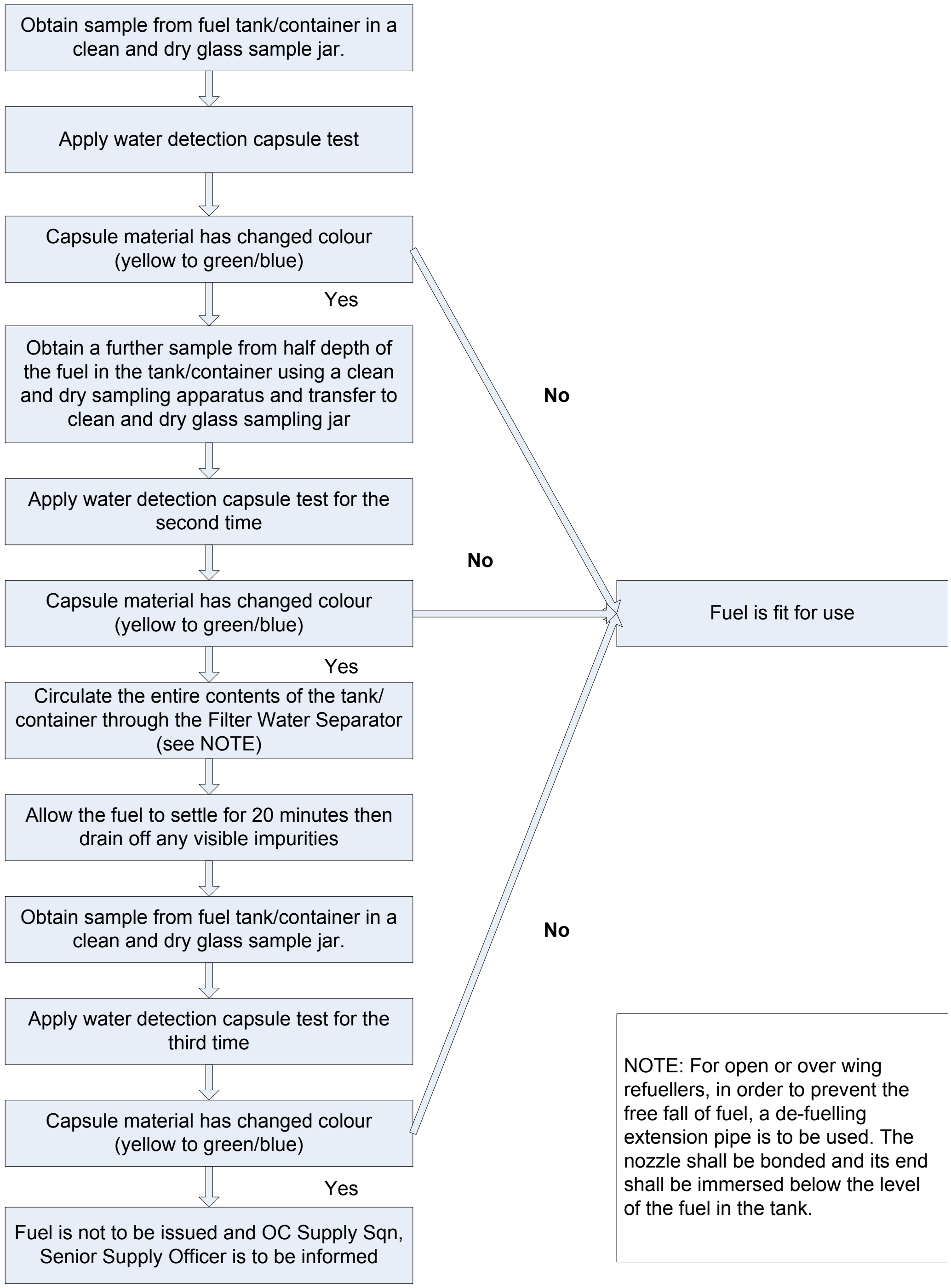
6. Following the sequence in the flow chart, Table 2.12.J.1, draw the sample of fuel from the tank or container into a clean glass jar and fit the water detector capsule to the syringe.

7. Immerse the capsule and syringe to approximately half the syringe length into the fuel sample and draw 5 ml of fuel into the syringe through the capsule.

8. Examine the detector material in the capsule for a change in colour to green or blue on part of its surface.

9. If there is a colour change, follow the directions in the flow chart until either there is no colour change at the first or second re-tests, or there is a colour change at the second retest. In this case the fuel shall not be issued.

Table 2-12-J-1: Flow Diagram for Water Detector Capsule Test



ASSESSMENT OF PARTICULATE CONTAMINATION IN AVIATION TURBINE FUEL

1. Assessment of particulate contamination of aviation turbine fuel is carried out to ensure the efficacy of filtration systems. Samples are taken at a convenient point downstream of the last filter water separator before the fuel enters an aircraft. Samples are not to be taken at every hose end from an issue point with a single filter water separator. In the event of contamination occurring between the filter water separator and the hose end, (for example, as a result of hose degradation), this will be identified when performing the strainer checks detailed in Annex M. There is no requirement for the gravimetric assessment of particulate contamination of AVGAS 100LL.

2. There is also no requirement for the assessment of particulate contamination from issue points that do not directly refuel aircraft.

3. Particulate contamination checks shall be performed at quarterly intervals. This should be carried out by in-line sampling of in-use refuellers and dispensing equipment using pre-weighed Millipore filters and sending these to the nominated laboratory for evaluation. If it is not possible to use pre-weighed Millipore filters, open-line samples may be taken into super-clean sample containers supplied by the nominated laboratory. However, there is no requirement to submit an open-line sample if a pre-weighed filter has been taken from a refuelling point downstream of the last filter water separator.

4. Where it is not practical to transport pre-weighed membrane filters to and from the nominated laboratory, a colorimetric Millipore test may be used at the discretion of the Service Authority.

5. Only staff qualified in aircraft refuelling techniques and procedures in respect of the refuelling equipment may carry out the procedure.

6. If not held on site, the Fuel sampling, back pressure adapter, (ref 6630-99-224-5332), Millipore sampling kit, (ref 6630-99-224-5330) and plastic monitor assemblies containing pre-weighed 0.8 micron membrane filters are obtainable through the Service Authority and the nominated laboratory.

7. Suitable metal containers graduated to show 1 litre and 5 litres should be provisioned locally.

PROCEDURE FOR USE OF THE MILLIPORE TEST KIT

8. Connect the fuel sampling back-pressure adapter to the fuel return input connection.

9. Remove the 3/8-inch BSP plug from the outlet hose end coupling and replace with the sampling valve connector from the Millipore sampling kit.

10. If the outlet hose end coupling is not fitted with a plug, the sampling valve connector is to be fitted to the 3/8 inch BSP connection on the back-pressure adapter.

11. Connect the hydrant/fuelling vehicle hose to the sampling back-pressure adapter.

12. Remove the sampling kit from the transit/storage box, ensure that the three-way tap is set to the off position and unscrew the monitor housing. Ensure that the two neoprene washers are serviceable and that they are correctly located in each half of the monitor housing.

13. Unpack a plastic monitor and record its serial number together with the hydrant serial number or refueller registration. Remove the RED plastic plug from the outlet connector of the monitor.

14. Position the monitor in the lower half of the monitor housing in the sampling kit.

15. Remove the BLUE plastic plug from the monitor and reassemble the monitor housing by screwing the halves together HAND TIGHT only.

16. Retain the red and blue plastic plugs from the monitor in a clean dry plastic bag.

17. Position the free end of the flushing line in the 1 litre graduated container.

18. Remove the dust caps from the sampling valve connector and pressure fuelling hose then connect the sampler. Position the sampler outlet hose and, if fitted, the separate flushing hose into the calibrated flushing and sampling containers, bonding as necessary.

19. Commence the fuel transfer through the hydrant refueller and establish a steady pressure of 30-35 psi and a fuel flow rate equivalent to 50% of the rate capacity of the filtration equipment.

20. When these conditions have been achieved and the flow rate is stable, turn the tap on the sampler to flush and allow at least 1 litre of fuel to flow into the 1 litre calibrated flushing container.

21. Ensuring the pressure and flow rate is maintained; turn the valve tap SLOWLY to the sample position avoiding any damage to the filter membrane. Too rapid an application of pressure will rupture the membrane.

22. Maintaining the pressure and flow rate, allow 5 litres of fuel to collect in the calibrated sample container. This must be an accurate volume and the fuel flow must be continuous throughout the sampling, if not, the whole procedure is to be repeated with a fresh monitor.

23. Once the 5 litres have been passed through the monitor, close the valves etc., disconnect the pressure hose, remove the sampling valve connector and replace both the blanking plug and the blanking caps to the Millipore kit and fuel couplings.

24. Remove the fuel sampling back-pressure adaptor and replace it in the transit/storage box.

25. To facilitate easy removal of the plastic monitor, tap the outside of the monitor housing lightly with a hide covered hammer whilst unscrewing. Carefully remove the plastic monitor from the sample kit monitor housing, ensuring that it does not separate. IMMEDIATELY replace the RED outlet and BLUE inlet plastic sealing plugs.

26. Drain the fuel from the sampling kit, reconnect the two halves of the monitor housing and return the kit together with the sampling valve connector to its transit/storage box.

27. Replace the monitor in a suitable clean container and record the details of test on the proforma shown below.

NOTES

28. The method of connecting the fuel sampler, ref 6630-99-224-5330, to the pressure fuelling head will depend on the type of sampler used. A Petrac sampler will thread directly on to the adapter, whereas the Millipore sampler has a snap on fitting which must first be screwed into the pressure head.

29. The two samplers also differ in two other major ways. The Petrac has a three-way valve with off, flush and sample positions and has separate flushing and sample hoses. The Millipore has a two-way valve with flush and sample positions only and a short bridging hose. This flushes the sampler by bypassing the monitor housing, the flushing fuel is then passed through the sampling hose.

SAMPLE DISPATCH

30. All monitor assemblies, including any that are unused, are to be enclosed in plastic bags together with the proforma, and returned to the nominated laboratory.

31. The test laboratory will report all pass results by post. The nominated laboratory will advise the Service Authority and Unit by telephone and fax if results fail (exceed 1 mg/l). The Service Authority will advise the Unit what action is necessary

Performa "Assessment of Particulate Contamination of Aviation Turbine Fuel"

From: .... To: ....

....

....

Date: ....

MILLIPORE TEST OF AVIATION FUEL

The enclosed monitor assemblies, details of which are tabulated below, have been processed in accordance with the agreed test procedure.

Monitor Serial No	Date of Test	Hydrant Serial No Or Refueller Reg No	Fuel Pressure During Test	Fuel Flow Rate During Test	Fuel Grade	For Laboratory Use Only	
						*Colour Rating	*Weight of Particulate (mg/litre)

The number of pressure refueller, allocated to aviation turbine fuel, expected to be in use during the following quarter is ....

The following monitors were unused.

*...(Laboratory Signature)

Note: All columns to be completed by the person carrying out the fuel sampling, except for those marked by an asterisk (*).

PROCEDURE FOR USE OF THE COLORIMETRIC METHOD

This method is to be used for qualitative assessment of particulate contamination levels of aviation turbine fuel where authorised by the Service Authority.

32. The colorimetric method must only be used when it is not practicable to use the gravimetric method. The colorimetric method is to be used, prior to issue of fuel to aircraft, when the equipment installation has not been subject to the standard 3 monthly Millipore checks. **It is a TSW mandatory requirement to perform colorimetric particulate matter inspection on initial set up prior to fuel issue from all field refuelling installations not utilising 1000 gal Tactical Refuelling vehicles or TARTs (these systems being subject to the standard 3 monthly Millipore checks)**.

33. The colour rating can be made in the field and does not require stringent laboratory procedures. Field monitors for colorimetric analysis cannot be used for gravimetric analysis.

34. The following equipment is required to carry out the colorimetric Millipore method.

a. Fuel sampling, back-pressure adapter (6630-99-224-5332).

b. Millipore sampling kit, (6630-99-224-5330).

c. Test monitor containing two membranes.

d. A metal container of minimum 10 litre capacity.

e. Colour standard booklet (63C/2224).

35. Using the Millipore sampling kit, a sample of fuel is taken from the hose end at the delivery nozzle in the manner described in paragraph 8e. After having passed 10 litres of fuel through the monitor, the colour of the membrane filter is rated as described below.

36. Remove the membranes from the monitor with forceps. Dry the membranes by placing them carefully on an absorbent paper (ensuring that the top membrane is face up, i.e. the side with the particulate is face up) on a low-level non-flammable heat source such as a radiator or letting it air dry for 3 hours in a dust-free location. Dryness can be estimated by comparing the white colour of the outer edge of the test membrane with a new membrane. In a location shielded from direct sunlight compare the top surfaces of both membranes with the colour standard booklet. If the sample is distinctly between two rating numbers, report the lower number.

PROCEDURE FOR INTERPRETING RESULTS

37. If the difference between the two membranes is more than 2 numbers, do not use the fuel until the problem has been investigated and solved or until a gravimetric Millipore has been completed and reported as satisfactory.

38. If the top membrane is rated 6 or darker, regardless of the colour of the lower membrane, do not use the fuel until the problem has been investigated and solved or until a gravimetric Millipore has been completed and reported as satisfactory.

Note: Colour standard booklets should be stored in a box and protected against sunlight and extremes of temperature. The colours can change with time and their accuracy cannot be guaranteed after 2 years; after such time the booklet is to be discarded and a new booklet demanded.

39. Sampling equipment is to be maintained in a clean condition and is to be handled with care.

40. Thread sealing compounds are not to be used. PTFE pipe thread sealing tape must be used to rectify leaks.

41. One litre of fuel is to be flushed through the Millipore sampling kit prior to fuel being passed through the monitor.

PROCEDURE FOR THE USE OF THE OPEN LINE METHOD

42. The fuel should be re-circulated through a representative hose for five minutes. All pertinent safety procedures are to be taken during this operation. The engine/pump RPM must be kept to a minimum.

43. Immediately after the fuel has been circulated ensure that the hose end is clean then transfer between 1L of fuel into a super-clean bottle supplied by the nominated laboratory. Care should be taken that no contamination is introduced from external sources.

44. A minimum headspace of 25mm should be left above the fuel in the can to allow for thermal expansion. Immediately after taking the sample, ensure that the lid for the can is free from particulate contamination and then replace on the can.

45. The sample can(s) together with the Proforma "**Assessment of Particulate Contamination of Aviation Turbine Fuel**" are to be returned to the nominated laboratory.

46. The test laboratory will advise the Service Authority and Unit by telephone and fax if results exceed 1mg/litre. The Service Authority will advise the Unit what action is necessary.

DETERMINATION OF THE CONDUCTIVITY OF AVIATION FUELS

GENERAL

1. This section applies to the aviation fuels: AVTUR/FSII (F-34) and AVTUR (F-35).

2. The conductivity of aviation fuel is measured to ensure it is within the specified limits and cannot accumulate static electricity during aircraft refuelling.

3. The conductivity of the fuel is determined using a hand held EMCEE conductivity meter model 1152 (63C/6630-01-1152398). A clean (rinsed in accordance with annex A) epoxy-lined metal sample container of 5 litre capacity is also required. Suitable containers are 8115-99-913-7719 and 8115-99-462-1665.

SAMPLING OF FUEL

4. The sample container should be rinsed with the fuel to be tested. After the sample for test has been withdrawn, wait for two minutes to allow static charges in the fuel to dissipate before continuing with the determination.

TEST PROCEDURE

5. Attach the measurement probe to the bottom connector on the conductivity meter.

6. Depress the MEASURE switch (M) with the probe OUT of the fuel sample. The reading should be below 000 ± 001 in approximately 3 seconds. If the reading is above these limits, check / calibrate using the procedure given in paragraphs 10 to 18.

7. Depress the CALIBRATE switch (C) with the probe OUT of the fuel sample. After 3 seconds the reading should be 10 times the probe calibration number ± 5. (The probe calibration number is marked on the probe):

e.g. Probe number = 40

Therefore Meter reading = 40 x 10 ± 5 i.e. reading should be between 395 and 405. If the reading is not between these limits, check / calibrate using the procedure given in paragraphs 10 to 18.

8. Insert the probe into the fuel to cover the upper holes, and depress the MEASURE (M) switch. Allow the reading to stabilise for 3 seconds and report the conductivity. During the determination, the probe must not touch the sample container's sides or bottom.

Note: The apparent reading will continue to change after 3 seconds but should not be reported.

9. If the conductivity of the fuel is outside the limits specified in Table 2.12.N.1 the fuel is not to be issued and the Officer Commanding Supply Squadron or Senior Supply Officer is to be informed.

10. The temperature of the fuel should be taken using an appropriate thermometer.

Fuel	Conductivity Limits pS/m
AVTUR/FSII (F-34)	100 min*, 600 max
AVTUR (F-35)	100 min*, 600 max

Table 2.12.L.1. Fuel conductivity limits

* 50pS/m is the minimum limit for delivery to aircraft. 100 pS/m is the minimum limit used for storage tanks to ensure additive losses or change in temperature changes do not reduce the limit at delivery to aircraft below 50 pS/m.

CHECK - CALIBRATION

11. Remove the probe from the meter and check the zero reading by depressing the MEASURE switch (M). The reading should be below 000 ± 001 in approximately 3 seconds.

12. If the zero adjustment is acceptable without the probe but not when the probe is attached, the probe should be rinsed with fuel and allowed to dry.

13. Attach the measurement probe to the bottom connector on the conductivity meter.

14. Depress the MEASURE switch (M) with the probe OUT of the fuel sample. The reading should be below 000 ± 001 in approximately 3 seconds.

15. If either the ZERO or CALIBRATE is outside the limits, the following steps should be completed.

16. Remove the probe.

17. Insert a small screwdriver into the hole marked ZERO. While depressing the MEASURE (M) switch adjust the control until the display reads 000 ± 001.

18. While depressing the CALIBRATE (C) switch, insert a small screwdriver into the Calibrate hole and adjust for 10 times the probes calibration number ± 002.

19. Attach the probe and depress the MEASURE (M) switch. The reading should be 000 ± 001. If the zero adjustment is acceptable without the probe but not when the probe is attached, the probe should be washed thoroughly with fuel and allowed to dry before re-testing for zero.

20. If the meter cannot be calibrated to within the limits stated above, then it should be returned to stores and a new meter employed.

CARE OF FUEL DELIVERY HOSES, NOZZLES AND PRESSURE COUPLINGS FOR AVIATION FUEL

DUST CAPS

1. The dust caps on all nozzles, hoses and pressure couplings are to be checked daily for security. They should only be removed during fuelling operations and replaced securely immediately after the operation has been completed.

STRAINER FILTERS

2. The strainers in refuelling nozzles, hoses and pressure couplings are to be inspected monthly. If more than a trace of paint flakes, corrosion products, small pieces of rubber etc. are found in the strainer the cause is to be investigated and remedial action taken. If there is evidence of hose break up, the hose(s) identified must be changed immediately. If this is not possible, the refueller is to be withdrawn from service until the hose can be replaced.

FLUSHING NEW FUEL DELIVERY HOSES

3. Before any new hose is used for aircraft fuelling it must be flushed with the appropriate grade of fuel as described below. After flushing, the strainer in the fuelling head or nozzle is to be examined. If foreign matter is present, this should be removed and the flushing repeated. If, after the second flushing foreign matter is found in the strainer, the hose is to be quarantined and a sample of the foreign matter is to be sent for examination to the laboratory identified by the Service Authority. If the laboratory reports there is no evidence of hose defect, the hose is to be returned to use. If examination indicates a possible fault, a fault report is to be submitted on a MOD form 760 and the hose is to remain in quarantine pending disposal instructions.

FLUSHING PROCEDURE FOR NEW HOSES FOR FUELLING VEHICLES

4. After fitting the new hose, the vehicle driver is to circulate a minimum of 2000 litres of fuel through the hose via the vehicle carrier tank. If the hose is fitted for open line refuelling, to avoid any free fall of fuel, a de-fuelling extension pipe must be fitted and the open end immersed below the fuel level in the carrier tank.

FLUSHING PROCEDURE FOR NEW HOSES FOR PERMANENT HYDRANT SYSTEM DISPENSERS

5. The new hose is to be connected to the bottom loading connection of a refuelling vehicle that either contains, or is authorised to contain, the same grade of fuel as the hydrant system and has sufficient ullage if loaded to receive the additional fuel. A minimum of 2000 litres of fuel is to be passed from the hydrant through the hose to the fuelling vehicle.

FLUSHING PROCEDURE FOR NEW HOSES FOR HYBRID HYDRANT SYSTEMS

6. The new hose is connected to the bottom loading connection of either the fuelling vehicle currently connected to the hydrant system or a vehicle which satisfies the fuel grade and ullage requirements. The procedure for permanent hydrant systems is then to be followed.

FLUSHING PROCEDURE FOR NEW HOSES FOR TRISTAR REFUELLING PLATFORMS

7. After fitting, the hose is to be lowered into the horizontal position before flushing is undertaken.

8. If the hose is intended for use with a fuelling vehicle, the procedure described in paragraph 4 above is to be used.

9. If the hose is to be used with a permanent hydrant system, the procedure described in paragraph 5 is to be used.

FLUSHING PROCEDURE FOR NEW HOSES FOR DRUMMED STOCK DISPENSER PUMPS

10. The new hose is to be flushed with the contents of one drum of the appropriate fuel.

11. The flushing fuel is to be collected in a clean empty drum that has previously contained the same grade of fuel.

12. Subject to contamination checks detailed at Annex L, the flushing fuel can be used for aircraft fuelling.

FLUSHING PROCEDURE FOR NEW HOSES FOR APFC

13. As fuel cannot be re-circulated through APFCs, the hose is to be flushed using a refuelling vehicle as at paragraph 4 ensuring the same grade of fuel as in the APFC is used. After satisfactory flushing the hose is to be blanked at each end and marked as "Certified Flushed".

14. When the new hose is fitted to an APFC, care must be taken to ensure no extraneous matter is introduced into the hose or dispenser system.

FLUSHING PROCEDURE FOR NEW HOSES FOR TFCS

15. Follow the procedure at paragraph 4.

FLUSHING PROCEDURE FOR IN-SERVICE HOSES

16. The requirements for flushing in-service hoses used on all refuelling systems other than APFCs are as below.

17. When a hose has been out of service for 10 days or more it is to be flushed with the appropriate grade of fuel using the appropriate procedure as described at paragraphs 4 to 15.

18. When the hose has been used for defuelling, the hose is to be flushed with the appropriate grade of fuel as described at paragraph 17.

FLUSHING PROCEDURE FOR APFCs

19. In most situations it is not possible to flush a hose which is already fitted to an APFC. The associated filter and water separator is to be inserted in the delivery hose as close to the aircraft as possible without causing an obstruction hazard.

FLUSHING PROCEDURE FOR SAR SITES USING APFCs

20. The system is to be purged to expel all fuel lying in hoses, pumps and filter water separators, and the fuel is to be collected in an empty APFC which is to be identified as containing the purged fuel.

USE OF THE ALBTMS SAMPLER AND WINDER

GENERAL

1. The fuel/fuel additives and solvent resistant, non-sparking sample line from the Winder (6695-99-257-8180) is to be attached to the shackle located at the top of the ALBTMS (6695-99-255-0244).

2. All sampling equipment is to be thoroughly cleaned and dried before and after use.

3. The ALBTMS and sample container should be flushed three times with the product being sampled before taking samples for testing.

OBTAINING TOP, MIDDLE OR BOTTOM SAMPLES

4. To obtain a top, middle or bottom sample, hold the ‘top hat’ on the top of the ALBTMS steady and push the spindle down until it is locked into position.

5. Check the top valve to ensure that it is locked into position.

6. The spindle/base is locked into position using the locking block.

7. The Winder is connected electrically to the tank structure using the Winder earthing strap.

8. The ALBTMS is lowered to the depth required and the sample line given a sharp jerk to remove the ‘top hat’.

9. This allows the inner valve to open and fuel to enter the body of the apparatus.

10. The ALBTMS is left to rest for approximately 10 seconds or until bubbles have ceased to appear at the surface.

11. The ALBTMS can then be withdrawn and the contents transferred into the sample container.

OBTAINING DEAD BOTTOM SAMPLES

12. To obtain a dead bottom sample –hold the ‘top hat’ steady and push the spindle down, until it is locked into position.

13. Check the top valve to ensure that it is locked into position.

14. The sampling height can be adjusted by pressing the locking pin and sliding the base out to the required position.

15. The locking pin should then be released ensuring that it goes through a hole in the spindle.

16. Lower the ALBTMS into the tank until it rests in an upright position on the tank bottom. This allows the inner valve to open and fuel to enter the body of the apparatus.

17. The ALBTMS is left to rest for approximately 10 seconds or until bubbles have ceased to appear at the surface.

18. The ALBTMS can then be withdrawn and the contents transferred into the sample contain

GUIDE TO IDENTIFYING MICROBIAL GROWTH IN FUELS

BACKGROUND

Hundreds of species of micro-organisms are capable of proliferating in water associated with petroleum products. Three main classes of organisms can be found, bacteria, yeasts, and moulds. Although individual microbes are invisible to the naked eye, their reproduction will produce visible aggregates and eventually substantial scums and sludges (biomass) with a tendency to adhere to surfaces (biofilm).

Microbes cannot survive or grow without the presence of water. Therefore, regular water drains from all fuel systems will minimise the chances of contamination.

Fuel system icing inhibitor (FSII) tends to inhibit microbial growth. Therefore fuels containing no, or low quantities of, FSII may be more prone to this contamination.

Visual Examination

Samples shall be left to stand for a few moments then held up to the light and gently swirled. The following observations are possible indications of microbial growth:

a. Discoloration
b. Emulsified free water (haze)
c. Haze due to suspended particulate
d. Sludge (normally brown or black)
e. Biofilm (visible as a ‘cling-film’ at a fuel/water interface or adhering to the sides of the sample bottle)
f. Dirty water bottom (either blackening or with the presence of soft debris)
g. Unusual smell (especially ‘bad eggs’ type smell)

If any of these conditions is observed a sample shall be sent to the nominated laboratory for analysis.

Part 2

Chapter 13 (Sponsor DIO-PTS)

STATIC ELECTRICITY

SECTION 1- GENERAL

2.13.01. The aim of this chapter is to identify operational conditions in which there is the tendency for a build-up of static electricity and to provide guidance as to how to prevent a dangerous build-up of electrical charge.

2.13.02. Static electricity is produced when any movement of fuel, relative to the static containment material occurs, which results in the separation of charges within the fuel. As the fuel moves along a pipe the charged particles are transferred to the conducting pipe wall, similarly when the fuel enters a container the inside surface of the container attracts the opposite charge to that attained by the fuel. The external surface of the container attains a charge of the opposite polarity to that exhibited on the inside surface. It is also possible for a generation to occur between two liquids or between two solids.

2.13.03. The rate at which static charges are generated is related to:

a. The type of containment material i.e. whether it is a good or bad insulator.

b. The rate of flow (in pipes the charges approximately proportional to the square of the fuel velocity) and the number of fittings and constrictions to that flow.

c. The surface area (the greater the area, the greater the charge, a notable example of this is in fuel filter elements).

d. The amount of debris, rust or water in the fuel.

2.13.04. The measure of how readily a fuel is able to dissipate a static charge is known as its conductivity. AVGAS, Petrol and diesel have low conductivity and hence, are static accumulators. Blended lube oils and fuel oils have high conductivity's. AVTUR and AVCAT may have high, or low, conductivity depending on whether they have been treated with static dissipater additive. Substances are defined as having a low conductivity when the conductivity value is 50 pico Siemens/m or less.

2.13.05. For electrostatic ignition to occur, it is necessary for charge separation, charge accumulation, and electrostatic discharge to take place in a flammable atmosphere.

2.13.06. **Bonding**. In order to eliminate the conditions which lead to an electrostatic discharge, fixed installations are bonded. Dispensing systems are also bonded prior to fuel transfers, the bonding being retained until after the completion of the transfer and de-coupling. Bonding eliminates electrostatic discharge by equalising electrical potential.

2.13.07. **Earthing**. Earthing is achieved by electrical connection to the general mass of the earth. It is required to dissipate the build-up of electrical charge and to mitigate against Radio-frequency, and lightning hazards.

2.13.08. **Radio-Frequency Radiation**. Electromagnetic fields propagated from radar or communication transmitting aerials can create potential ignition hazards. Whenever possible, these hazards should be avoided. Reference is to be made to BS 6656 - Prevention of inadvertent ignition of Flammable Atmospheres by Radio Frequency Radiation.

2.13.09. **Lightning Protection**. Lightning protection is often required for permanent and semi-permanent installations, but is not needed for DBFI. Advice should be sought from DIO for fixed installations, and from 170 (Infra Sp) Engr Gp) 64 Wks Gp, RE for deployable installations.

SECTION 2 - TYPICAL OPERATIONS

GENERAL

2.13.10. There are several design requirements which are applied irrespective of the specific operation in progress. Such requirements are:

a. All metallic storage tanks are to be earthed with a maximum resistance to earth of 10 Ohms.

b. All pumps, filters etc are to be electrically continuous. Additional bonding is to be provided when necessary.

c. All fuel installations are to be earthed such that the earth contact resistance is achieved as follows:

(1) For permanent and semi-permanent installations - 10 Ohms

(2) For DBFI installations - 10 Ohms

d. All loading/unloading structures are to be earthed.

e. Loading arms are to be bonded to the loading structure.

2.13.11. Storage receptacles, including BFCVs, which have previously been filled with a high vapour pressure product (e.g. petrol), are not to be filled with low vapour pressure products (e.g. Diesel, AVTUR or AVCAT) without seeking advice from the DIO/DF&FS.

BULK FUEL CARRYING VEHICLE AND RAIL CAR LOADING

2.13.12. Top-loading is to be avoided, but when necessary, the fill pipe is to be held vertically, reach the bottom of the compartment, and have a tee-piece on the bottom protected by a conducting rubber pad. Fuel equipment, including permanent, semi-permanent and tactical installations should be designed to provide a maximum fuel velocity of 7 m/s. This velocity is applied to both loading and discharge rates and should not be exceeded. For AVTUR containing a static dissipater additive, the maximum velocity is 7 m/s. For AVTUR without the additive, the maximum velocity is not to exceed 1 m/s until the end of the fill pipe has been covered by a minimum of 150 mm, when the velocity may be increased to 5 m/s. Guidance and advice on the subject can be sought from DIO for permanent and semi-permanent installations, from 170 (Infra Sp) Engr Gp for tactical installations, or from DF&FS.

2.13.13. Bottom loading is preferred and is subject to a maximum velocity of 7 m/s or 0.38 divided by the diameter of the fill pipe in metres, whichever is the smaller value.

2.13.14. If free or suspended water is present, the flow rate is not to exceed 1 m/s.

2.13.15. BFCVs are to be bonded to the loading structure, or to the loading BFCV, as appropriate.

2.13.16. Rail tankers are to be bonded to the loading structure.

2.13.17. Rail track in the loading/unloading area is to be isolated from the main track and bonded to the loading/unloading structure.

2.13.18. Hoses may be conductive or non-conductive. However, where hoses are non-conductive, e.g. aircraft refueller hoses, an independent bonding cable is required.

FILLING STORAGE TANKS

2.13.19. For floating and fixed roof tanks the flow is to be kept below 1 m/s until the inlet pipe work is covered by a minimum of 150 mm, the flow can then be increased to a maximum of 7 m/s. For AVTUR containing a static dissipater additive the maximum velocity is to be 7 m/s, for AVTUR with a conductivity value lower than 50 ps/m the maximum velocity is to be 1 m/s until the end of the fill pipe has been covered by a minimum of 150 mm and then it may be increased to 5 m/s.

2.13.20. Tanks are to be provided with an earthed, conducting full height dip tube or still well. Portable gauging equipment is to be bonded to the tank shell to ensure electrical continuity before the gauging hatch is opened.

2.13.21. Dipping operations are not to take place when electrical storms are present. Dipping is also not to take place within 2 hours of the tank being filled, to allow the static charge to fully dissipate.

2.13.22. Personnel are to wear anti-static safety footwear and are not to remove clothing in hazardous areas.

2.13.23. Where possible, all receptacles are to be inspected to ensure that there is no debris within them that may act as unearthed static accumulators.

SHIP AND BARGE OPERATIONS

2.13.24. Ships and Barges are earthed by the surrounding water; consequently it is not necessary to provide additional earthing or bonding cables. Additional cables may react with the ship's cathodic protection system and/or form a galvanic cell with the hull to provide dangerous stray currents. An insulating flange or a length of non-conducting hose is to be fitted at the loading point to isolate the ship from the jetty.

2.13.25. Filling rates are to be in accordance with *International Safety Guide for Oil Tankers & Terminals (ISGOTT)* guidance which is an initial flow of less than 1 m/s until the inlet pipe work is submerged by a minimum of 150 mm and then it may be increased to a maximum of 7 m/s. If free or suspended water is present the flow is not to exceed 1 m/s.

CONTAINER FILLING

2.13.26. For low conductivity fuels including petrol, diesel, and some AVTUR, flow rates are to be kept to below 1 m/s; other fuels may have a flow rate which is imposed by normal filling operations.

2.13.27. Metal containers filled on metal conveyors which are bonded to the filling nozzle do not require additional bonding.

2.13.28. Metal containers which can be guaranteed to be in contact with the fill nozzle before the fill process starts through until after completion do not require additional bonding. If Contact cannot be guaranteed, the nozzle and container must be bonded.

2.13.29. Bonding is not necessary when filling portable plastic containers but if the plastic containers have metal components, these must be bonded to the fill nozzle.

2.13.30. Containers are not to be placed on plastic sheets during filling operations due to the static charge which can accumulate in such sheets which could discharge and thus generate a spark.

DELIVERIES TO MECHANICAL TRANSPORT FILLING INSTALLATIONS

2.13.31. Gravity discharge to buried tanks can be accomplished by using non-conductive hoses. Bonding is not required between the BFCV and the underground tank provided that the metallic closed fill connections are made.

2.13.32. Refer to DIO Design and Maintenance Guide 14 *Mechanical Transport Fuelling Installations* for the electrical design of the installation.

AIRCRAFT REFUELLING

2.13.33. Earthing and bonding is to be in accordance with *STANAG 3682*.

2.13.34. Aircraft are to be earthed and then separately bonded to the Fuel Dispensing system before any refuelling begins. Bonding may be omitted if a hard piped, earthed pantograph system is used.

2.13.35. It is to be noted that aircraft engineers require separate earthing arrangements for ground power equipment and the aircraft so that there is not a risk of ground power equipment discharging through the fuel system to earth, additional requirements are stated in *STANAG 3632*.

2.13.36. Hydrant pits are not to be used as earthing points.

2.13.37. **Pipelines**. The flow of fuel in pipelines generates electrostatic charge. Earthing of the pipeline may be required dependent upon a number of variables including cathodic protection, soil conditions, type and velocity of fuel, and pipeline material. Advice should be sought from DIO / 170 (Infra Sp) Engr Gp.

2.13.38. **Maintenance Activities**. Internal cleaning and coating operations are potential causes of static electricity. A formal risk assessment is to be undertaken of the operation to ensure that the provision of adequate earthing and bonding arrangements are undertaken. For instance, steam cleaning produces clouds which may be electrostatically charged which together with the steam action of producing heat and disturbance will often release pockets of flammable gases. Refer to DIO Functional Standard Specification 031 *Internal Cleaning of Fuel Tanks* for permissible methods of cleaning and *DEO(W) Functional Standard Specification 032 Internal Coating of Aviation Fuel Tanks* for method statement requirements.

BIBLIOGRAPHY

1. DEO (W) Design and Maintenance Guide 14 Mechanical Transport Fuelling Installations.

2. DEO (W) Functional Standard Specification 031 Internal Cleaning of Fuel Tanks.

3. DEO (W) Functional Standard Specification 032 Internal Coating of Aviation Fuel Tanks.

4. STANAG 3632 Aircraft and Ground Support Equipment Electrical Connections for Static Grounding.

5. STANAG 3682 Electrostatic Safety Connection Procedures for Aviation Fuel Handling and Liquid Fuel Loading/Unloading Operations During Ground Transfer and Aircraft Fuelling/De-fuelling.

6. BS 5958 Control of Undesirable Static Electricity.
   Part 1: General Considerations.
   Part 2: Recommendations for Particular Industrial Situations.

7. BS 6651 Protection of Structures Against Lightning.

8. BS 6656 Prevention of Inadvertent Ignition of Flammable Atmospheres by Radio Frequency Radiation.

9. ISGOTT International Safety Guide for Oil Tankers and Terminals.

10. IP Code of Practice Part 7 Airports.

11. API RP 2003 Protection Against Ignition Arising out of Static, Lightning and Stray Currents.

12. IP Model Code of Safe Practise Part 21 Guidelines for the control of hazards arising from static electricity.

Part 3

Chapter 1 (Sponsor FGSR-Insp 1)

MECHANICAL TRANSPORT FUELLING INSTALLATIONS (MTFI) - OPERATING PROCEDURES

SECTION 1 - GENERAL

3.1.01. **Introduction**. This chapter provides general information regarding the day to day operations of Mechanical Transport Fuel Installations (MTFIs).

3.1.02. **Personnel**. Mechanical Transport Fuel Installations may only be operated by personnel who are trained and competent to do so. Part 2 Chapter 6. A Certificate of Competence (COC) for each operator, specifying each installation the individual is authorised to operate, is to be held by the unit as detailed in Part 4, Chapter 1.

3.1.03. **DSEAR Risk Assessment.** To ensure compliance with DSEAR 2002 an initial risk assessment must be completed. The details of this assessment are within JSP 375, Vol 2 Sect 6 Leaflet 56. If any areas of potentially explosive atmospheres are identified, these must be recorded and a plan showing the boundaries of the hazardous zones, in profile and elevation, shall be held. A Class 3 site exclusively storing Diesel (MT, UK and Marine) will not normally be expected to produce an explosive atmosphere; however clarification of this should be sought through the AP (Petroleum) for the site.

3.1.04. **Activity Risk Assessment.** All processes and activities involving Fuel & Lubricants i.e. storage, handling, distribution, and maintenance of systems / plant, containing F&L, are potentially hazardous activities which require accurate and in-date risk assessments to satisfy the requirements of JSP 375, Vol 2, Leaflet 39. This must be reviewed on an annual basis.

3.1.05. **Environmental Risk Assessment.** A detailed site environmental risk assessment must be held by the operating authority. JSP 375 and 418 prescribe this process.

3.1.06. **Maintenance of Installation**. The MMO is responsible for all maintenance and repair of mechanical transport fuel installations, DEO (W) specification 005 issue 003 (or equivalent as defined in the contract) refers. Except in an emergency, such as a burst pipeline, operators are not permitted to carry out maintenance, repair or modifications to these installations.

3.1.07. **Schematic Diagrams**. A schematic diagram and site plan showing the installation layout and valve numbering is to be located on the site. The schematic diagram and site plan is to correspond exactly with the layout and numbering of the tanks, valves and other permanent apparatus.

3.1.08. **Maintenance Documentation.** The Operating Authority must be familiar with, and hold copies of appropriate maintenance documentation. The list is not exhaustive but includes:

a. Inspection of the Fuel and Flammable Goods Facilities Annual Report.

b. Annual Electrical Systems Test Certificate.

c. Lightning Protection Certificate (if applicable).

d. 6 Monthly Pump Calibration Certificate.

e. Level 1 Assessments (if storage tanks are Under Ground Single Skin Steel).

f. Level 2 Testing Certificate (if applicable).

g. Interceptor Specifications.

h. Interceptor Maintenance Records.

SECTION 2 – FUEL OPERATIONS

Automated Fuel Dispense System (AFDS).

3.1.09. An AFDS enables the user to obtain 24 hour fuel delivery at unattended or part attended facilities yet ensures security systems are in place to prevent misuse. AFDS also enables full monitoring, reconciliation and billing functions to be available. An AFDS is to incorporate the following features:

a. A fuel dispensing controller located on the pump/dispenser island.

b. A vehicle memory type key with a read/write capability is to be provided for each vehicle that uses the system.

c. The controller is to incorporate an annunciator display providing the user with instructions for operation and providing reasons for non-delivery of fuel.

d. The controller is to provide a receipt to incorporate the requirements of the Service standard report form.

e. A manual over-ride facility is required to enable pump/dispenser operation in the event of a system failure.

f. The AFDS is to be capable of maintaining storage tank stock records for each tank, with an end of month reconciliation facility.

3.1.10. **Turnover of Stocks**. Stocks are always to be issued on the principle of using oldest stock first. The age of stock is to be assessed by the length of time it has been in storage in the installation. Where an installation has two or more tanks, the tanks are to be filled and emptied in rotation.

3.1.11. **Colour Perception**. The minimum colour perception standard for F&L operators is normally CP2. Similar conditions may apply in other locations and should be taken into consideration by the unit fuels officer when selecting personnel for such duties.

3.1.12. **Colour Marking**. All valves, pipe junctions and portions of pipe work are to be clearly painted in the colour code appropriate to the grade they carry; in accordance with *Def Stan 05 – 52 Part 2*.

SECTION 3 - SAFETY PRECAUTIONS

3.1.13. **Hazardous Areas**. Hazardous areas are to be inspected every six months by an appropriate officer delegated by the Commanding Officer to ensure that the appropriate safety precautions are being observed.

3.1.14. **Emergency Communications.** There should be an effective means of both raising the alarm and giving warning in case of fire. It should be audible to all those likely to be affected by the fire. Advice should be sought from the establishment Fire Officer. If a phone is not fitted, a risk assessment should be carried out. There must be access to a phone within a reasonable distance, which is to be clearly sign posted.

WARNING AND INFORMATION MARKINGS

3.1.15. The following markings are required in accordance with BS 5378, BS 5499 and SI 341 *Health and Safety (Safety Signs and Signals) Regulations 1996* are required:

a. At each connection point for a vapour return hose:

"CONNECT VAPOUR LINE BEFORE OFFLOADING"

Together with a notice indicating the maximum number of road tanker compartments that may be unloaded simultaneously.

b. At each tank connected to a common vapour collection point:
"WARNING. THIS TANK IS MANIFOLDED. ISOLATE TANK VENT PIPE BEFORE COMMENCING ANY WORK".

c. At each metering pump/dispenser, at the control point and at the offset filling points (in addition, units should display a smaller version of Fig 3.3.1 at the dispense points):

"PETROL (OR PETROLEUM SPIRIT), HIGHLY FLAMMABLE, NO SMOKING, SWITCH OFF ENGINE".

d. At the opening of any tank that has contained leaded petrol a label reading:

"THIS TANK HAS CONTAINED LEADED PETROLEUM SPIRIT. IT MUST NOT BE ENTERED UNLESS THE PRESCRIBED REGULATIONS ARE COMPLIED WITH".

The extent of the hazard must be clearly indicated on all approaches. A risk assessment is to be conducted to determine the positioning and number of signs required similar to the sign shown at Fig 3.1.1. For installations located overseas notices in the language relevant to the host nation must be provided.

Figure 3.1.1. HWS – MTFI

3.1.16. Consideration is to be given to the provision of signs for the following:

a. Fire Fighting Equipment (FFE)

b. Pollution Control Sorbents (PCS)

c. Eye wash stations

d. OWI Signs

As well as meeting the technical parameters, the Service operating the installation is to be consulted to determine if there is a requirement for the equipment to be compatible with other existing installations. Any such requirement ensures that vehicles may refuel at other installations and all data logged accordingly for accounting purposes.

If any equipment fault arises or spills, leaks or other emergency occurs, all operations are to cease, electrical supplies isolated and the occurrence rectified. No operation is to continue until approved by a competent person.

Suitable portable containers are to be filled at kerbside facilities with nozzle operating levers held open in the manual position. Containers are to be securely closed as soon as filling is complete and removed from the facility promptly.

There are serious risks associated with the contamination of one product by another. For this reason specialist installations normally wash out cans before refilling with a different product, as this facility is not available to units the following guidelines are to be observed:

a. Cans are only to be filled with product they have previously contained.

b. Where any doubt exists as to the previous contents, cans must not be filled.

c. Kerosene is only to be filled into cans clearly marked for use in accordance with Part 1, Chapter 4.

d. In no circumstances are cans to be washed with water.

3.1.17. **Disposals**. Disposals of surplus and serviceable F&L are to be accounted for as detailed in JSP 886.

3.1.18. **Filling, Sampling and Dip Hole Covers**. All filling, sampling and dip hole covers are to be replaced and locked after use. All openings other than vents and dipping hatches where no fixed gauging device is fitted are to be closed when tanks are being filled.

3.1.19. **Fire Precautions**. Fire precautions are detailed in Part 2, Chapter 5.

3.1.20. **Housekeeping**. A high standard of cleanliness is to be maintained. Rubbish of any kind is not to be allowed to accumulate, and the growth of vegetation is to be controlled so as not to present a fire hazard.

3.1.21. **Security**. When not in use, all manhole covers, dip hatch covers, sampling hatches, inlet and outlet points and dipsticks are to be securely locked. When not in use the keys to these locks are to be kept in safe custody under local arrangements.

3.1.22. **Settling Periods**. When fuel is received into a MTFI it must be allowed sufficient time to settle before any issues are made. The minimum settling periods are detailed in Part 2, Chapter 12.

3.1.23. **Static Electricity**. To reduce the risk arising from static electricity when Class I or II petroleum products (see *Def Stan 01-5/2* and Part 2 Chapter 13 which do not contain anti-static additives are pumped through pipelines, careful control is to be exercised over the rate of flow. This applies particularly when starting to fill empty tanks, the free fall of fuel is to be avoided whenever possible.

3.1.24. **Liquefied Petroleum Gas (LPG) Cylinders**. LPG cylinders may be stored at an MTFI where a dedicated gas cylinder storage compound is not available on the Unit. LPG cylinders up to a combined quantity of 400 kg may be stored in a secure cage. JSP 319, Part 2, Chapter 9 refers. The storage of LPG is to be included in the site safety case and will be audited as part of the Fuel and Gas Safety Assurance Programme.

Note: The policy for the provision of an Automotive LPG MTFI is detailed within JSP 319, Part 3, Chapter 14.

3.1.25. **Washing Facilities**. Facilities for hand washing should be available within a reasonably practicable distance. Otherwise new or refurbished facilities should be provided with a hand wash basin.

3.1.26. **Unit Filling from Kerbside Pumps**. The equipment normally used for unit filling of containers is designed for the purpose. However, occasions may arise where a unit is required for exercise or other reasons to fill jerricans for a specific purpose from a kerb side pump. A unit commander may authorise a responsible officer or NCO to fill a given number of jerricans for a specific task. Containers filled from kerb side pumps are to have all existing jerrican markings removed prior to filling. Once filled the jerrican is to be fitted with a unit filled identification label, available on demand from the Petroleum Depot (West Moors) and stencil the fill date on the can. The contents of unit filled jerricans are to be consumed within **3 months** of the filling date.

3.1.27. **Vehicles.** All MHE vehicles which need to operate within Zone 2 areas associated with storage tanks must be protected to Zone 2 standards.

SECTION 4 - POLLUTION CONTROL SORBENTS (PCS)

3.1.28. At all Petrol Filling Stations a supply of PCS should be provided to clean up small spills and leaks. The PCS should be kept in a sealed and clearly identifiable container and provided with a means of application. Sand may be used. Normally one full bucket (0.015 m^3) of absorbent is sufficient for every two dispensers. The required quantity of absorbent is to be stored centrally in a designated Pollution Control Point (PCP) close to the MFTI, the following additional items should be held:

a. Dustpan and brush.

b. Stiff Broom.

c. Heavy duty plastic sacks and ties/ container - sufficient to contain the quantity of absorbent stored at the PCP.

d.

SECTION 5- VAPOUR RECOVERY

3.1.29. Petrol Vapour Recovery Stage I and Stage II Directives (94/63/EC and 2009/126/EC) was introduced to reduce the emissions of Volatile Organic Compounds (VOCs). Effective reduction of VOCs is only achievable by carrying out modifications to infrastructure. Stages of vapour recovery are:-

a. Stage 1A – At Petrol Distribution Terminals.

b. Stage 1B – At MTFIs storing ULGAS; delivery of ULGAS from road tanker to bulk storage tank.

c. Stage 2 – At MTFIs storing ULGAS; issue of fuel from dispensing point to vehicles. See figure 3.1.2 for details.

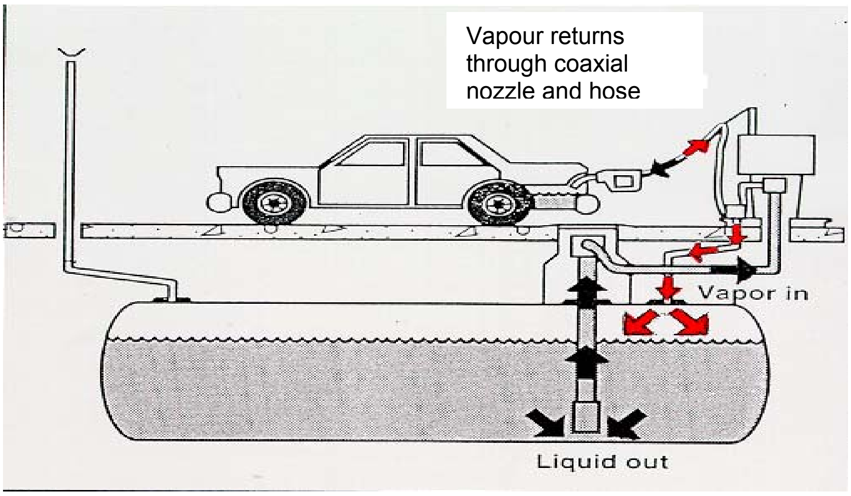


Figure 3.1.2 Stage 2 vapour recovery.

3.1.30 Environmental Permitting (England & Wales) Regulations 2010, SI 675-2010 was introduced to simplify the permitting of environmentally damaging practises. Activities polluting all media (land, water, air), require an A1 permit. Activities polluting just 1 media (atmosphere) require a Part B permit issued by Local Authorities.

3.1.31 Vapour Recovery implementation and permitting on MTFIs are required subject to the following caveats: - See Table 3.1.1

Table 3.1.1. Vapour Recovery and EPR 2010 in-service dates by throughput per annum	
Vapour Recovery 94/63/EC & 2009/126/EC 31 Dec 1994	**EPR 2010 SI 675-2010**
Stage 1B; Tanker Delivery on MTFIs	**MTFIs require a Part B permit issued by the Local Authority for :-**
By 31/12/97 for all MTFIs with a throughput > 1,000m^3 (1,000,000 Litres) per annum	***Unloading of Petrol into*** MTFI storage tanks if qty is > 500m^3 (500,000 Litres) per annum
By 31/12/01 for all MTFIs with a throughput > 500m^3 (500,000 Litres) per annum	Vehicle refuelling activities ***at an existing*** MTFI if throughput is > 3500m^3 (3,500,000 Litres) per annum
By 31/12/05 for all MTFIs with a throughput > 100m^3 (100,000 Litres) per annum	Vehicle refuelling activities ***at a new**** MTFI if throughput is > 500m^3 (500,000 Litres) per annum *wef 31/12/09
Stage 2, Dispense point to Vehicles on MTFIs	
By 31/12/18 for all MTFIs with a throughput > 3000m^3 (3,000,000 Litres) per annum	
By 31/12/12 for all MTFIs with a throughput > 500m^3 (500,000 Litres) per annum	

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1. JSP 319, Joint Service Safety Regulations for the Storage, Handling and Use of Gases'.

2. JSP 886 – 'The Defence Logistics Support Chain Manual'.

3. Def Stan 01-5/2.

4. Def Stan 05-52 Part 2.

5. Stanag 7011 – Automated Fuel System Monitoring and Control Equipment.

6. DEO (W) Spec 005 Issue 03

7. APEA/IP Guidance for the Design, Construction, Modification and Maintenance of Petrol Filling Stations 2nd Edition March 2005.

8. Design and Maintenance Guide 14, Mechanical transport fuelling installations.

MECHANICAL TRANSPORT FUEL INSTALLATION MAINTENANCE GUIDE CHECK SHEET

Useful contact details:

Site Estate Team Leader (SETL): ________________ Tel:____________

Defence Infrastructure Organisation (DIO): ______________ Tel:___________

Regional Prime Contractor representative: ______________ Tel:____________

Approved Person Petroleum (AP Pet): _________________ Tel:____________

Aquatrine Liaison Representative (ALR): _______________ Tel:____________

Fuel & Gas Safety Regulator (FGSR): _________________ Tel:____________

Installation Information:

IP Flashpoint Classification: ______________ (ULGAS - Class 1 / DIESO - Class 3)

Certificate for Continued Operation (CCO) expiry date (Class 1 installations only):_____________

Next FGSR Inspection date: __________________

Maintenance Documentation:

Serial	Maintenance	Frequency	Last Inspection		Next Inspection		Remarks
1	Inspection of Fuel Infrastructure and Flammable Goods Facilities (Previously Task 249)	Annual					*In accordance with the requirements of DE Practitioners Guide 01/09*
2	Electrical Test	Annual					*Inspector must be NIC EIC or compex 7&8 qualified*
3	Lightning Protection*	Annual					**If applicable iaw BS 6651*
4	Metering Pump Calibration	6 Monthly					*Certificates must be provided for each dispense pump.*
5	Level 1 Assessment*	Annual					**Underground single skinned steel (USSS) tanks in conjunction with Serial 1*
6	Level 2 Assessment*	See Remarks					*USSS tanks only at 20, 25, 30 and every 2 years thereafter.*
7	Interceptor Maintenance	6 monthly					*Aquatrine Liaison Representative (ALR)*

Part 3

Chapter 02 (Sponsor Safety Infrastructure)

OPERATING PROCEDURES - MOD PETROLEUM INSTALLATIONS

SECTION 1 - GENERAL

3.2.01. **Scope**. This Chapter provides the standards for bulk Fuel and Lubricant (F&L) operations in MOD Petroleum Depots and covers the receipt, issue, storage and handling of F&L in tanks and associated pipelines. Where applicable, information contained else where in this JSP will be referred to by Part and Chapter number.

3.2.02. **Definition**. For the purpose of this chapter, a MOD Petroleum Depot is a site, whose sole purpose is the receipt, issue, storage and handling of F&L.

3.2.03. **Inclusions**. MOD Petroleum Depots include:

a. Royal Navy (RN) - NATO Petroleum Depots (NPDs).
- Oil Fuel Depots (OFDs).

b. Army – Petroleum Depot (West Moors) PD (WM).

c. Royal Air Force (RAF) - Petroleum Supply Depots (PSDs).

d. Any other depot operated by the MOD that handles bulk F&L and which meet the definition of a MOD Petroleum Depot.

3.2.04. **Exclusions**. Bulk Petroleum Depots do not include the following facilities:

a. Aviation Fuel Installations – Part 3, Chapter 3.

b. Field Installations – Part 4, Chapter 1.

c. Mechanical Transport Fuelling Installations – Part 3, Chapter 1.

Additionally, the following operations (that take place in MOD Petroleum Depots) are excluded as they are dealt with separately within the JSP and are to be read in conjunction with this Chapter.

a. Operating Procedures General – Part 3, Chapter 1.

b. QA Batch Control – Part 2, Chapter 12.

c. Packed Stock - Part 2, Chapter 7.

d. Loading and Discharge of Rail Tank Cars – Part 2, Chapter 10.

e. Loading and Discharge of Bulk Fuel Carrying Vehicles (BFCVs) – Part 2, Chapter 10.

3.2.05. **Security**. The security measures at MOD Petroleum Depots are to be adequate to protect the general public, operating personnel, F&L stock, plant and equipment. Access gates are to be monitored continuously while the depot is open and the perimeter fence inspected at least once each day, and preferably once each shift.

SECTION 2 - COMPLIANCE

3.2.06. **Records**. Records are to be maintained and are to include statutory notification, construction and operating procedures applicable to the depot. The records are to be maintained by the depot staff, support organisations and the Property Management organisation. The records are to be made available on request to the MOD licensing authority, command inspection team(s) and other regulatory bodies or Headquarters that requests them. Annex A is a list of records to be maintained for MOD Petroleum Depots.

3.2.07. **Operating Procedures**. The operation of a MOD Petroleum Depot is to take into account all relevant legislation and military regulations and in particular health, safety and environmental considerations. To comply, all activities in MOD Petroleum Depots are to be conducted using approved written operating procedures. Additionally, detailed procedures for the maintenance of equipment and response to emergency situations are to be available. Information on the legislative and regulatory requirements are contained throughout this JSP.

3.2.08. **Depot Operating Procedures**. The operating procedures contained in this Chapter, and supplementary information within this JSP, contains the minimum requirements for operating a MOD Petroleum Depot and are designed to assist with the production of site specific Depot Operating Procedures.

3.2.09. **Risk Assessment**. In addition to the operating procedures, complying with legislation and regulative requirements they, are also to be the subject of a risk assessment. The procedure for carrying out a risk assessment in a MOD facility is contained in *JSP 375*.

3.2.10. **Accounting**. Accounting procedures and the keeping of accounting records are contained in JSP 886, *The Defence Logistics Support Chain Manual*.

3.2.11. **Staff**. To ensure that the depot is operated safely and the quality of the F&L products are maintained, only appropriately qualified and experienced staff are to be employed. Where unqualified or inexperienced staff are employed, they are to be supervised, and effective training given before working unsupervised. Personnel are not to be allowed to operate plant or equipment if they have not received appropriate training. All operating personnel are to be familiar with the layout and operation of the depot. A location plan, product flow diagram and emergency plans are to be readily available to staff in the event of an emergency.

3.2.12. **Training**. For Depot Training Part 2 Chapter 6 refers.

SECTION 3 - TANKAGE

TANK OPERATIONS

3.2.13. **Prevention of Floatation of Tanks**.

a. Where necessary a safety mark is to be painted on each surface tank to indicate the depth of water in which the empty tank will float.

b. As a safeguard against flotation of empty or nearly empty tanks when flooding of the tank enclosure is likely, product is to be introduced into the tank sufficient to maintain the differential indicated by the safety mark i.e. the product level must always exceed the external water level by at least the distance the safety mark is above the bottom of the tank.

3.2.14. **Maximum Safe Filling Height of Tank**. When filling tanks, due allowance is to be made for subsequent expansion of the contents. Unless otherwise authorised by DF&FS, tanks may be filled to a point not less than 0.20 m (8 in) below either the lowest point of the top curb angle, or any side access for foam pourers, swing arm cable, or other ancillary fittings below the top curb angle, whichever is the lower. This capacity must be annotated in litres on a plate next to the dip opening.

3.2.15. Fuel in reservoirs is not to be allowed to rise above the safe level laid down in Depot Operating Instructions (DOIs).

3.2.16. **Settling Times**. For details regarding settling times for fuels in tanks refer to Part 2, Chapter 12.

3.2.17. **Detection and Draining Water from Tanks**. It is of the utmost importance that all liquid fuels are kept free of water during storage. A regular programme of water draining is to be established, with the following frequency:

a. Aviation Fuels - weekly.

b. Dieso Fuels - monthly.

3.2.18. The above intervals are satisfactory for static stocks in surface tanks. Some under-ground storage may require more frequent removal of water, and tanks may need to be drained following receipt from tankers or pipelines.

a. **Detection**. The presence of free water in fuel can be readily detected by the application of an approved water-finding paste to a brass weight on a plump line. Discoloration or complete removal of the paste indicates the presence of water.

b. **Removal**. Aviation tanks are to be drained using semiautomatic drain valves, where fitted. Tanks not so fitted are to be drained off through the sump and drain valve provided.

c. **Accounting for Water Removal**. The tank or reservoir is to be dipped before and after water is drawn off and the details recorded on the appropriate accounting form. The quantity of water is to be reported to the Depot HQ, who will raise the necessary forms to account for the adjustment.

3.2.19. **Swing Arms**. The mouth of the swing arm is to be positioned as follows:

a. Normally, at about 1 m (3 ft) below the surface of the product when not in use and also during the issue of product.

b. Exceptionally, it may be adjusted in order to issue stock at a particular level from a tank.

c. Prior to the receipt of product, the swing arm is to be lowered to its lowest point in the tank.

d. Other than in an emergency arising from a defective tank valve, the mouth of the swing arm is not to be raised above the surface of the product. In common with floating suctions, the pipe end is to be kept submerged to prevent the ingress of air with attendant corrosion and fouling of product.

e. Swing arm winch cables, from winch to tank top, are to be inspected for serviceability on each occasion of use or weekly when not in use.

TANK AND TANK FITTINGS - INSPECTION AND CARE

3.2.20. A monthly inspection of tanks and fittings is to be carried out by Engineering Staff as part of the Depot maintenance routines. Defects are to be reported immediately for remedial action. Findings of the inspection are to be checked against the Depot Status Board which is to be amended accordingly. Particular attention is to be paid to the points outlined below:

a. **Roof Manholes**. The covers of the roof manholes are to be kept securely closed when not in use.

b. **Dip Hatches**. To keep out rain and foreign matter, the covers of dip hatches, and sounding tubes provided in reservoirs for dipping purposes, are to remain closed when not in use.

c. **Walkways**. Walkways, normally made of expanded metal, are to be provided on the roofs of all tanks. Persons visiting the tops of the tanks are to be cautioned that, for reasons of safety, they are to walk only on these walkways. Continual attention is to be paid to the condition of the plating immediately beneath walkways, which is to be lifted every twelve months to enable close examination.

d. **Tank ventilation**. Wire gauze hoods and flame arresters fitted to open air vents in tank roofs are to be kept free of dirt and other debris. Pressure and vacuum valves, where fitted, are to be inspected every six months to ensure that they are in sound working order and serviced every twelve months.

e. **Level Indicators**. During tank inspection the indicator wire is to be manipulated by hand to check that it is moving freely in the guides and is in good working order. Defects are to be rectified as opportunity permits.

f. **Automatic Tank Gauges (ATG)**. Ensure that the tank transmitter is secure and undamaged.

3.2.21. Glass Gauges fitted to Lubricating Oil tanks are to be inspected every six months for malfunctions due to corrosion, sediment etc. The reading on the gauges are to be tested on each occasion of dipping and any substantial unaccountable difference reported to Depot HQ for investigation and re-calibration of the tank. Glass gauges are always to be emptied after use and the cock turned off to avoid loss of oil in the event of the glass being broken. Opportunity is to be taken to replace glass tubes with transparent plastic tubes, as these are more robust.

TANK EXAMINATION

3.2.22. Fuel tanks fitted with ATG systems should be examined at least weekly to confirm freedom from leaks. Tanks not fitted with ATG should be examined daily. Defects should be reported immediately to the Depot Manager for remedial action.

3.2.23. Details of the inspection are to be recorded in a tank maintenance record, to be provided for the purpose. Findings are to be checked against the Depot State Board, which is to be amended accordingly.

TANK STATE BOARDS

3.2.24. A minimum of one Tank/pipeline status indicator board or 'State Board', is to be erected and maintained in all Depots. The board is to be installed in such a position to ensure that each officer is aware of the state of the tanks and pipelines in the Depot. The board is to show all tanks, indicating the following:

a. Product

b. Contents

c. Date last cleaned

d. Current tank state

3.2.24.1 The tank state is to detail if the tank is empty, open for inspection / cleaning / maintenance / ventilation, or closed up awaiting filling, plus any other information deemed relevant. Similar details for pipeline sections which are not operational are also to be displayed. The boards are to be updated daily and a suitable procedure for this is to be established by the Depot Manager.

TANK CLEANING - GENERAL

3.2.25. It is normal operating policy for Quality Control purposes for tanks to be cleaned at intervals dictated by the type of product and to some extent by climate. Whenever a tank is emptied, opportunity is to be taken to inspect the tank internally. Consideration should be given to cleaning, or minimum cleaning, together with any maintenance repairs that may be necessary. Records of all maintenance work carried out should be completed showing the extent of work, faults detected and rectification or modification carried out. Such records should be prepared by the contractor and handed to the site operator for retention, on completion of the work.

3.2.26. Tanks are to be inspected by a competent person, and a report made in the following circumstances:

a. Whenever a tank is emptied.

b. Whenever Dead Bottom samples indicate the presence of any sludge or dirt liable to contaminate the product.

c. When a tank, which has contained FFO, is to be filled with Dieso.

d. When a tank, which has contained any other product, is to be changed over to aviation fuel.

e. When a tank, which has contained one grade of Lubricating Oil, is to be changed to another grade to Lubricating Oil.

f. When maintenance is necessary.

g. As recommended by the Aviation Fuels Technical Manager or Marine & Ground Fuels Technical Manager as a result of a Micro Biological Contamination (MBC) test being in excess of the permitted allowance.

3.2.27. Any tank not inspected for any of the above stated reasons is to be inspected and cleaned in accordance with the timescale found in *Defence Works Standard 07* and is not to be exceeded without written authorisation from DF&FS. Inspection of tanks before and after cleaning is the responsibility of the competent person.

TANK CLEANING – ARMY/RAF

3.2.28. Tank cleaning for Army and RAF Depots is only to be carried out by an approved specialist contractor. The contractor is to be responsible for the disposal of all sludge removed from the tank.

TANK CLEANING BY NAVAL DEPOT STAFF

3.2.29. Special procedures should be applied on a change of product at Naval depots.

3.2.30. **General**. The Energy *Institute's Model Code of Safe Practice, Part 16: Tank cleaning safety code,* contains chapters and guidance on preparatory work including medical aspects, taking tanks out of service, gas freeing, cleaning procedures and precautions specific to product groups and should be consulted prior to any tank cleaning requirements.

3.2.31. **Personnel**. Tanks in use for Class III products, in NPDs and OFDs may be opened and cleaned by Naval depot personnel. They must be fully conversant with the dangers of tank cleaning, competent in the techniques required and fully trained in the operation of equipment to be used, during the tank cleaning process. They must also be in possession of a current medical certificate stating they are fit to carry out tank cleaning.

3.2.32. **Change of Product**

a. **Change from sullage to Dieso**. When the product stored is to be changed from sullage to Dieso, arrangements for conversion and cleaning of the tank are to be initiated by the appropriate Property Manager, with the work being carried out by a contractor.

b. **Change from Dieso to Aviation Fuel**. If required, remove all traces of Dieso, sludge or sediment and corrosion, up to the maximum oil level. Interior tank plates and fittings are to be flushed with Aviation Fuel before filling. *Stanag 3149* and *JSP 375, Volume 3, Chapter 5, Petroleum Appendix 10* refers.

MICROBIOLOGY GROWTH IN DIESEL AND AVIATION FUEL TANKS

3.02.33. Certain fungal spores and bacteria develop at the interface between the fuel and any water, when present. This growth is reduced by the regular removal of the water from storage tanks and strict compliance with paragraph 3.2.17.

3.2.34. Regular tank cleaning in accordance with paragraphs 3.2.25 - 3.2.33 and appropriate Quality Control checks Part 2, Chapter 12 refers, this will ensure that Microbiological Contamination (MBC) is kept to a minimum.

RECOVERY OF AVIATION FUEL TANK BOTTOMS

3.2.35. When suction is lost on the swing arm or floating suction of an Aviation Fuel tank, a considerable quantity of good fuel will remain in the tank. In order that the maximum amount of Aviation Fuel is recovered from tank bottoms, a standard draining procedure is to be incorporated in Depot Operating Instructions (DOIs).

SECTION 4 - PIPELINES

PERIODIC VISUAL EXAMINATION OF PIPELINES AND FITTINGS

3.2.36. It is essential that all staff concerned with operation and maintenance of Fuel Depots have a thorough working knowledge of the layout of the pipeline system. The Depot Manager is to arrange for the lines both in and out of the Depot to be visually examined, during every issue or receipt, for any leaks.

PIPELINE OPERATIONS

3.2.37. **Segregation of Products**:

a. Separate pipelines are usually provided at Depots for each product stored.

b. Separate Issue and Receipt pipelines are normally provided for the receipt and issue of Aviation Fuel. Where there is only a single line for both issue and receipt purposes, the Quality Control instructions Part 2, Chapter 12 refers for such circumstances are to be strictly observed.

c. Where, for any reason, dissimilar products may enter a pipeline, they are to be fully segregated by positive means, eg a blanking flange, spectacle piece, Hindle blind, Hamer blind, or double valve with an open drain. Segregation by single valve only is inadequate and is to be avoided.

d. Where complete segregation of different products is not possible, DF&FS is to be consulted.

3.2.38. **Draining of Water from Pipelines**. Water can accumulate at low points along pipelines and where drain cocks are fitted, these points are to be inspected and drained at intervals of not more than one week.

3.2.39. **Surge Pressures**. A flow of product in a pipeline has momentum, which if the flow is suddenly stopped, will force it to be elastically compressed against the end closure of the line, greatly increasing the pressure at the valve being closed. This extra pressure is known as surge pressure and is additional to that which already exists in the line. The closing of a valve too rapidly against the flow of product adds a surge pressure of considerable force which could be destructive and cause the line to fracture, resulting in a major loss of product and serious pollution.

3.2.40. **Emergency Closure**. An emergency closure of a valve against the flow of product is most likely to be necessary in the following circumstances:

a. Hose burst during receipting/issuing at maximum pump rate.

b. Booster pump failure.

c. Tank overflow during receipt.

3.2.41. **Hose Burst**. In the event of a hose burst during pumping operations normal SOPs for emergency valve closure and pollution control are to be carried out. The incident is to be reported through the chain of command.

3.2.42. **Valve Closure**. In all pipeline operations it is essential that all concerned are fully aware of the hazard of closing valves too quickly against a product flow during pumping operations. Immediate action is to be taken to stop pumps before valves are closed. Line pressure gauges, where fitted, are to be monitored during all operations to ensure that the working pressures of hoses are not exceeded.

3.2.43. **Pipeline Priming**. Pipelines are to be kept filled with product for which they are used.

3.2.44. **Pipeline Clearing**. Line clearing may be necessary as part of the standard practice for Quality Control purposes, or occasionally to remove foreign matter accumulated in lines during construction, repair or normal operations. For practical purposes cleaning is accomplished by flushing the line with the appropriate product or other liquid at maximum flow rate into a suitable reception tank. Flushing will normally clear any loose contaminants in the line. Exceptionally, facilities can be provided, during pipeline installation, for the subsequent use of special cleaning and scraping tools known as 'pigs' or 'go-devils'.

SECTION 5 - FITTINGS

3.2.45. Valves are to be regularly serviced in accordance with maintenance schedules to ensure that they are clean, free from leaks and in good working order. Other basic rules to be followed are:

a. When not required for use during fuelling operations, tank and terminal valves should be kept shut and locked and other line valves are to be kept closed. In accordance with local procedures, one or more valves may be cracked open at all times to relieve pressure for thermal expansion of product in the pipeline system. Where such action is found to be necessary, pressure relief valves *are* to be fitted to the appropriate sections of pipeline to counteract the need for cracking of line valves.

b. Drain valves on tank sumps are to be protected from damage by regular drainage of free water during cold and frosty weather or when freezing can be expected.

c. Sluice valves for draining tank bunds are only to be opened when it is necessary to drain off rainwater, which must be disposed of in accordance with Part 3, Chapter 4. At all other times they are to be closed and, if possible, locked in this position.

d. Pipeline pressure relief valves are not to be set above 1.4 bar (20 psi) unless site conditions determine otherwise.

3.2.46. All valves in the pipeline system are to be numbered consecutively to facilitate identification. The number is to be displayed boldly on the valve body, or clearly shown on a metal plate or label fixed to the valve. DOIs for the operation of valves are always to quote the relevant valve numbers.

PUMPS

3.2.47. Before pumping commences all necessary line valves are to be opened.

3.2.48. Once pumping operations commence, the pump gauges are to be monitored at all times. If there is an excessive rise or fall in pressure, the pumps are to be stopped and the cause investigated.

COMMUNICATION

3.2.49. Close communication between pumping stations is the key to effective movement of product, in order that adjustments to pumping rates are carried out promptly and efficiently. A logbook is to be kept in each pumphouse in which all pumping details are recorded. Normally one person only, at each pumping station, is to be nominated for all communications and their names and those of any relief are to be logged. At no time are pumping stations to be unmanned during pumping operations, unless fitted for remote control operations.

3.2.50. Different types of pumps require different methods of handling and the more important aspects of the two main types are summarised below:

a. **Centrifugal pumps**. For use over a wide range of speeds and can be throttled to required throughputs without building up excessive pressure in the pump or overloading the driving motor. For this reason, centrifugal pumps are not normally to be by-passed.

b. **Positive Displacement pumps**. Normally used in addition to centrifugal pumps for the pumping of thicker oils. A by-pass line with pressure relief valve is fitted to each pump to guard against excess pressure.

AVIATION FUEL FILTER/COALESCERS

3.2.51. Efficient operation of filter/coalescers is dependent upon careful attention to the following basic rules:

a. Do not allow air to collect at the top of the unit; an air lock will reduce the number of cartridges through which fuel will pass. Release air through vent valves.

b. Water is to be drained from the sump before the level rises above the indicated level on the sight-gauge tube.

c. Open inlet and outlet valve slowly to avoid excessive flow of fuel and possible damage to elements.

d. Maintaining accurate monitoring of pressure across the filters is required, as this is the only guide to their condition. All cartridges are to be replaced when the differential pressure reaches 1 Bar or after 36 months, whichever occurs sooner, as per Part 2, Chapter 8. The method for the replacement of cartridges is to be detailed in local work instructions.

SECTION 6 - SULLAGE

SULLAGE RECEPTION TANK

3.2.52. Free water settles to the bottom of the sullage reception tank, this water is to be run off regularly to keep the oil/water interface as low as possible in the tank. An interface height of 1 m from the tank floor is to be maintained. See Part 2, Chapter 9 for OWI design and operation.

TREATMENT OF FUEL/WATER WASTE

3.2.53. All waste products are to be disposed of as detailed in Part 3, Chapter 4 .The entire procedure appropriate to the local treatment operation is to be detailed in DOIs.

HYDROGEN SULPHIDE IN FUEL WATER WASTE

3.2.54. In some tanks containing waste fuel and water, the growth of Sulphate Reducing Bacteria (SRB) creates a problem due to the production of the toxic gas Hydrogen Sulphide (H_2S), which is hazardous to health. A safe system of work, as found in *The Energy Institute's Model Code of Safe Practice, Part 16,* must be applied when dealing with SRB. Any Depot having a persistent problem with H_2S is to report the facts to DF&FS.

SECTION 7 - SEPARATORS

See Part 2, Chapter 8 for OWI design and operation.

MONITORING OF EFFLUENT FROM OIL/WATER SEPARATORS

3.2.55. Legislation requires that Depot operators monitor effluent discharges by approved methods and can provide evidence that discharge limits are not being exceeded. See Pt 2 Chapter 8 for OWI design and operation.

3.2.56. Arrangements are to be made for samples of effluent from all separators in use in accordance with the site specific discharge consent / discharge permit.

3.2.57. The method for sampling effluent water is to be detailed in local DOIs.

3.2.58. Test results are to be retained for five years.

BIBLIOGRAPHY

1. JSP 375 - MOD Health and Safety Handbook.

2. JSP 886 – The Defence Logistics Support Chain Manual.

3. Defence Works Standard 07.

4. Energy Institute's Code of Safe Practice Part 16.

5. STANAG 3149.

6. JSP 375, Volume 3, Chapter 5, Petroleum Appendix 10.

Annex A to
Part 3
Chapter 2
JSP 317

RECOMMENDED LIST OF RECORDS TO BE MAINTAINED BY MOD PETROLEUM INSTALLATIONS

Statutory Notification

This list is based on regulatory requirements in the United Kingdom. Similar requirements will apply elsewhere.

1. Planning approval(s)
2. Building regulations approval(s)
3. Petroleum licence
4. H. M. Revenues & Customs approval (where necessary)
5. Fire certificate (special premises) / Fire Safety Management Plan
6. Consent(s) to discharge aqueous liquids to controlled waters
7. Consent(s) for airborne discharges
8. Notification of installations handling hazardous substances
9. Pipeline capacities

Construction records

1. Storage tank test reports
2. Storage tank calibration certificates
3. Piping pressure test certificates
4. Instrument calibration certificates
5. Pressure vessel test certificates
6. Site general arrangement drawing
7. Product flow diagram
8. Layout of underground services

Operational records

1. Written procedures
2. Hazard and operability (HAZOP) studies
3. COSHH records
4. Tank calibration tables
5. Bund capacity calculations
6. High level alarm test register
7. Pipeline capacities
8. Meter proving certificates
9. Electrical inspection certificate (annual)
10. Pressure relief valve test register (tanks and pipework)
11. Boiler house weekly/daily log sheet
12. Annual fire extinguisher inspection/test register

13. Lifting equipment inspection test certificate(s)
14. Annual pressure vessel inspection test certificate(s) for boilers and compressor receivers
15. Pressure systems – written review records
16. Oil separator cleaning register
17. Product filter cleaning register
18. Rail tank car discharge record
19. Rail tank car certificate of readiness
20. Fire occurrence record
21. Accident register
22. Product hose testing register (6 monthly)
23. Oil separator sampling register
24. Fire alarm test register (weekly)
25. Tank water bottom draining register
26. Tank maintenance record(s)
27. Visitors' register
28. Record of work permits issued
29. Personnel training records
30. Induction course register

Note: Some of the operational records listed are statutory requirements.

Part 3

Chapter 3 (Sponsor FGSR – Insp 2)

AVIATION FUEL INSTALLATIONS

SECTION 1 – GENERAL

3.3.01. This chapter provides information particular to the operation of Bulk Fuel Installations (BFIs) used for the storage of all aviation fuel. It is to be read in conjunction with Part 2, Chapter 8 and Part 2 Chapter 10 which outlines the general operating procedures common to both aviation and ground fuel BFIs. DIO publications should be referred to the design and construction of aviation installations.

3.3.02. The type of fuel to be stored and dispensed is dependent on the type of aircraft/helicopter deployed but is normally AVGAS for piston engine aircraft and AVTUR or AVCAT for jet engine aircraft and helicopters.

3.3.03. On base aircraft fuel installations fit one or more of the following criteria:

a. Fuel storage and dispense to aircraft refuelling vehicles.

b. Fuel storage and supply direct to aircraft servicing areas through a pressurised fuel hydrant system.

c. Fuel storage with direct dispense from the installation to light aircraft or helicopters either by hose or by a local hydrant system.

3.3.04. **Personnel**. Petroleum installations are only to be operated by authorised personnel as detailed in Part 2 chapter 6. The OC of the unit operating the BFI is to ensure that all personnel employed on Petroleum duties are fully conversant with the general information and safety precautions to be observed which are contained within this JSP.

3.3.05. **Disposals**. AVTUR F34 is not to be downgraded to KERO/A as it contains HITEC E-515 (a constituent of AL48) which includes small amounts of phosphorus; this may have a harmful effect if used in domestic heaters. However, AVTUR F34 may be downgraded to KERO/B provided it is not used in flue less wick fed burners.

3.3.06. **Control of Entry**. Only authorised vehicles and personnel should be permitted to enter installations. All installations are to be enclosed by a substantial fence (see Part 2, Chapter 7). This is normally in addition to the security fence of the unit upon which it is sited; however there may be instances where the security fence prevents unauthorised entry or trespass in its own right. In such cases an application may be made, to the single Service fuels authority to grant dispensation from erecting a second fence.

3.3.07. **Elimination of Water from Storage Tanks**. The procedures for eliminating the presence of water in storage tanks are outlined in Part 2, Chapter 8.

3.3.08. **Floating Suction Units**. BFIs which do not conform to the UK version of the NATO Standard for construction may be fitted with floating suction arms. If floating suction arms are fitted and access is provided, their free operation is to be checked at a minimum of monthly intervals by the person dipping the tank. The floating suction arms are provided with a lifting line for this purpose. The cover of the inspection hole in the tank manhole cover is to be opened, and the lifting line hauled up to take in any slack. An increase in tension will indicate when the float is being pulled clear of the surface of the product. The float should then be gently lowered and the line returned to the tank and the cover replaced. The cover is to be cleaned before being replaced, and is to be locked into position to ensure a sound seal to prevent the escape of any fuel vapour. Personnel carrying out this task are to wear appropriate personal protective clothing. The check is to be recorded on the dip record sheet, by the person conducting the check/dips, in accordance with *JSP 886*.

3.3.09. **Couplings and Flexible Hoses**. Flexible hoses are to be stored and maintained in accordance with single Service regulations. These hoses may require additional maintenance whenever their operational condition is suspect. Periodic maintenance is required only if specified in the particular equipment's servicing schedule. The following checks, inspections, and regulations are also to apply:

a. Before issue all hoses and couplings are to be visually checked for signs of general deterioration. It is essential that the coupling is kept scrupulously clean and the protective cap kept in position when not in use. When in use hoses and couplings are to be inspected periodically, as outlined below. The inspections are to be conducted on at least a quarterly basis, although more frequent checks may be required depending on local conditions. Standing Operating Procedures are to outline the frequency and method of recording such checks.

(1) General examination of all parts for wear and tear.

(2) Examination and cleaning of coupling cone filters, where fitted.

b. When not in use, flexible hoses used for dispensing to refueller and hydrant dispensers are to be stored in the following manner:

(1) All hose ends are to be sealed in a suitable manner to prevent the ingress of moisture and contaminants.

(2) Non-packaged hose up to 2.4 m in length are to be stored uncoiled.

(3) Non-packaged hoses exceeding 2.4 m in length are to be coiled and laid on racks so that there is no strain on the hose.

(4) All hoses are to be turned at least once a month to prevent flattening and kinking.

(5) The storage period for hose end units (eg Avery Hardoll female) is not to exceed 2 years. Hose end units are to be removed from storage at the end of 2 years, dismantled, rubber components replaced and reassembled. They can then be stored for a further 2 years as necessary.

SECTION 2 – OPERATION OF PRE-COAT AVIATION FUEL FILTERS

3.3.10. The purpose of this section is to explain the general principles and operation of a pre-coat (Diatamaceous Earth) filter; it is not a definitive operating procedure. Units are to produce detailed operating procedures taking into account local conditions and the equipment specification, in consultation with the Maintenance Management Organisation (MMO) and the AP (Pet). Pre-coat filter units vary in type and specification and may be affected by local conditions. The operating procedures peculiar to one operating unit will not necessarily apply to another.

3.3.11. Pre-coat filters are installed at units that receive aviation fuel via the Government Pipelines and Storage System and, depending on local conditions, other overland pipelines. The type of pipeline supplying the fuel determines where in the system the pre-coat filter is situated. For a unit that is supplied through a dedicated pipeline (i.e. one dedicated to F34), the fuel passes through the pre-coat filter before entering the BFI tanks. Where a unit is supplied from a multi-product pipeline, the fuel is received into reception tanks. Once samples of the fuel receive satisfactory laboratory test results, the fuel may be pumped to the units operational BFI's through the pre-coat filter.

3.3.12. Pre-coat filters remove particulate contamination not water. Upon entering the filter the fuel passes through layers of powder contained in trays which act as the filtration medium. After a period of use the particulate matter filtered from the fuel will block the filter and the powder will need to be renewed. The renewal method involves the removal of the old powder and replacing it with new powder, processes known as "back flushing" and "recoating" respectively.

3.3.13. A differential pressure gauge is fitted which activates a pressure switch giving both an audible and visible alarm in the BFI Control Room, signalling the need for back flushing and re-coating the filter. In addition to this the differential pressure gauge is to be physically checked every 30 minutes during a fuel transfer operation. If the maximum permitted differential pressure is reached without the alarm being activated the pumping operation is to cease and the AP (Pet) is to be contacted. If an unusually high increase in differential pressure is observed, dependent on local conditions, the OC of the operating unit is to be informed immediately and if deemed necessary the pumping operation is to cease.

3.3.14. Back-flushing action must be initiated before the limiting differential pressure is reached otherwise damage to the unit can ensue. It is the responsibility of the MMO to advise the operating staff of the filter operating pressures, and to correctly set the differential pressure alarm. Alarm settings should be clearly indicated to operating staff, and displayed in BFI Control Room Orders.

3.3.15. The BFI Control Room is to be manned throughout the pipeline transfers operation. Remedial action to back-flush and re-coat the filter should be initiated immediately the differential pressure warning activates. This is particularly important as all pipeline operations are controlled from a remote Petroleum Storage Depot (PSD) by the Pipeline Operating Agency (POA). Back-flushing and recoating must take place using an uninterrupted fuel flow, if in an emergency it becomes necessary to stop pumping the POA/PSD must be informed using the direct link telephone or radio as appropriate. The pipeline isolating valve should only be closed in a severe operational emergency without warning the POA/PSD in advance as this can cause over pressurisation to the pipe-work system and activation of the alarm at the remote PSD.

3.3.16. **Reception BFIs Receiving Fuel From Multi-Product Pipeline**. The inflow of fuel to the reception tanks are direct (ie not filtered) and all particles carried into it must be allowed to settle out before cross base pumping is undertaken. This is normally less than the time during which the fuel is quarantined awaiting acceptance test results from the laboratory. All outgoing fuel from the reception tanks must pass through the pre-coat filter.

3.3.17. **Terminal BFIs Receiving Fuel From a Dedicated Pipeline**. Incoming fuel passes through the pre-coat filter before being pumped into the BFI tanks. The back flushing material change will be more frequent than that for fuel received via a reception tank.

3.3.18. **Filters**. A coarse filter is located at the ‘end of pipeline’ installation (usually located just outside the perimeter of the unit it serves) which is cleaned, when occasion demands, by the POA staff. The pre-coat filter in the unit installation retains fine particulate matter that passes through this coarse filter. It should be noted that when such coarse filter cleaning takes place at a Terminal (dedicated pipeline) unit, an increased amount of particulate matter will be carried forward to the pre-coat filter and will cause an immediate increase in differential pressure across the filter. Such a sudden increase is likely to raise the pressure above the danger level. To obviate this, the following actions are to be carried out:

a. The unit is to arrange, for the POA, to be informed when cleaning of the coarse filter is planned so that unit personnel may be standing by in the event that an immediate back flush is required.

b. When a routine (planned) back flush operation of the pre-coat filter is proposed by the unit, they are to advise the POA in order that the ‘end of pipeline’ coarse filter may be cleaned immediately prior to this back-flush taking place.

3.3.19. **Back Flushing**. The back-flush slops tank capacity is suitable for 2 back-flushes only; this should be adequate for normal operations provided that back flushing is not instigated unless the alarm has been activated. If back flushing the filter is left too late it can lead to mechanical damage to the assembly. Initiating back flushing too early will cause an unnecessary waste of fuel and filter material.

SECTION 3 - AVIATION FUELS CONTROL BOARD

3.3.20. Aviation fuel control boards are to be maintained in F&L Sections to ensure that information regarding the state of each bulk aviation fuel storage tank is readily available. The following information should be recorded:

a. Tank number.

b. Grade of fuel.

c. Tank capacity.

d. Stock.

e. Ullage.

f. Tanks into which bulk receipts are to be accepted.

g. Tanks from which issues are to be made.

h. Date of next tank clean.

i. Date of last update.

j. Density of fuel @ 15°c (density reading taken from BFI after a receipt).

SECTION 4 - RECEIPT FROM GPSS

3.3.21. Despite high initial construction costs, transfer by pipeline offers a fast, reliable and relatively secure method of moving large quantities of fuel at a comparatively low running cost. Most of the military aviation fuel in the United Kingdom is delivered by pipeline through the Government Pipelines and Storage System (GPSS).

3.3.22. Accounting instructions for pipeline receipts are set out in JSP 886. In addition to the general health and safety precautions detailed in Part 2 Chapter 1. Certain basic requirements must be observed and these are set out below:

a. General Operating Instructions.

1. Pipelines are to be restricted to one grade or product unless suitable slopping facilities are available for the product interface, together with adequate arrangements for batching and laboratory testing.

2. The separation of grades by water plug is prohibited in multi-product pipelines. Pipelines are not to be pressed up in water between consignments.

3. All personnel engaged in pipeline operations are to be properly trained and certified as competent (Part 2 Chapter 6). The overall supervision of pipeline operations is not to be delegated below the rank of Sgt (Q-Sup-F). A JNCO (Q-Sup-F) may be nominated as the pipeline controller to monitor pipeline transfers provided that a qualified SNCO is available to supervise the initial setting up and final close down arrangements.

b. Before Transfer.

1. An adequate system of direct communication is to be established and tested between the despatch and receipt points, and internally within the installation.

2. The type, grade and quantity of fuel to be transferred are to be confirmed.

3. Care is to be taken to ensure that the bulk tank selected to receive the fuel is the appropriate one for the grade of fuel to be delivered and that there is sufficient ullage available.

4. A schedule of pumping and pumping rates is to be agreed. When products do not contain static dissipater additive (SDA) the initial flow rate is not to be higher than one metre per second.

5. The time at which pumping is to be agreed.

6. Where the unit is responsible for additive injection, bulk tanks containing AL48, AL41, AL61 and/or SDA are to be dipped to confirm that there is sufficient additive for blending the fuel parcel.

7. All F&L personnel involved in the operation are to be briefed, paying particular attention to individual duties.

8. All valves are to be checked to ensure their correct position prior to the transfer of product.

9. Control Room preparations are to be completed and a movement diary is to be opened. The movement diary is to record opening and closing dips, pump start/stop and half-hourly dip measurements of dispatching and receiving tanks. In addition the diary is to serve as a communications log and a record of occurrences.

10. The PSD/ Control Centre/ issuing BFI controller is to be informed when all actions are complete so that pumping may commence.

c. During Transfer.

1. Dispatching and receiving tank measurements are to be synchronised and reconciled as half hourly intervals using metering or gauging equipment. Dipping during transfer is prohibited.

2. When product is received from a multi-product line into reception tankage, a line sample is to be taken once pumping has started to obtain a conductivity reading. The timing of the sampling will vary from unit to unit depending on how long it takes to clear the spur pipeline content and start receipt of the fuel parcel, but it will usually be one third of the way through a parcel movement. Advice from DF&FS should be sought immediately when the conductivity meter reading is low (below 100 pS/m).

3. Due to the length of the GPSS pipeline the fuel being received at the PRE, in many cases, is not necessarily the same fuel being pumped from the PSD Tanks, therefore the COC is not a true reflection of what is being delivered. As a result of this FSII checks are to be carried during the receipt process.

d. After Transfer. At the end of the planned pumping period when the fuel flow has ceased the following actions are to be carried out:

1. All valves are to be closed.

2. Receipt and slop tanks (issue tanks if applicable) are to be dipped to measure final quantities transferred, but not until 30 minutes has elapsed to avoid the danger of electrostatic discharge.

3. Once the correct settling time has elapsed see Part 2 Chapter 12 Para 16 the tanks are to be checked for free water; any free water found is to be drained off immediately.

4. The following sampling and acceptance tests are to be carried out in all receipt tanks:

(i) Receipts through a dedicated (single product) AVTUR pipeline are to be sampled and examined for colour, water and solid matter. In addition, an FSII and conductivity test is to be conducted in the manner detailed in Part 2, Chapter 12.

(ii) Where the fuel is received through a multi-product pipeline, in addition to the checks detailed in paragraph 4(i), a composite sample, as described in Part 2, Chapter 12, Annex A, is to be taken from each receipt tank and despatched immediately to Intertek for testing.

(iii) In order to monitor any change of density levels whilst fuel is stored in bulk tanks a density reading, converted to 15°C (table

2.12.H1), is required after a receipt. This reading should be readily available when fuel is issued to bowsers at a later date (recorded on State board for example).

SECTION 5 - FUELLING AIRCRAFT ON THE GROUND

3.3.23. For the purpose of this section fuelling is defined as refuelling and defueling operations.

3.3.24. Fuelling operations are inherently dangerous as static electricity accumulated on the aircraft and generated by friction, together with the presence of fuel vapour in the atmosphere, create an increased risk of fire and explosion. There is also a risk to flight safety should the wrong fuel be issued to an aircraft. To safeguard against these hazards, strict discipline must be observed whenever an aircraft is fuelled and special safety precautions must be applied within its fuelling hazard zone(s) immediately around aircraft. Fuelling of aircraft is therefore only to be carried out by trained and authorised personnel as defined in the following single service documents:

a. RN/ RAF - Manual of Maintenance and Airworthiness Processes 01 (MAP – 01).

FIRE PRECAUTIONS

3.3.25. When fuelling aircraft adequate First Aid Fire Appliances (FAFAs) appropriate to the potential fire hazard are to be deployed up-wind of the aircraft. The FAFAs should be within the hazardous area and easily accessible without interfering with the fuelling operation. Full details of fire precautions are at Part 2, Chapter 5.

EARTHING AND BONDING

3.3.26. The fuel bowser or hydrant dispensing vehicle must be bonded to the aircraft prior to the refuelling operation commencing. If required, the aircraft is to be earthed. Hydrant pits **are not** to be used as earthing points.

ENGINES RUNNING AND ROTORS TURNING

3.3.27. The tri-Service policy for the fuelling of aircraft whilst their engines are running or their rotors turning is provided generally at MAP 01 Chapter 2.6, para 5, where units are to refer to specific aircraft type regulations.

AVPIN

3.3.28. AVPIN is a highly flammable Class I product with a flash point of 11˚c. It is volatile, toxic, hydroscopic and corrosive. Strict adherence to safety precautions shall be enforced when fuelling aircraft with AVPIN. All personnel required to handle AVPIN are to be trained and competent for fuelling duties in accordance with AP 100B-01 Order No 3020.

JP- 8+100/F-37

3.3.29. JP-8+100 is conventional JP-8 (NATO F-34) with an additive which contains a detergent designed to improve the thermal stability of the fuel. On USAF Jet Fuel Identaplates it is referred to as JP-8W100 and has the NATO designation F-37. The use of F-37 poses a particular concern with flight safety implications. It disarms water coalescers in filter water separators found in bulk fuel installations and fuel bowsers. Consequently, proactive measures must be taken to prevent disarming fuel filter separator systems and the inadvertent issue of F-37 to aircraft that have not been authorised for its use.

3.3.30. Units are not to routinely defuel aircraft operating on F-37. If such a request is received, it is to be referred to the aircraft's parent unit for action. **F-37 is not to be introduced into hydrant systems**. However, if in exceptional circumstances it becomes necessary to defuel such aircraft into a unit bowser, authority must be obtained from the appropriate fuels office at the unit's command HQ prior to every defuel. Requests are to be considered on a case-by-case basis and should take into account the current Host Nation Support arrangements, details of the exceptional circumstances that gave rise to the request, and the potential impact on the requesting unit. In consultation with the Fuel, Lubes and Gasses Technologist section of the Defence Fuel and Food Services (DF&FS), the fuels office is to provide the unit with advice on the action to be taken.

3.3.31. Fuels managers are to develop local procedures to ensure compliance with these instructions and higher level documents on the handling of F-37. As a minimum, the following requirements will be addressed in local procedures:

a. The physical constraints to be implemented to prevent inadvertent bulking of bowsers with F-37.

b. The measures to be taken to prevent the mixing of F-37 with other fuels.

c. The procedures for defuelling aircraft operating on F-37.

d. The procedures for handling bowsers containing F-37 to ensure all quality control measures are met.

3.3.32. The disposal of waste F-37 is to be through the current fuel disposal contract. Until its collection, the bowser containing the waste F-37 is to be quarantined. Before the bowser can be used to carry fuel other than F-37, the tank is to be flushed and the coalescer replaced. The tank must then be partially filled with F-34 or F-35 and samples drawn off for analysis by the appropriate laboratory. If 2 consecutive batches of samples return results that determine that the fuel is outside its specification, the bowser is to be cleaned and the coalescers replaced as necessary.

Bibliography

1. U/TYPE/-/BFI-/-/2.M/D/5370/001/A Above ground (AVTUR) Bulk Fuel Installation Schematic.

2. U/TYPE/-/BFI-/2.M/D/5370/002/A Helicopter Bulk Fuel (AVTUR) Installation Schematic.

3. DWS/P1/001 NATO/RAF Protected Bulk Fuel Installation Type Design.

4. D/DWS/24/0180/6 Standard Design for an AVGAS Bulk Fuel Installation.

5. D/DWS/26/14/4/5/6 Standard Design for an AVGAS Fixed Modular Fuel Installation.

6. D/DEO/26/14/4/5/10 Type Specification for a Helicopter Bulk Fuel (AVTUR) Installation.

7. Spec 046 Aviation Fuel Filtration, DE.

8. Spec 044 Fuel Measurement, DEO.

9. MAP – 01.

10. HS [G] 146.

11. STANAG 3632 Aircraft and Ground Support Equipment Electrical Connections for Static Grounding.

12. STANAG 3682 Electrostatic Safety Connection Procedures for Aviation Fuel Handling and Liquid Fuel Loading/Unloading Operations During Ground Transfer and Aircraft Fuelling/De-fuelling.

13. Operating Instruction for the Handling JP-8+100.

14. STANAG 3681 Criteria for Pressure Refuelling / Defueling of Aircraft.

15. STANAG 2946 Forward Area Refuelling Equipment.

Part 3

Chapter 4 (Sponsor WOIC Army HQ UK Insp)

WASTE F&L STORAGE FACILITIES

SECTION 1 – GENERAL

3.4.01. This chapter covers the temporary **storage** of bulk and packed:

a. Waste F&L including AL fluids

b. Used PCS

c. Empty used F&L non-returnable containers

3.4.02. MOD JSP 418 is the overarching document that gives detailed information on this subject and should always be consulted. For policy guidance on waste disposal including hazardous waste, refer JSP 418 volume 2 leaflet 3.

3.4.03. The Environmental Permitting (England &Wales) (Amendment) Regulations 2010 state that a permit is not required where a waste is temporarily stored at the place of production in a secure place for no longer than 12 months.

3.4.04. These regulations mandate that a permit shall be required by a waste intermediary for the storage of more than 3000L of waste F&L stored for more than 12 months.

SECTION 2 – DISPOSAL ONWARD TRANSFER OF HAZARDOUS WASTE

3.4.05. The Disposal Services Authority (DSA) is lead and provides advice to units who have waste that needs to be disposed of.

SECTION 3 – WASTE HANDLING

3.4.06. Establishments, which store and /or transfer large quantities of Hazardous Waste may allocate responsibility to a designated Waste Manager who is technically trained and experienced in waste management. Waste operations remain the responsibility of the Commanding Officer or Head of Establishment.

3.4.07. The handling and storage of Hazardous Waste requires the same diligence as serviceable F&L products.

Note: Dangerous Goods regulations regarding classification, marking, labelling, packaging and documentation applies to Hazardous Waste products.

3.4.08. All Commanding Officers, Heads of Establishment and Employees are individually responsible for adherences to the Health and Safety Act 1974 for ensuring that Hazardous wastes are handled in accordance with *COSHH* regulations. Detailed guidance is given in JSP 375, Volume 2, Leaflet 5.

3.4.09. Different types of waste are to be stored separately to avoid the risk of fire, explosion or toxic vapour arising from incompatible materials, see Annex A .
For the purposes of damage to the environment, waste F&L has the same impact as serviceable F&L. Therefore, the bulk waste storage shall comply with the principles laid detailed at Part 2, Chapter 8, waste tanker issue and receipts Part 2, Chapter 10 and pack waste stock detailed at Part 2, Chapter 7.

3.4.10. The storage of waste AL fluids shall be securely stored separately from other waste F&L. Waste AL fluids are soluble in water and shall not enter drainage systems as they have the ability to emulsify trapped F&L in OWI's. See Part 2 Chapter 9 for principles of OWI's.

Note: Where permitted products are mixed, a record of content should be kept to aid classification of waste product.

BIBLIOGRAPHY

1. Environmental Protection Act 1990 (EPA 90).

2. Hazardous Waste (England & Wales) (Amended) Regulations 2009.

3. Technical Guidance WM2 Version 2.3 – (updated 2011).

4. The Environmental Permitting (England & Wales) Amdt Regulations 2010.

3. Special Waste (Scotland) Regulations 1997.

4. MOD Waste Management and Duty of Care Guidelines.

5. The Control of Substances Hazardous to Health (COSHH) Regulations 1994.

6. Health and Safety at Work Act 1974.

7. JSP 375 - 'MOD Health and Safety Handbook'.

8. JSP 418 – 'MOD Sustainability Development and Environmental Manual.

Annex A to
Part 3 Chapter 4
JSP 317

Due to the composition of F&L products that are used within the MOD there is a requirement to segregate certain products before disposal. The table below is designed to assist establishments with the segregation of waste F&L products. Units/Establishments are to where possible separate products as detailed below and mark the containers iaw Part 1 Chap 4 of this document. Items in each column can be stored together.

SEGREGATION OF F&L PRODUCTS

Mineral Oils	Fuels	Fuels Containing FSII	Miscellaneous Semi-Solid Waste	Silicone Based Fluids	Phosphate Ester Based fluids	Solvents, Glycols Glycol Ethers	Synthetic Ester
Diesel 2 stroke oil	AVGAS	AVCAT	PX	OX 16	OX 20	AL	OX 7
Gear oils	AVTUR F-35	AVTUR F-34	XG	OX 70		OX 40	OX 8
OCs (Compounded oils)	DIESO	AVTAG F-40	ZX (see note 1)	ZX 41 –53		OX 165	OX 9
OEPs	FFO						OX 14
OMs	KERO						OX 22
OMDs	Stove Naphtha						OX 26
OX 18	ULGAS						OX 27
OX 19	White Spirit						OX 28
OX 24							OX 38
OX 29							OX 87
OX 30							OX 95
OX 72	**Isopropyl Nitrate**						OX 125
OX 75							OX 135
OX 85	AVPIN						OX 538
OX 90	(See note 2)						ZX 9
OX 300							
Transmission Fluid							

Notes:
1. Excluding ZX 9, ZX 41 to ZX 53.
2. AVPIN (Aviation Pre-Ignition fuel) should be held separate and treated as special waste. Further advice may be sought from DES Log Commodities (Fuels, Lubricants and Gases Team).
3. In doubt, Refer to the product Safety Data Sheets (SDS)

Part 4

Chapter 1 (Sponsor 516 Specialist Team Royal Engineer (Bulk Petroleum) (516 STRE (BP))

GENERAL PRINCIPLES OF DEPLOYED/PERMANENT FUEL AND LUBRICANTS BULK AND PACKED INSTALLATIONS

SECTION 1 – GENERAL

4.1.1. The purpose of this chapter is to outline who has responsibilities and what standards are to be adhered to when considering the Deployed Bulk Fuel Installations (DBFI) and Deployed Permanent Installations (DPI). The chapters sponsored by 516 STRE (BP) have been structured in such a way to provide an easy to use, user friendly reference document. The structure throughout has been standardised, identifying who is responsible, the responsibilities of each unit and the standards to which each stage is to be carried out.

4.1.1.1. **Definitions**: The following definitions apply throughout Chapters 1, 2 and 3:

a. Small Scale Installation: An installation that consists of a maximum of 4 TFC's constructed from 4" TFHE.

b. Medium Scale Installation: An installation that consists of a maximum of 4 TFC's constructed from 6" TFHE.

c. Large Scale Installation: An installation that consists of more than 4 TFC's in a bespoke system to include remote issue/receipt points, culverts and overhead crossings.

4.1.2. A number of flow charts to clarify procedures such as earthing and the use of Authorised Persons Petroleum (AP Pet) have also been included to aid in clarity and usability. In order to try and simplify the matter of compliance with a large number of complex regulations a Master Check List (MCL) has been produced to ensure that a project/task has the correct appointments and documentation in place before proceeding.

4.1.3. Due to the deployed nature of DBFIs and DPIs and the increased risk these installations present over Permanent Installations it is of the utmost importance that all installations are designed, constructed, built and operated under the guidance of the Military Design Authority (MDA) 516 STRE (BP).

SECTION 2 – RESPONSIBILITIES.

4.1.4. **Who**: The following organisations have responsibilities within the deployable fuels infrastructure for the British Forces:

a. **Royal Navy**

1) Royal Marines/Commando Logistic Regiment.

b. **Army**

1) Royal Engineers

(i) 516 STRE (BP) Military Design Authority (MDA).

(ii) Royal Engineer ME Fitter Utilities and Petroleum (Ftr U&P) (Not serving with MDA).

2) Royal Logistic Corps

(i) Royal Logistic Corps Petroleum Operators.

c. **Royal Air force**

1) Tactical Supply Wing (TSW), (Battlefield Fuels Operator Course Qualified).

2) 1 Expeditionary Logistic Squadron (ELS) Q-Sup-TFE.

d. **Joint Service**

1) Battlefield Utilities (BFU) Project Team (PT).

2) Joint Support Chain Services (JSC Services).

4.1.5. **Responsibilities**. The above organisations have the following responsibilities within deployable fuels infrastructure for the British Forces:

e. **ROYAL NAVY**

1) Deliver fuel in bulk by surface ship.

2) Operate RN shore storage and distribution facilities.

3) Provide Ships Taken up from Trade (STUFT) including Anchor Handling Tugs (AHT).

4) Provide, deploy and maintain offshore moorings for ocean going vessels.

5) Provide, deploy and maintain Single Point Moorings (SPM) for ship to shore operations.

6) Control off-shore traffic and allocate beach space.

Royal Marines/Commando Logistic Regiment

(i) Provide Competent and qualified Operating Authority (when required) to operate all TFHE installations with the exception of rotary and fixed wing Aircraft installations.

(ii) Provide Competent and qualified personnel who will be responsible for all equipment accounting.

(iii) Management and maintenance of installation and associated equipment and documentation in accordance with the Master Check List, and ensure a Safe System of Work (SSoW) is followed in all instances.

(iv) Carry out detailed reconnaissance for the installation of small scale installations when required.

(v) Ensure that all designs meet the requirements of the client and are to be approved by the MDA before construction.

(vi) Provide designs for approval to the MDA for small scale installations.

(vii) Manage and supervise the construction, testing, commissioning, handover, de-commissioning and recovery of small scale installations.

(viii) Provide Competent and qualified person and when appointed carry out the duties of Authorised Person Petroleum (AP Pet) and Authorised Person Mechanical (AP Mech).

(ix) CPTP Carry out maintenance up to and including level 1 repair.

(x) Quality testing and accounting of fuel.

f. **Army.**

1) **516 STRE (BP) Military Design Authority (MDA).**

(i) The MDA for all TFHE/JOFS systems is 516 STRE (BP), 64 Wks Gp.

(ii) The only military authority to approve the designs for all DBFIs and DPIs.

(iii) Carry out detailed reconnaissance for the installation of all DBFI's when required.

(iv) Design complete range of DBFI's including Forward Air Refuelling Point (FARP).

(v) Provide a Military Engineer (Fabricator) ME (Fabricator) Class 1 qualified to American Society of Mechanical Engineers IX (ASME IX) standards in order to provide the ability to manufacture fittings, adaptors and repairs to the pipework and pressure systems found in DBFIs and DPIs.

(vi) Manage and supervise the design construction, testing, commissioning, handover, de-commissioning and recovery of all DBFI's when required and Deployed Permanent installations.

(vii) When appointed carry out the duties of Authorised Person Petroleum (AP Pet) and Authorised Person Mechanical (AP Mech).

(viii) When tasked carry out six monthly safety inspections and technical document inspection in accordance with Master Check List (MCL) on all TFHE/JOFS installations in place for over six months.

(ix) The Single Point of Contact (SPoC) for all technical matters to include the use of AP Pet AP, Mech and Earthing systems for all DBFIs and DPIs.

2) **Royal Engineer ME Fitter Utilities and Petroleum (Ftr U&P) (Not serving with MDA).**

(i) Carry out detailed reconnaissance for the installation of medium scale installation.

(ii) Provide designs for approval to MDA for medium scale installations.

(iii) Manage and supervise the construction, testing, commissioning, handover, de-commissioning and recovery of medium scale installations.

(iv) If qualified, competent and when appointed carry out the duties of an AP Pet and AP Mech.

(v) Carry out maintenance up to and including level 3 repairs.

3) **Royal Engineers.**

(i) Provide ME Plant Operator Mechanic to construct earthen bunds to an approved MDA design.

(ii) Provide Military Divers when required for the deployment and recovery of (SSPS) and (TFBDS).

4) **Royal Logistic Corps Petroleum Operators**

(i) Provide Competent and qualified Operating Authority (when required) to operate all TFHE installations with the exception of Air and Aviation installations.

(ii) Provide Competent and qualified personnel who will be responsible for all equipment accounting.

(iii) Management and maintenance of installation and associated equipment and documentation in accordance with the MCL, and ensure a Safe System of Work (SSoW) is followed in all instances.

(iv) Carry out a detailed reconnaissance for the installation of small scale installations when required.

(v) Ensure that all designs meet the requirements of the client and are approved by the MDA before construction.

(vi) Manage and supervise the construction, testing, commissioning, handover, de-commissioning and recovery of small scale installations.

(vii) Provide Competent and qualified person and when appointed carry out the duties of Authorised Person Petroleum (AP Pet) and Authorised Person Mechanical (AP Mech).

(viii) Provide Competent Persons Trained Petroleum (CPTP) to carry out maintenance up to and including level 1 repair.

(ix) Quality testing and accounting of fuel.

g. **ROYAL AIR FORCE**

1) Carry out aerial reconnaissance of potential locations for installation of DBFI and FARP.

2) Provide airlift capability for the deployment and re-supply of FRP

3) Provide RAF Trade Group 5 personnel to carry out Level 2 maintenance when required.

4) **TSW and ELW (Battlefield Fuels Operator Course Qualified).**

(i) Provide Competent and qualified Operating Authority (when required) to operate TFHE installations pertaining to Air and Aviation installations respectively.

(ii) Provide Competent and qualified personnel who will be responsible for all equipment accounting.

(iii) Management and maintenance of installation and associated equipment and documentation in accordance with the MCL, and ensure a Safe System of Work (SSoW) is followed in all instances.

(iv) Carry out detailed reconnaissance for the installation of small scale installations DBFI) when required.

(v) Carry out detailed reconnaissance and installation of all FRP's.

(vi) Ensure that all designs meet the requirements of the client and are approved by the MDA before construction.

(vii) Provide designs for approval to MDA for small scale installations including FRP's.

(viii) Manage and supervise the construction, testing, commissioning, handover, de-commissioning and recovery of small scale installations.

(ix) Provide Competent and qualified person and when appointed carry out the duties of Authorised Person Petroleum (AP Pet) and Authorised Person Mechanical (AP Mech).

(x) CPTP carry out maintenance up to and including level 1 repair.

(xi) Quality testing and accounting of fuel.

h. **JOINT SERVICE**

1) Deployable Infrastructure (DI) Project Team.

2) Provide the management of all in service TFHE and JOFS equipment.

3) Joint Support Chain Services (JSC Services).

4) Hold fourth line equipment stocks of TFHE and JOFS.

5) Carry out level 4 maintenance while equipment is held in stock.

4.1.6. **Standards**. Standards to which individual units and personnel deploy DBFI's and responsibilities can be found in Part 4 Chap 2 and are to be followed at all times regardless of Arm or Service. It should be noted that not all standards are set within this JSP for example the use of divers and divers regulations, the deployment of a Single Point Mooring (SPM) by the Royal Navy, the under slinging of loads and the carriage of flammable goods by Air with regards to the deployment of a FARP. It is a commander's responsibility to ensure all regulations are followed to the correct standard.

SECTION 3 – COMPETENT PERSONS.

4.1.7. **Who:** All organisations involved with the recce, design, construction, testing, commissioning, operation, de-commissioning and recovery of DBFIs and DPIs are to be aware of the levels of competency required of personnel to carry out such tasks. No level of competency covers all the necessary stages of the life span of an installation and the required level of competency should be considered (and reviewed, where necessary) at each stage.

4.1.8. It is essential that all operators of petroleum installations hold a Certificate of Competence for personnel operating bulk fuel installations at Part 2 Chapter 6.

4.1.9. Who is competent for a particular works task will need to be determined by the relevant commander, taking advice as necessary. Competency should not be just measured against the individual but also the organisation and the responsibility it has to ensure the competency of its employees.

4.1.10. The Management of Health and Safety at Work Regulations 1999, Regulation 7 (MHSWR) states that: The person is regarded as competent if they have 'sufficient training and experience or knowledge and other qualities to properly assist the employer to meet his safety obligations.

4.1.11. To ensure compliance with all current legislation and ensure the correct level of competency is committed to the correct stage of a task commanders should apply the following:

a. Part 4 Chapter 3, DEPOYED BULK FUEL INSTALLATIONS.

b. Part 2 Chapter 6 PRINCIPLES OF COMPETENT PERSONS WITHIN F&L ENVIRONMENT.

c. Part 4 Chapter 3 Annex E Master Check List.

d. CERTIFICATE OF COMPETENCE FOR PERSONNEL OPERATING BULK FUEL INSTALLATIONS at Part 2 chapter 6.

SECTION 4 – SITING.

4.1.12. **Who:** All organisations involved with the recce and design of DBFIs and DPIs are to be aware of the considerations when siting an installation and are to consider all aspects including possible compromise between tactical, technical factors and operator convenience. The influence of these considerations will vary depending on the circumstances, however, the following factors should be considered:

a. **Siting Boards**. In all circumstances a siting board or siting reconnaissance addressing the issues normally covered by a siting board should be held as described in Part 1, Chapter 2. Operational considerations will include ammunition storage areas, weapon safety distances, nearby water supplies and possible effects of enemy action. If a DBFI has been positioned without a formal board and remains in place for 6 months, a formal board must be convened to confirm the location.

b**.** **Dispersion of Vapours**. Other than in the context of bunds, TFHE/JOFS should not be sited in hollows or buildings which might prevent dispersion of vapours, consideration should be given to locations from which vapours may flow downhill and accumulate in trenches, drains and other low lying features. The influence of wind shall be considered.

c. **Pollution Control**. The containment and consequences of any spillage may affect siting and a comprehensive spill response plan needs to be produced. Part 5 Chapter 9

d. **Release of Water**. All water released from bunded areas is to be treated as contaminated waste and consideration should be given to the placement of interceptors if required and waste water removal by local contract. All sites must have a Spillage Plan that will contain actions on the release of any contamination.

e. **Fire Fighting**. Consultation is required with Defence Fire Services (DFS), landowners and possibly local fire brigade to develop a fire-fighting plan with consideration given to access accommodation and other facilities. Part 2 Chapter 5.

f. **Vehicular Access and Control**. Traffic circuits must be adequate to allow the passage of all delivery/receipt vehicles as well as allow for the unhindered passage of fire fighting vehicles. Access and egress to site must be controlled and where necessary physical protection measures will be required to protect exposed pipework/equipment from vehicular damage.

g. **Warning Signs**. All sites must have there boundary marked with the correct Ex Warning Sign and all other hazards signed clearly upon the entrance to the site. JSP 375

Vol 2 leaflet 44 Safety Signs provides guidance on the type of signs required and the procedure for purchasing signs from an approved supplier. If in any doubt on the type, quantity and location of any safety signage the MDA must be contacted for guidance.

h. **Dispersion of Stock**. Tactical considerations may dictate that stock be dispersed.

i. **Camouflage, Concealment, and Deception (CCD)**. Where possible DBFIs should be sited in areas that afford a level of CCD e.g. farms or industrial areas. In the field, the use of camouflage nets should be considered. However, if camouflage nets are used they should be a minimum of 1m above bund walls to allow the dispersion of vapour. If the tactical situation requires it on operations, the use of earthen bunds, TFHE/JOFS packaging and camouflage nets should be considered to construct dummy installations.

j. **Bunds**. Bunds shall be of a material which is non-combustible, will withstand fire, and is resistant to shrapnel. Bunds must be of sufficient capacity to hold 110% of the total stock. The walls shall be strong enough to resist the hydraulic pressure which may result from a ruptured tank. No more than 2 Tank Fabric Collapsibles (TFCs) are to be used in a bunded area, but 2 bunded areas may be constructed side by side sharing a bund wall. When possible, bunded areas are to be separate from each other.

k. **Product**. The storage of Class I products in DBFIs and DPIs should be avoided where possible but is permissible with special care when required for operational reasons MDA advice is to be sought at all times. Particular care is also required when product is stored and used in temperatures, which are likely to exceed their flash point temperature, ie F-35 (AVTUR) flash point is 38°C. In this situation the product increases in classification by 1, ie when F-35 is stored or used in temperatures greater than 38°C it changes from being a Class II product to a Class I product. Winterised diesel mixed with aviation fuel or kerosene is to be treated as a Class II product.

l. **Separation and Safety Distances**. In the past these were easily detailed according to the type of product used. Following the implementation of DSEAR Regulations 2002, this is not the case as DSEAR Hazardous Areas Risk Assessment would have to be used to calculate the various distances taking into account many other values. These Assessments are to be conducted by competent persons having completed the DSEAR Hazardous Area Zoning Course.

m. **Other Hazards**.

1) Ammunition Storage Areas (ASA) – ATO.

2) Safe Handling of explosive ordnance – ATO.

3) Flight paths. Flight Safety Officer (FSO).

4) Radio Frequency (RF) (incl Radar etc…). Signals.

5) Accommodation, Technical / Domestic. Fire Advisor.

Part 4

Chapter 2 (Sponsor 516 Specialist Team Royal Engineer (Bulk Petroleum) (516 STRE (BP))

DEPLOYED BULK FUEL INSTALLATIONS

SECTION 1 – GENERAL

4.2.1. The purpose of this chapter is to outline who has responsibilities and what standards are to be adhered to when designing, constructing, operating, decommissioning and recovering Deployed Bulk Fuel Installations (DBFI). It is to be noted that this chapter contains guidance on and the interpretation of regulations contained within other JSPs and external British and European Standards. DBFIs include but are not limited to Tactical Fuel Handling Equipment (TFHE) and the Joint Operational Fuels System (JOFS).

4.2.2. **Definitions**: The following definitions apply throughout Chapters 1,2 and 3:

a. Small Scale Installation: An installation that consists of a maximum of 4 TFC's constructed from 4" TFHE.

b. Medium Scale Installation: An installation that consists of a maximum of 4 TFC's constructed from 6" TFHE.

c. Large Scale Installation: An installation that consists of more than 4 TFC's in a bespoke system to include remote issue/receipt points, culverts and overhead crossings.

SECTION 2 – DESIGN

4.2.3. **Who**. The following personnel are involved in the design process for DBFI:

a. **516 STRE (BP) is the Military Design Authority (MDA) for all DBFIs installations**.

1) Provide MDA Pre issued drawings.

2) Technical assistance to higher authorities.

3) Approve designs from external agencies ie TSW, ELS and RLC Petroleum Operators.

4) Design large, complex or bespoke installations.

b. **Royal Engineer ME Fitter Utilities and Petroleum (Ftr U&P)** (Not serving with MDA).

1) Design medium scale installations.

2) All designs are to be approved by MDA before construction.

c. **RLC Petroleum Operators (Class One)**.

1) Design small scale installations.

2) All designs are to be approved by MDA before construction.

d. **TSW (Battlefield Fuels Operator Course Qualified) 1 ELS Q-Sup-TFE.**

1) Design small scale installations DBFI to include Forward Air Refuelling Point (FARP)).

2) All designs are to be approved by MDA before construction.

4.2.4. **Responsibilities**. The following have responsibilities for the design of DBFIs.

a. **516 STRE (BP)**.

1) Ensure that any pre issued and approved system drawings contain the required safety devices and they are to be installed and operated as intended.

2) Ensure the installation meets the requirements of DSEAR regulations (Zoning).

3) The Single Point of Contact for all technical matters to include the use of Authorised Persons Petroleum (AP) (Pet), AP Mechanical and earthing systems for all DBFIs.

b. **Royal Engineer ME Fitter Utilities and Petroleum (Ftr U&P) (Not serving with the MDA)**.

1) Ensure that all designs meet the requirements of the client and are to be approved by the MDA before construction.

c. **RLC Petroleum Operators (Class One) and TSW, 1 ELS (TFHE Qualified).**

1) Ensure that all designs meet the requirements of the client and are to be approved by the MDA before construction.

4.2.5. **Standards**. The following standards are to be applied to the design of all DBFIs.

a. Dangerous Substances and Explosive Atmosphere Regulations (DSEAR 2002) JSP 375 Vol 2 Lflt 56.

b. Pressure System Safety Regulations (PSSR) 2000. JSP 375 Vol 2 Lflt 30.

c. HSE Guidance Note GS4 Safety in Pressure Testing 1998. (Used for Pneumatic Leak Testing).

d. BS 5958-2:1991 Code of Practice for Control of Undesirable Static Electricity - Part 2.

e. PD CLC/TR 50404:2003 Electrostatics Code of Practice for the avoidance of Hazards Due to Static Electricity.

f. JSP 375 MOD Health and Safety Handbook ie CDM Regulations.

SECTION 3 – CONSTRUCTION

4.2.6. Construction is to be defined as the assembly of TFHE or JOFS component parts in order to build a new system or in anyway modify an existing system to a MDA approved design. The nominated Person in Charge (PinC) is wherever possible to remain the same person throughout all phases through to handover to the Operating Authority (OA). The PinC remains wholly responsible for all aspects of the site through to the handover of the OA.

4.2.7. **Who**. The following personnel are involved in the construction process for DBFIs:

a. **516 STRE (BP)**.

1) Provide supervision for the construction of all DBFIs where required.

2) Facilitate the connection to permanent fuels infrastructure when required.

b. **Royal Engineer ME Fitter Utilities and Petroleum (Ftr U&P)** (Not serving with the MDA). Provide supervision for the construction of medium scale installations.

c. **RLC Petroleum Operators (Class One)**. Provide supervision for the construction of small scale installations.

d. **RLC Petroleum Operators**.

1) Construct small scale installations.

2) TSW (Battlefield Fuels Operator Course Qualified),1 ELS Q-Sup-TFE.

3) Provide supervision for the construction of small scale installations.

4.2.8. **Responsibilities**. The following have responsibilities for the construction of DBFIs.

a. **516 STRE (BP)**.

1) Provide a nominated SNCO / JNCO as a PinC.

2) Provide supervision and management for the construction of all large/complex DBFIs, ie those involving Road/Culvert Crossing and Rail Offload.

b. **Royal Engineer ME Fitter Utilities and Petroleum (Ftr U&P)** (Not serving with the MDA).

1) Provide a nominated SNCO as a PinC.

2) Provide supervision and management for the construction of medium DBFIs.

c. **RLC Petroleum Operators (Class One)**.

1) Provide a nominated SNCO as a PinC.

2) Provide supervision and management for the construction of small DBFIs.

d. **TSW** (Battlefield Fuels Operator Course Qualified) **1 ELS** Q-Sup-TFE.

1) Provide a nominated SNCO as a PinC.

2) Provide supervision and management for the construction of small DBFI to include Forward Refuelling Point (FRP).

4.2.9. **Standards**. The following standards are to be applied to the construction of all DBFIs.

a. Dangerous Substances and Explosive Atmosphere Regulations (DSEAR 2002). JSP 375 Vol 2 Lflt 56.

b. BS 5958-2:1991 Code of Practice for Control of Undesirable Static Electricity - Part 2. L

c. PD CLC/TR 50404:2003 Electrostatics Code of Practice for the avoidance of Hazards Due to Static Electricity.

d. JSP 375 MOD Health and Safety Handbook. ie CDM Regulations, PUWER and LOLER,

SECTION 4 – TESTING

4.2.10. The purpose of this section is to outline who has what responsibilities and to what standards, pneumatic, hydraulic and earth testing is to be carried out. The aim of testing is to prove the integrity of the construction of the DBFI prior to use.

4.2.11. **Earth Testing**. Earth testing is carried out upon completion of the construction phase and before any other testing is carried out. To ascertain who can carry out the testing and what levels of competency must be held on site refer to the Earthing Standards Flow Chart at Annex A and the DBFI Earthing Flow Chart at Annex B.

4.2.12. **Who**. The following personnel can carry out Earth Testing on a DBFI:

a. **516 STRE (BP)**.

1) Personnel qualified, competent and trained in the use of the multi-function clamp meter for DBFI in use for less than 7 days.

2) A practicing ME Electrician Class One or other military, civilian equivalent holding a City in Guilds 2391 Testing and Inspecting certificate. Required on all installations in use for more than 7 days.

b. **Royal Engineer ME Fitter Utilities and Petroleum (Ftr U&P)** (Not serving with MDA). Personnel qualified, competent and trained in the use of the multi-function clamp meter for DBFI in use for less than 7 days.

c. **RLC Petroleum Operators (Class One), TSW (Battlefield Fuels Operator Course Qualified) 1 ELS Q-Sup-TFE**. A person competent, qualified and trained in the use of the multi-function clamp meter for DBFI in use for less than 7 days.

4.2.13. **Responsibilities**. The following have responsibilities for the earth testing of DBFIs.

a. **516 STRE (BP)**.

1) Provide a nominated SNCO / JNCO as a PinC.

2) Ensure that all large, complex and bespoke installations are tested by a practicing ME Electrician (Class One) or other military, civilian equivalent holding a City in Guilds 2391 Testing and Inspection certificate.

3) Ensure that large / complex scale installations are tested by a person trained in the use of the multi function clamp meter. For DBFIs in use for less than 7 days.

b. **Royal Engineer ME Fitter Utilities and Petroleum (SNCO Ftr U&P)** (Not serving with the MDA).

1) Provide a nominated SNCO as a PinC.

2) Ensure that medium scale installations are tested by a person trained in the use of the multi-function clamp meter. For DBFIs in use for less than 7 days.

3) Ensure that all installations to be operated for more than 7 days are tested by a practicing ME Electrician (Class One) or other military, civilian equivalent holding a City in Guilds 2391 Testing and Inspection certificate.

c. **RLC Petroleum Operators (SNCO Class One), TSW and 1 ELS (SNCO Battlefield Fuels Operator Course Qualified) or Q-Sup-TFE.**

1) Provide a nominated PinC.

2) Ensure that small scale installations are tested by a person trained in the use of the multi function clamp meter. For DBFIs in use for less than 7 days.

3) Ensure that all installations to be operated for more than 7 days are tested by a practicing ME Electrician (Class One) or other military, civilian equivalent holding a City in Guilds 2391 Testing and Inspection Certificate.

4.2.14. **Guidance Note**. Static electricity is a bi product of the friction created between a pumped medium and the pipe surface. To prevent this build up of potential static electricity, all piped systems must be physically connected to the earth. In order to eliminate the conditions which lead to an electrostatic discharge all installations are to be bonded. Bonding eliminates electrostatic discharge by equalising electrical potential. Bonding is the physical connection (by means of a wire) of one system to another (dispense point to tanker or hydrant to aircraft) before dispensing or receiving product can take place. The bonding cable must remain attached until after the completion of the transfer and de-coupling.

2. **Standards**. The following standards are to be applied to the earth testing of all DBFIs.

a. BS 5958-2:1991 Code of Practice for Control of Undesirable Static Electricity - Part 2.

b. PD CLC/TR 50404:2003 Electrostatics Code of Practice for the avoidance of Hazards Due to Static Electricity.

c. JSP 375 MOD Health and Safety Handbook eg CDM Regulations.

4.2.15. **Pneumatic Leak Testing**. Pneumatic leak testing is testing conducted using compressed air. It is carried out upon completion and after a visual and physical inspection of the system. Before any associated works are conducted, a Safe System of Work (SSoW) regime is to be implemented by an Authorised Person Mechanical (AP Mech). In order to decide if the system requires an AP Pet refer to Authorised Persons Mechanical Flow Chart at Annex C.

4.2.16. **Who**. The following personnel can carry out pneumatic testing on a DBFI under a SSoW regime provided by an AP Mech, when deemed competent:

a. **516 STRE (BP)**. A SNCO or JNCO Ftr U&P or Clk Wks (M) deemed competent by the OC.

b. **Royal Engineer ME Fitter Utilities and Petroleum (Ftr U&P)** (Not serving with the MDA). A SNCO Ftr U&P deemed competent by OC MDA.

c. **RLC Petroleum Operators** (Class One). A SNCO Class One Petroleum Operator having received formal training in pneumatic testing and deemed competent by OC Petroleum Sqn.

d. **TSW** (Battlefield Fuels Operator Course Qualified or **1 ELS** Q-Sup-TFE.). A SNCO holding a TFHE qualification having received formal training in pneumatic testing and deemed competent by OC TSW/1 ELS.

4.2.17. **Responsibilities**. The following have responsibilities for the pneumatic testing of DBFIs.

a. **516 STRE (BP)**.

1) Provide a nominated SNCO / JNCO as a PinC.

2) Supervise and manage for the pneumatic leak testing all large / complex DBFIs ie those involving road / culvert crossing and rail offload.

3) When authorised by the OC MDA the max pneumatic test working pressure may be exceeded up to a maximum of 10% of the design pressure.

4) The Single Point of Contact (SPoC) for all technical matters to include the use of AP Mechanical systems for all DBFIs.

b. **Royal Engineer ME Fitter Utilities and Petroleum (SNCO Ftr U&P)** (Not serving with MDA).

1) Provide a nominated PinC.

2) Carry out pneumatic leak testing to a max pressure of 10 psi on medium scale installations.

c. **RLC Petroleum Operators** (SNCO Class One).

1) Provide a nominated PinC.

2) Carry out pneumatic leak testing to a max pressure of 10 psi on small scale installations.

d. **TSW (**SNCO Battlefield Fuels Operator Course Qualified) **1 ELS** Q-Sup-TFE.

1) Provide a nominated PinC.

2) Carry out pneumatic leak testing to a max pressure of 10 psi on small scale installations.

4.2.18. **Procedure**. The following procedure is a guide to the method of works to be carried out in order to pneumatically leak test an installation. All works are to be carried under a Permit to Work (PtW) Mech provided by an AP Mech.

a. Before any pressure is introduced into the system the PinC must ensure that an independent safety device (Pressure Relieve Valve) (PRV) is fitted that cannot be isolated from the testing medium and can be adjusted to operate at 150% of the permitted test pressure, ie 10psi test pressure, PRV set to 15psi.

b. Position the works parties, guards and safety signs, around the area to be tested to encompass the 50m safety distance.

c. **Note:** It is possible for there to be a substantial amount of potential energy retained in compressed air, which in the event of an unintended release, provides an opportunity for a high risk of injury. Non-essential personnel shall be kept clear of the site during pneumatic testing for leaks.

d. Divide long runs of pipes into manageable lengths.

e. Warn all personnel in the vicinity that the test is about to commence.

f. Bring the first section slowly up to the required test pressure.

g. A soak period of 10 mins will be adhered to prior to personnel approaching the system.

h. Follow the pipeline on foot, visually inspecting the pipeline for the presence of an air leak. Use a soap solution around the couplings to check for bubbling which will indicate a leak.

i. If no leaks are found in the first section of the pipeline, repeat the procedure as stated above for the next sections of pipeline.

j. If a leak is detected, the system must be carefully de-pressurised, repaired and the test repeated.

k. Continue the test until the entire system has been tested and held for 10 mins.

l. On completion of testing, the system must be slowly de-pressurised in a controlled manner. Any personnel carrying out this task must ensure they wear ear and eye protection.

m. Upon completion of the works the PtW Mech is to be closed.

4.2.19. **Standards**. The following standards are to be applied to the pneumatic testing of all DBFIs.

a. Pressure System Safety Regulations (PSSR) 2000. JSP 375 Vol 2 Lflt 30.

b. HSE Guidance Note GS4 Safety in Pressure Testing 1998. (Used for pneumatic leak testing).

c. JSP 375 Vol3 Chap 4 Mechanical Systems.

4.2.20. **Hydraulic Leak Testing**. Hydraulic leak testing is only to be carried out by the MDA on large, complex and bespoke systems. Hydraulic testing is to be carried out upon the completion of pneumatic leak testing. Before any associated works are carried out a SSoW is to be put in place including the use of an AP Pet. In order to decide if the system requires AP Pet refer to Authorised Persons Petroleum Flow Chart at Annex D.

2. **Who**. A SNCO / JNCO Ftr U&P or Clk Wks (M) deemed competent by OC 516 STRE (BP) can conduct hydraulic leak testing on a DBFI under a SSoW provided by an AP Mech:

3. **Responsibilities**. The following have responsibilities for the hydraulic testing of DBFIs.

a. **516 STRE (BP)**.

1) Provide a nominated SNCO / JNCO as a PinC.

2) Produce bespoke Risk Assessments and Method Statements for the testing to be carried out.

4.2.21. **Guidance Note**. Before any pressure is introduced into the system the PinC must ensure that an independent safety device (Pressure Relieve Valve) (PRV) is fitted that cannot be isolated from the testing medium.

a. The max test pressure is not to exceed 150% of the normal system working pressure ie 80psi working pressure = 120 psi test pressure.

b. The PRV must be adjusted to operate at 100% of the permitted test pressure. ie 120psi test pressure = PRV set to 120psi.

4.2.22. **Standards**. The following standards are to be applied to the pneumatic testing of all DBFIs.

a. Pressure System Safety Regulations (PSSR) 2000. JSP 375 Vol 2 Lflt 30.

b. HSE Guidance Note GS4 Safety in Pressure Testing 1998. (Used for Pneumatic Leak Testing).

c. JSP 375 Vol3 Chap 4 Mechanical Systems.

d. Pressure System Safety Regulations (PSSR) 2000. JSP 375 Vol 2 Lflt 30.

e. HSE Guidance Note GS4 Safety in Pressure Testing 1998. (Used for Pneumatic Leak Testing).

SECTION 5 – COMMISSIONING

4.2.23. The process of commissioning is the initial introduction of product to the system. All commissioning must be carried out in a controlled manner under a SSoW, supervised by an AP Petroleum. Prior to the introduction of product the PinC must ensure that all plans / documents are in place as per the Master Check List (MCL), for example Pollution Control Plan and Spill Response Plan.

4.2.24. **Who**. The following personnel can carry out commissioning on a DBFI under a SSoW provided by an AP Petroleum:

a. **516 STRE (BP)**. A SNCO / JNCO Ftr U&P or Clk Wks (M) deemed competent by the OC.

b. **Royal Engineer ME Fitter Utilities and Petroleum (Ftr U&P)** (Not serving with the MDA). A SNCO Ftr U&P deemed competent by OC MDA.

c. **RLC Petroleum Operators** (Class One). A SNCO Class One Petroleum Operator deemed competent by OC Petroleum Sqn.

d. **TSW** (Battlefield Fuels Operator Course Qualified **1 ELS** Q-Sup-TFE). A SNCO holding a Battlefield Fuels Operator Course Qualification or a Q-Sup-TFE deemed competent by OC TSW / ELS.

4.2.25. **Responsibilities**. The following have responsibilities for the commissioning of DBFIs.

a. **516 STRE (BP)**.

1) Provide a nominated SNCO / JNCO as a PinC.

2) Produce bespoke Risk Assessments and Method Statements for the commissioning of all large, complex or complex DBFIs under the guidance of an AP Petroleum.

b. **Royal Engineer ME Fitter Utilities and Petroleum (Ftr U&P)** (Not serving with MDA).

1) Provide a nominated PinC.

2) Produce bespoke Risk Assessments and Method Statements for the commissioning of all medium scale installations under the guidance of an AP Petroleum.

c. **RLC Petroleum Operators (Class One), TSW (TFHE Qualified) 1 ELS Q-Sup-TFE.**

1) Provide a nominated SNCO as a PinC.

2) Produce bespoke Risk Assessments and Method Statements for the commissioning of all small scale installations under the guidance of an AP Petroleum.

4.2.26. **Guidance Note**. **Functional and Acceptance Tests**. Full functional tests of all equipment are to be conducted and witnessed by the OA. This will include operating all pumps through their complete operating range, checking the operation of all safety devices, operating the system in all pumping and flow configurations, and checking indications on gauges and other instruments. The Valve Operation Chart (often known as an OXO chart) must be used to ensure safe operation of the installation.

4.2.27. **Standards**. The following standards are to be applied to the commissioning of all DBFIs.

a. JSP 375 Vol3 Chap 5 Petroleum.

b. HSE Guidance Note GS4 Safety in Pressure Testing 1998. (Used for commissioning, functional test).

SECTION 6 – DBFI HANDOVER / TAKEOVER

4.2.28. The purpose of this section is to outline who has what responsibilities for the Handover / Takeover of a DBFI and to what standards the documentation required, completed and held by the OA on completion.

4.2.29. Handover / Takeover of a DBFI is to allow the PinC (construction, testing and commissioning phases) to formally hand the installation to the OA prior to the commencement of operations, or for the OA to formally hand the DBFI over to the PinC de-commissioning on conclusion of all operations.

4.2.30. **Who**. The following personnel can carry out Handover/Takeover of DBFI.

a. **516 STRE (BP)**. For Handover/Takeover to OA as PinC, a SNCO / JNCO Ftr U&P or Clk Wks (M) carrying out the duty of PinC construction, testing, commissioning or de-commissioning that is deemed competent by the OC.

b. **Royal Engineer ME Fitter Utilities and Petroleum (Ftr U&P)** (Not serving with MDA). For Handover Takeover to OA as PinC, a SNCO Ftr U&P carrying out the duty of PinC construction, testing, commissioning or de-commissioning that is deemed competent by OC MDA or RLC Pet Sqn whilst serving in one.

c. **RLC Petroleum Operators** (Class One).

1) For Handover/Takeover to OA as PinC a SNCO Class One Petroleum Operator carrying out the duty of PinC construction, testing, commissioning or de-commissioning that is deemed competent by OC Petroleum Sqn.

2) OA for Takeover/Handover from PinC construction, testing, commissioning or de-commissioning, a SNCO Class One Petroleum Operator deemed competent by OC Petroleum Sqn.

d. **TSW (**Battlefield Fuels Operator Course Qualified) **1 ELS** Q-Sup-TFE.

1) For Handover/Takeover to OA as PinC a SNCO holding a Battlefield Fuels Operator Course Qualification carrying out the duty of PinC construction, testing, commissioning or de-commissioning that is deemed competent by OC TSW/1 ELS.

2) OA for Takeover/Handover from PinC construction, testing, commissioning or de-commissioning, SNCO holding a TFHE Qualification deemed competent by OC TSW/1 ELS.

4.2.31. **Responsibilities**. The following have responsibilities for the Handover/Takeover of DBFIs.

a. **516 STRE (BP)**. Provide PinC from construction, testing, commissioning or de-commissioning to Handover or Takeover installation to or from OA, and ensure documentation is correct in accordance with the MCL on all large/complex DBFIs, ie those involving road / culvert crossing and rail offload.

b. **Royal Engineer ME Fitter Utilities and Petroleum (Ftr U&P)** (Not serving with MDA). Provide PinC from construction, testing, commissioning or de-commissioning to Handover or Takeover installation to or from OA, and ensure documentation is correct in accordance with the MCL on medium scale installations.

c. **RLC Petroleum Operators** (Class One).

1) Provide PinC for construction, testing, commissioning or de-commissioning to Handover or Takeover installation to or from OA, and ensure documentation is correct in accordance with the MCL on small scale installations.

2) Provide SNCO from OA for Takeover/Handover from PinC construction, testing, commissioning or de-commissioning, and ensure documentation is correct in accordance with the MCL.

d. **TSW** (Battlefield Fuels Operator Course Qualified) **1 ELS** Q-Sup-TFE.

1) Provide TFHE Qualified PinC from construction, testing, commissioning or de-commissioning to Handover or Takeover installation to or from OA, and ensure documentation is correct in accordance with the MCL on small scale installations.

2) Provide TFHE Qualified SNCO from OA for Takeover Handover from PinC construction, testing, commissioning or de-commissioning, and ensure documentation is correct in accordance with the MCL.

4.2.32. **Guidance Note**. **Handover Takeover of DBFI.** The Handover Takeover of a DBFI is the final process prior to having an operational DBFI, the OA must witness full functional tests of all equipment. The PinC construction, testing, commissioning must ensure all relevant documents in accordance with the MCL are ready for Handover Takeover to OA. PinC is to train the OA in the use of the installation and ensure that all operators are competent in its use.

a. The OA is to ensure that all documentation provided by PinC is correct in accordance with the MCL and that all operators are aware of the contents of documentation such as, Spill Response Plan, Fire Plan and are competent to act and carry out actions in accordance with them.

b. The final process is for the PinC to formally handover the installation to the OA and the PinC and OA to Sign the Handover Takeover Certificate.

c. Prior to the De-Commissioning of any installation the OA is ensure the installation is handed over to PinC of de-commissioning and again a Handover / Takeover Certificate has been signed. The PinC conducting the de-commissioning is to ensure all personnel are competent in the de-commissioning process and that all documentation and procedures are conducted in accordance with the MCL.

4.2.33. **Standards**. The following standards are to be applied to the Handover / Takeover of all DBFIs, the PinC construction, testing, commissioning or de-commissioning is to liaise with OA and ensure the following has been applied in accordance with the MCL.

a. Dangerous Substances and Explosive Atmosphere Regulations (DSEAR 2002) JSP 375 Vol 2 Lflt 56.

b. Pressure System Safety Regulations (PSSR) 2000. JSP 375 Vol 2 Lflt 30.

c. HSE Guidance Note GS4 Safety in Pressure Testing 1998. (Used for Pneumatic Leak Testing).

d. BS 5958-2:1991 Code of Practice for Control of Undesirable Static Electricity. Part 2.

e. PD CLC/TR 50404:2003 Electrostatics Code of Practice for the avoidance of Hazards Due to Static Electricity.

f. JSP 375 MOD Health and Safety Handbook ie CDM Regulations.

SECTION 7 – OPERATOR MAINTENANCE OF DBFI

4.2.34. A high standard of operator maintenance is required at all times on DBFIs constructed of TFHE and JOFS. This section aims to outline what is required and what standards are used to ensure the safe and effective maintenance of DBFIs and who is responsible.

4.2.35. **Who**. The following personnel can carry out operator maintenance on a DBFI, much of which will require a SSoW provided by an AP Pet.

a. **516 STRE (BP)**. A Ftr U&P or that deemed competent by OC MDA.

b. **Royal Engineer ME Fitter Utilities and Petroleum (Ftr U&P)** (Not serving with MDA). A Ftr U&P deemed competent by OC MDA or OC Pet Sqn RLC.

c. **RLC Petroleum Operators** (Class One). A Class One Petroleum Operator deemed competent by OC Pet Sqn RLC.

d. **TSW and 1 ELS**. Personnel holding a Battlefield Fuels Operator Course Qualification or Q-Sup-TFE.deemed competent by OC TSW/ELS.

e. **RAF Trade Group 5**.

4.2.36. **Responsibilities**. The following have responsibilities for the Operator Maintenance of DBFIs.

a. **516 STRE (BP)**.

1) A Ftr U&P or deemed competent by OC MDA.

2) Level 3 Maintenance.

b. **Royal Engineer ME Fitter Utilities and Petroleum (Ftr U&P)** (Not serving with MDA).

1) A Ftr U&P deemed competent by OC MDA or OC Pet Sqn RLC whilst serving in one.

2) Level 3 Maintenance.

c. **RLC Petroleum Operators** (Class One).

1) A Class One Petroleum Operator deemed competent by OC Pet Sqn RLC.

2) Level 1 Maintenance.

d. **TSW and ELS**.

1) Personnel holding a Battlefield Fuels Operator Course Qualification deemed or Q-Sup-TFE competent by OC TSW/ELS.

2) Level 1 Maintenance.

e. **RAF Trade Group 5**. Level 2 Maintenance.

4.2.37. **Guidance Note**. Responsibilities for repair of TFHE/JOFS are defined within the equipments AESP or AP 119 publications. Units are responsible for ensuring that all records of use, servicing maintenance and repair are recorded in equipment documents or on JAMES. The equipment records must follow the individual equipment. The responsibilities for repair are:

a. **Level 1 Maintenance**. Competent Petroleum Trained Personnel (CPTP).

b. **Level 2 Maintenance**. RE Fitter (Utilities and Petroleum) (Ftr (U&P)) or RAF Trade Group 5.

c. **Level 3 Maintenance**. RE Ftr (U&P) in a Royal Engineer Field Support Squadron or 516 STRE (BP).

d. **Level 4 Maintenance**. Through DSDA or DSG.

4.2.38. It is the OA responsibility that all maintenance is carried out under a SSoW, any requirement to use tooling or breaking in to the system on a maintenance task on any part of the installation will require a Permit to Work (PtW) Pet, ie change or clean of strainer, FWS elements coupling or hose change (unless dry break, ie can be changed with no exposure to product).

4.2.39. **Standards**. The following standards are to be applied to the Operator Maintenance of all DBFIs.

a. JSP 375 MOD Health and Safety Handbook.

b. CDM Regulations.

c. PtW Pet.

SECTION 8 – DE-COMMISSIONING

4.2.40. The process of de-commissioning is the safe removal of all product from the system. All de-commissioning must be carried out in a controlled manner under a SSoW, supervised closely by the PinC. Prior to the removal of product the PinC must ensure that all plans / documents are in place as per the MCL, ie Pollution Control Plan and Spill response Plan.

4.2.41. **Who**. The following personnel can conduct de-commissioning on a DBFI under a SSoW provided by an AP Petroleum:

a. **516 STRE (BP)**. A SNCO / JNCO Ftr U&P or Clk Wks (M) deemed competent by the OC.

b. **Royal Engineer ME Fitter Utilities and Petroleum (Ftr U&P)** (Not serving with MDA). A SNCO Ftr U&P deemed competent by OC MDA OC Pet Sqn RLC whilst serving in one.

c. **RLC Petroleum Operators** (Class One). A SNCO Class One Petroleum Operator deemed competent by OC Petroleum Sqn.

d. **TSW and 1 ELS** (Battlefield Fuels Operator Course Qualified) or (Q-Sup-TFE). A SNCO holding a Battlefield Fuels Operator Course Qualification deemed competent by OC TSW / 1 ELS.

4.2.42. **Responsibilities**. The following have responsibilities for the de-commissioning of DBFIs.

a. **516 STRE (BP)**.

1) Provide a nominated SNCO / JNCO as a PinC.

2) Produce bespoke Risk Assessments and Method Statements for the de-commissioning of all large/complex DBFIs under the guidance of an AP Petroleum.

3) Produce bespoke Risk Assessments and Method Statements for the pigging of all DBFIs (if required) under the guidance of an AP Petroleum and AP Mechanical.

b. **Royal Engineer ME Fitter Utilities and Petroleum (Ftr U&P)** (Not serving with MDA).

1) Provide a nominated PinC.

2) Produce bespoke Risk Assessments and Method Statements for the de-commissioning of all medium scale installations under the guidance of an AP Petroleum.

c. **RLC Petroleum Operators (Class One) and TSW and 1 ELS (TFHE Qualified)**.

1) Provide a nominated SNCO as a PinC.

2) Produce bespoke Risk Assessments and Method Statements for the de-commissioning of all small scale installations under the guidance of an AP Petroleum.

4.2.43. **Guidance Note. De-Commissioning.** The PinC de-commissioning must ensure that all personnel involved in the process are aware of all safety precautions and the correct response to spill or fire in accordance with fuel spill response plans and that all work is carried out under a SSoW, supervised by an AP Petroleum, and that all the documentation and processes are correct in accordance with the Master Check List. Pigging operations are only to be carried out by the MDA under a SSoW, supervised by an AP Petroleum and AP Mechanical, When authorised by the OC MDA the max pneumatic test working pressure of 10psi may be exceeded up to a maximum of 10% of the design pressure.

4.2.44. **Standards**. The following standards are to be applied to the commissioning of all DBFIs.

a. Dangerous Substances and Explosive Atmosphere Regulations (DSEAR 2002) . JSP 375 Vol 2 Lflt 56.

b. Pressure System Safety Regulations (PSSR) 2000. JSP 375 Vol 2 Lflt 30.

c. HSE Guidance Note GS4 Safety in Pressure Testing 1998. (Used for Pneumatic Leak Testing and Pigging).

d. JSP 375 MOD Health and Safety Handbook ie CDM Regulations.

SECTION 9 – RECOVERY

4.2.45. The purpose of this section is to outline who has what responsibilities for the Recovery of TFHE and JOFS post de-commissioning of a DBFI and what standards and documentation required.

2. **Who**. The following personnel are involved in the recovery process for DBFIs:

a. **516 STRE (BP)**.

1) Provide supervision for the recovery of all Large Scale DBFIs where required.

2) Provide a PinC for the recovery of all Large Scale DBFIs where required and return of stores.

b. **Royal Engineer ME Fitter Utilities and Petroleum (Ftr U&P)** (Not serving with MDA).

1) Provide supervision for the recovery of medium scale installations and return of stores.

2) Provide a PinC for the recovery of medium scale installations and return of stores.

c. RLC Petroleum Operators and TSW, 1 ELS (Battlefield Fuels Operator Course Qualified) or Q-Sup-TFE.

1) Provide supervision for the recovery of small scale installations and return of stores.

2) Provide a PinC for the recovery of small scale installations and return of stores.

4.2.46. **Responsibilities**. The following have responsibilities for the recovery of DBFIs.

a. **516 STRE (BP)**.

1) Provide a nominated SNCO / JNCO as a PinC.

2) Provide supervision and management for the recovery of all large/complex DBFIs ie those involving road / culvert crossing and rail offload.

3) Ensure that all equipment is packed to CES and that all equipment documentation has been completed.

b. **Royal Engineer ME Fitter Utilities and Petroleum (Ftr U&P)** (Not serving with MDA).

1) Provide a nominated SNCO / JNCO as a PinC.

2) Provide supervision and management for the recovery of all medium DBFIs.

3) Ensure that all equipment is packed to CES and that all equipment documentation has been completed.

4.2.47. **RLC Petroleum Operators (Class One), TSW and ELS (Battlefield Fuels Operator Course Qualified or Q-Sup-TFE.)**

4) Provide a nominated SNCO / JNCO as a PinC.

5) Provide supervision and management for the recovery of all small DBFIs.

6) Ensure that all equipment is packed to CES and that all equipment documentation has been completed.

4.2.48. **Guidance Note. Recovery**. A PinC of Recovery is to be nominated to ensure that all equipment documentation has been completed in and that all equipments have been packed to CES and in accordance with its relevant AESP and any deficiencies are correctly annotated and equipment that is unserviceable requires a AF 1043 to be raised and the relevant authority to sign it. All equipment needs to be vented in an open air environment for a minimum of 24 hours prior to being packed. The mode of transport that it is being returned in needs to be identified (land, sea or air) and prepared in accordance with the relevant regulations and the correct transport documentation completed as per the MCL.

4.2.49. **Standards**. The following standards are to be applied to the recovery of all DBFIs.

a. International Carriage of Dangerous Goods by Road. (ADR)

b. International Maritime Dangerous Goods Code. (IMDG)

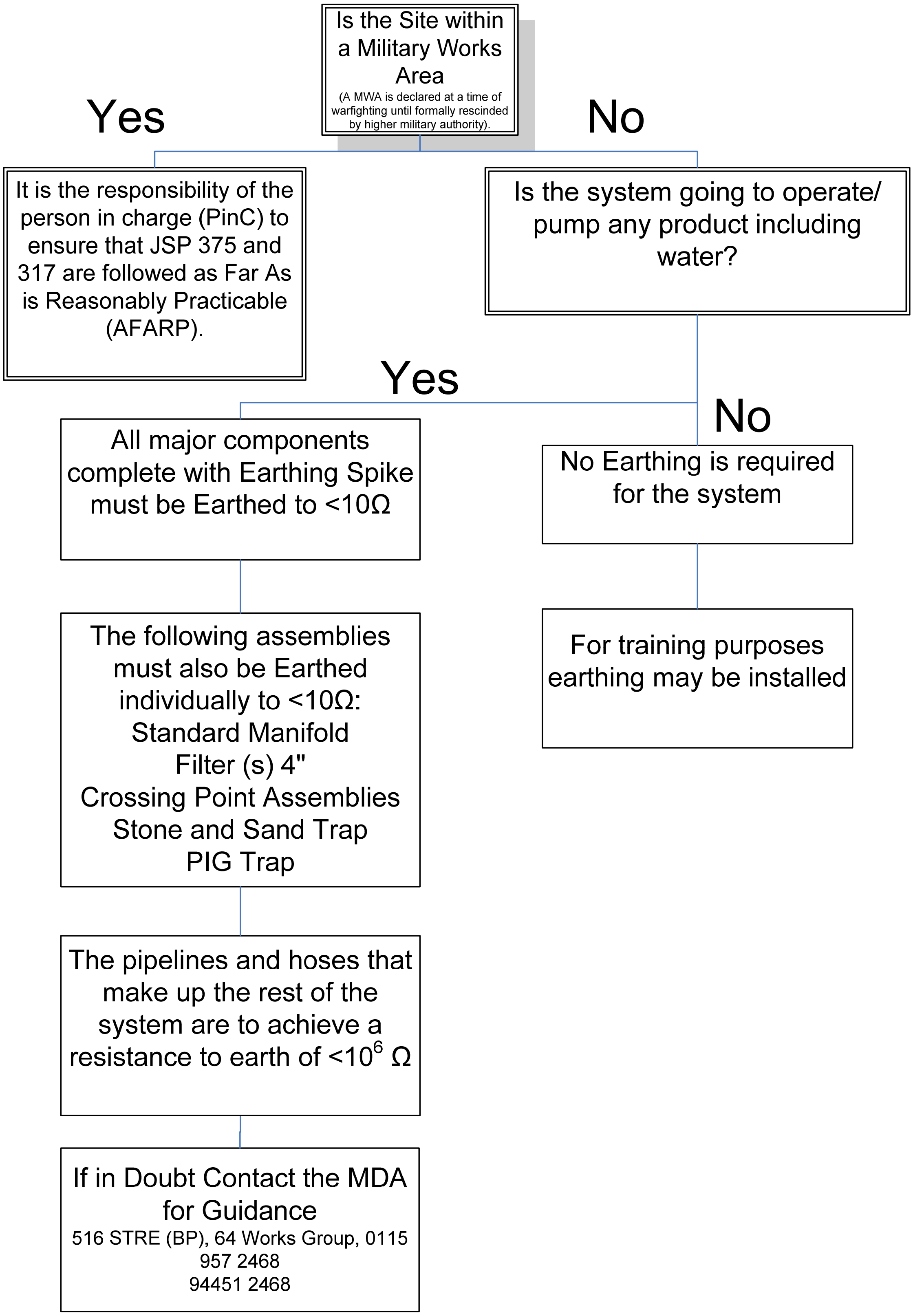
c. International Rule for Transport of Dangerous Substance by Railway. (RID)

d. Internatinal Air Transport Association. (IATA)

e. JSP 375 MOD Health and Safety Handbook, ie CDM Regulations, PUWER and LOLER.

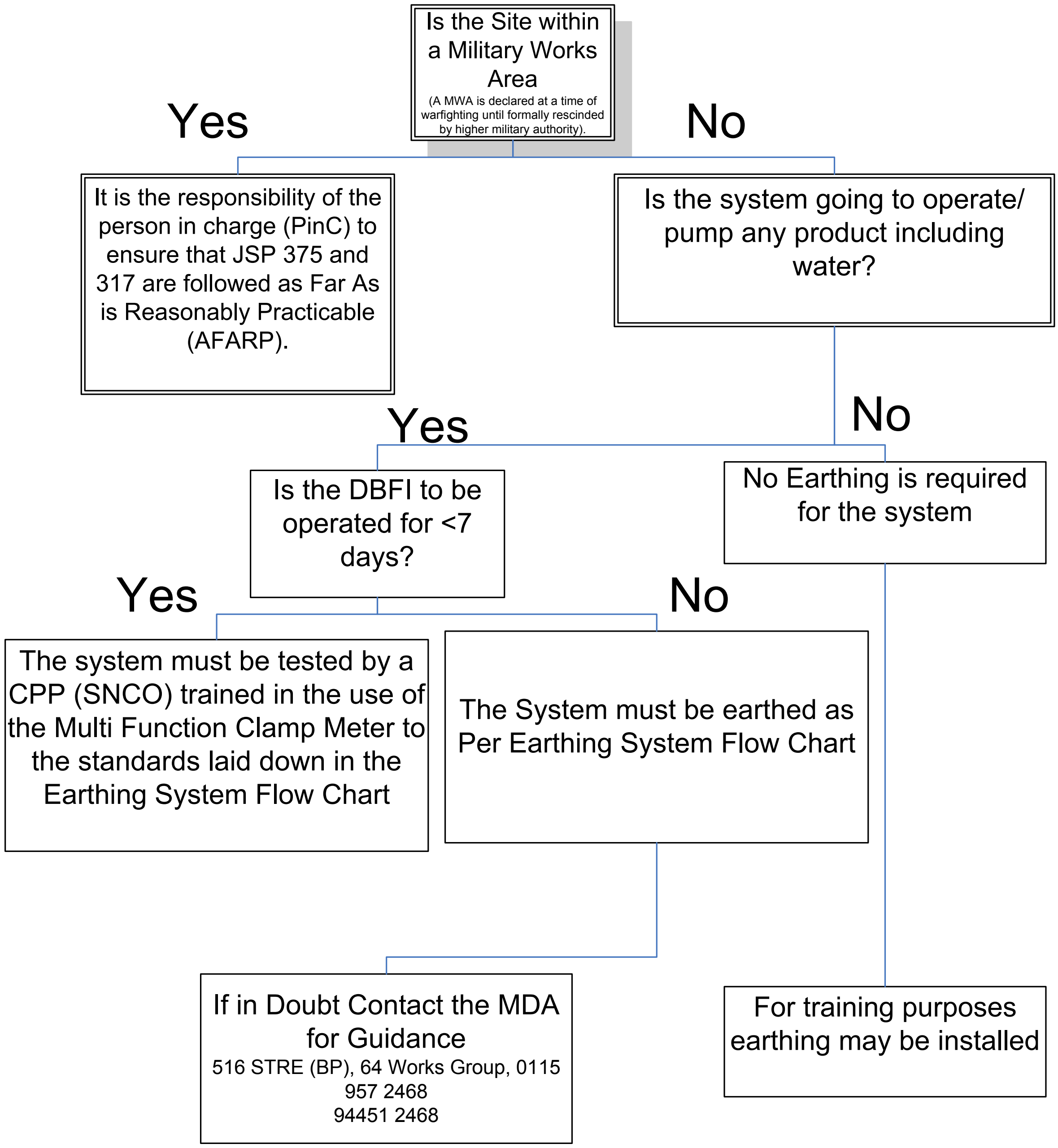
Earthing Standards Flow Chart

Annex A to
Part4
Chapter 2
JSP317
DBFI

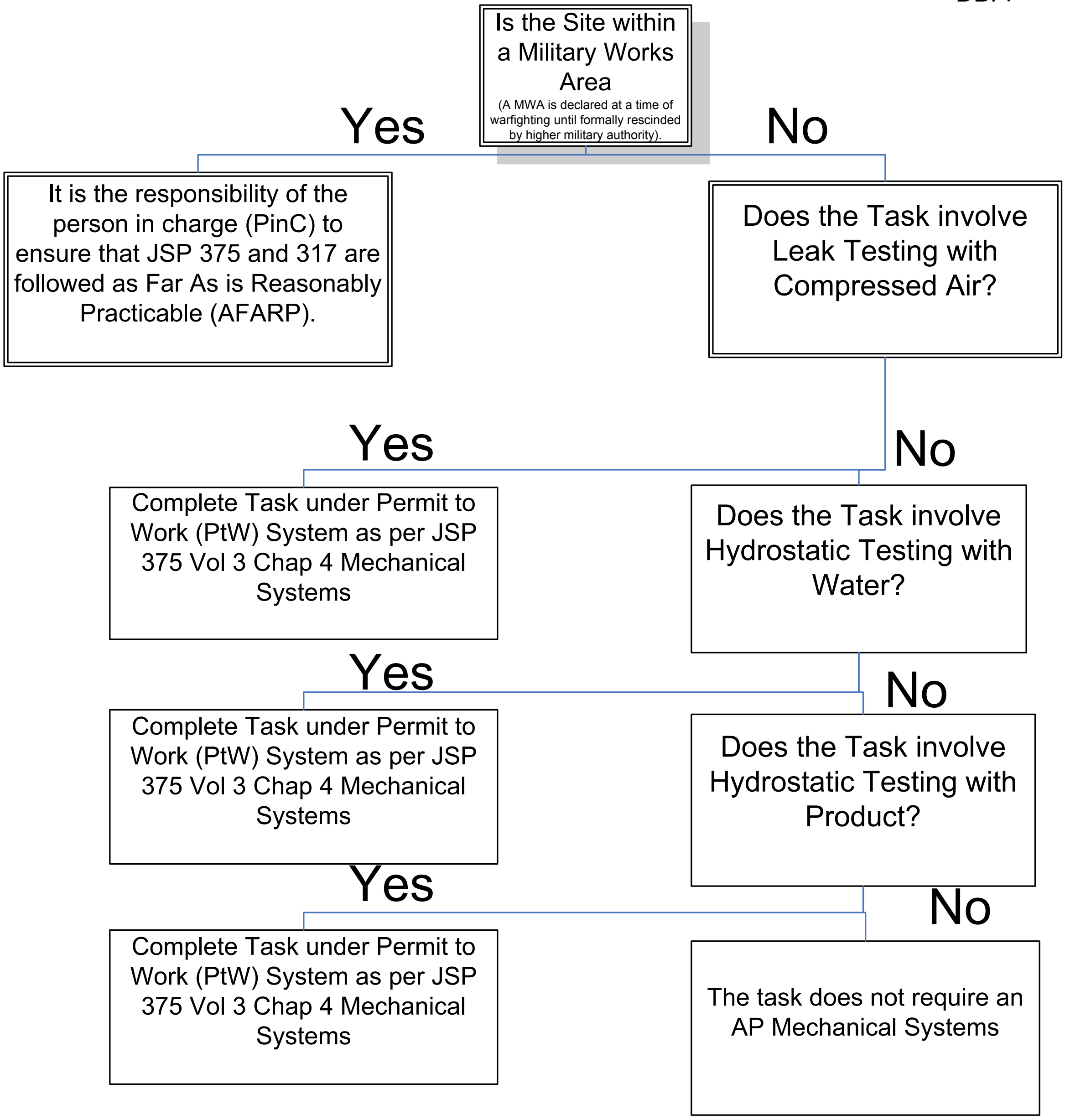


DBFI Earthing Flow Chart

Annex B to
Part4
Chapter 2
JSP 317
DBFI

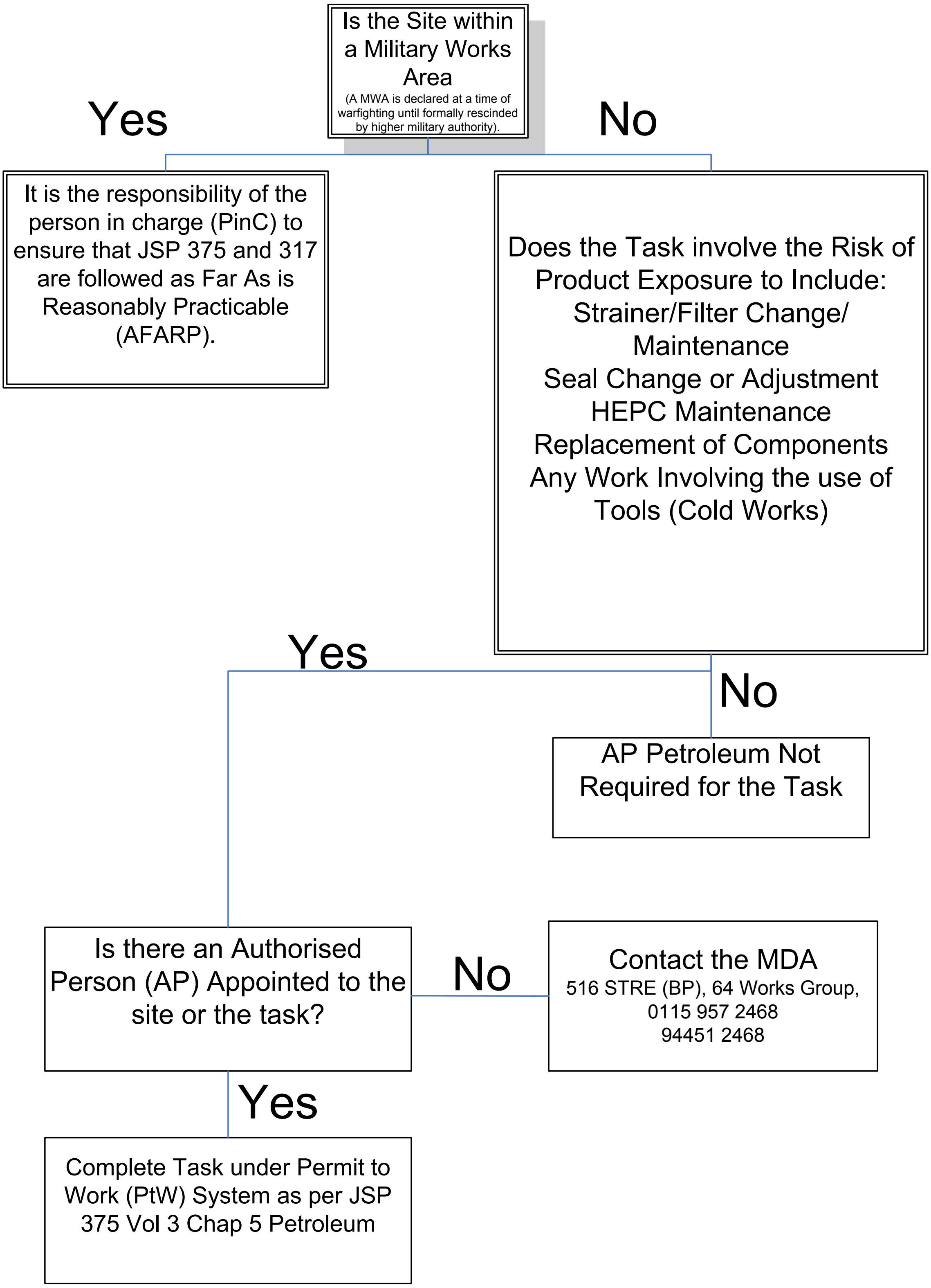


Authorised Persons Mechanical Flow Chart



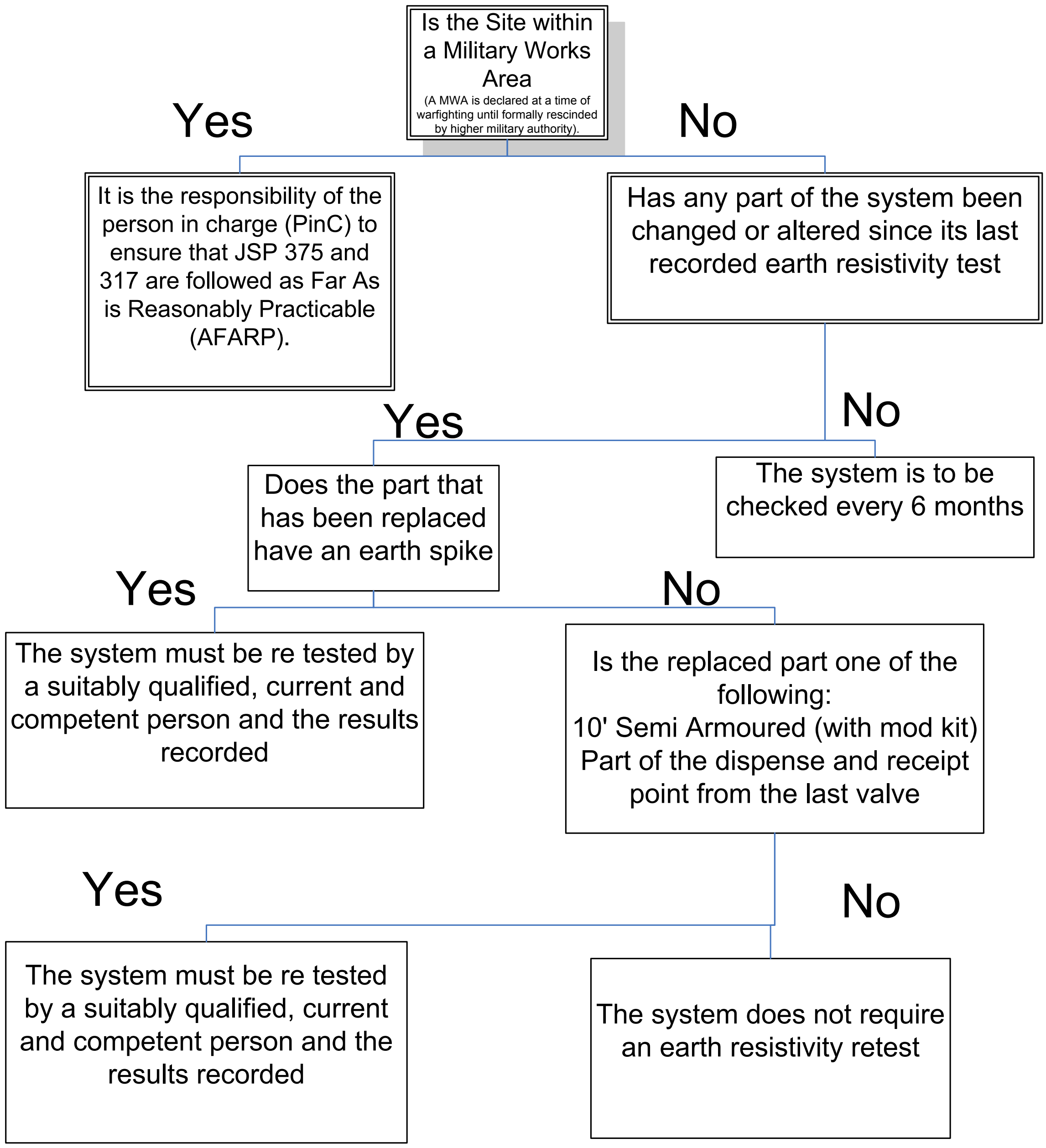
Authorised Persons Petroleum Flow Chart

Annex D to
Part4
Chapter 2
JSP317
DBFI

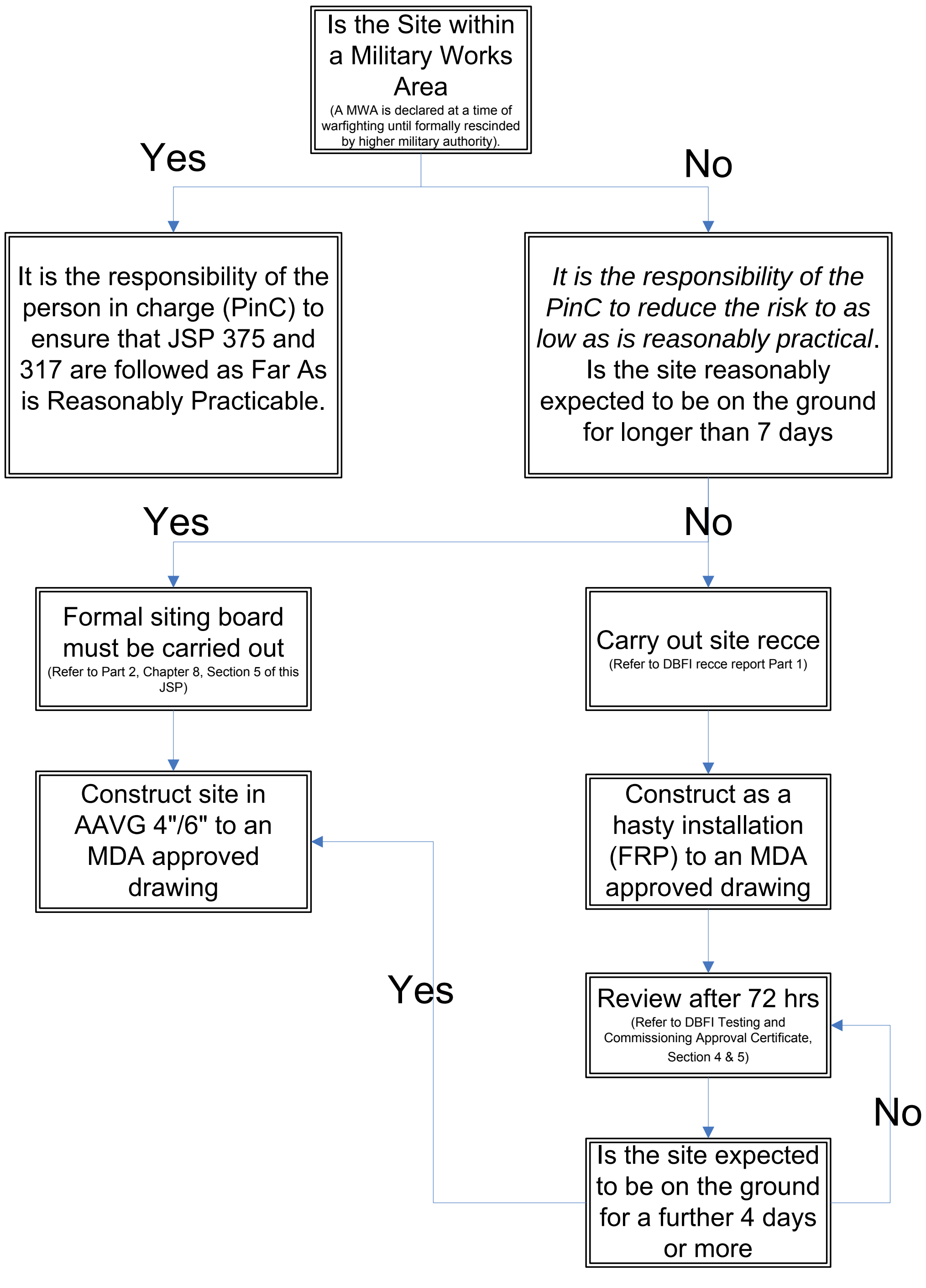


DBFI Earthing Retest Flow Chart

Annex E to
Part4
Chapter 2
JSP317
DBFI



Construction and Sequence Timeline Flow chart



Part 4

Chapter 3 (Sponsor 516 Specialist Team Royal Engineer (Bulk Petroleum) (516 STRE (BP))

DEPLOYED PERMANENT INSTALLATIONS

SECTION 1 – GENERAL

4.3.1. The purpose of this chapter is to outline who has responsibilities and what standards are to be adhered to when designing, constructing, operating, decommissioning and recovering and relocating Deployed Permanent Installations (DPI). It is to be noted that this chapter contains guidance on and the interpretation of regulations contained within other JSPs and external British and European Standards.

4.3.2. **Definitions**: The following definitions apply throughout Chapters 1,2 and 3:

a. Small Scale Installation: An installation that consists of a maximum of 4 TFC's constructed from 4" TFHE.

b. Medium Scale Installation: An installation that consists of a maximum of 4 TFC's constructed from 6" TFHE.

c. Large Scale Installation: An installation that consists of more than 4 TFC's in a bespoke system to include remote issue/receipt points, culverts and overhead crossings.

SECTION 2 – DESIGN

4.3.3. **Who**. The following personnel are involved in the design process for DPI:

a. **516 STRE (BP) is the Military Design Authority (MDA) for all DPI installations**.

1) Provide all design works for a DPI including the detailed reconnaissance, specification and costing.

2) Technical Assistance to higher authorities.

4.3.4. **Responsibilities**. The following have responsibilities for the design of DPIs.

a. **516 STRE (BP)**.

1) Ensure that the design meets the requirements of all current statutory codes and legislation. To include equipment compliance with ATEX regulations[1].

2) Any system drawings contain the required safety devices and they are to be installed and operated as intended.

3) Ensure the Installation meets the requirements of DSEAR Regulations (zoning).

[1] ATEX is the name commonly given to the framework for controlling explosive atmospheres and the standards of equipment and protective systems used in them. It is based on the requirements of two European Directives. Directive 99/92/EC (also known as 'ATEX 137' or the 'ATEX Workplace Directive') and Directive 94/9/EC (also known as 'ATEX 95' or 'the ATEX Equipment Directive').

4) The Single Point of Contact (SPoC) for all technical matters to include the use of Authorised Persons Petroleum (AP) (Pet), AP Mechanical and earthing systems for all DPIs.

4.3.5. **Standards**. The following standards are to be applied to the design of all DPIs.

a. Dangerous Substances and Explosive Atmosphere Regulations (DSEAR 2002). JSP 375 Vol 2 Lflt 56.

b. Pressure System Safety Regulations (PSSR) 2000. JSP 375 Vol 2 Lflt 30.

c. HSE Guidance Note GS4 Safety in Pressure Testing 1998. (Used for Pneumatic Leak Testing).

d. BS 5958-2:1991 Code of Practice for Control of Undesirable Static Electricity - Part 2.

e. Directives 94/9/EC (also known as 'ATEX 95' or 'the ATEX Equipment Directive') and 99/92/EC (also known as 'ATEX 137' or the 'ATEX Workplace Directive).

f. PD CLC/TR 50404:2003 Electrostatics Code of Practice for the avoidance of Hazards Due to Static Electricity.

g. JSP 375 MOD Health and Safety Handbook ie CDM Regulations.

SECTION 3 – CONSTRUCTION

4.3.6. Construction is to be defined as the installation and assembly of components and groundwork required in order to build a new system or in anyway modify an existing system to a MDA approved design. The nominated Person in Charge (PinC) is wherever possible to remain the same person throughout all phases through to handover to the Operating Authority (OA). The PinC remains wholly responsible for all aspects of the site through to the handover of the OA.

4.3.7. **Who**. The following personnel are involved in the construction process for DPIs:

a. **516 STRE (BP)**.

1) Provide supervision and management for the construction of all DPIs.

2) Facilitate the connection to permanent fuels infrastructure or TFHE when required.

4.3.8. **Responsibilities**. The following have responsibilities for the construction of DPIs.

a. **516 STRE (BP)**.

1) Provide a nominated Fitter Utilities and Petroleum (Ftr U&P) SNCO and or Clerk of Works Mechanical (Clk Wks (M)) as a PinC.

2) Provide supervision and management for the construction of all DPIs.

4.3.9. **Standards**. The following standards are to be applied to the construction of all DPIs.

a. Dangerous Substances and Explosive Atmosphere Regulations (DSEAR 2002). JSP 375 Vol 2 Lflt 56.

b. Directives 94/9/EC (also known as 'ATEX 95' or 'the ATEX Equipment Directive') and 99/92/EC (also known as 'ATEX 137' or the 'ATEX Workplace Directive).

c. BS 5958-2:1991 Code of Practice for Control of Undesirable Static Electricity - Part 2.

d. PD CLC/TR 50404:2003 Electrostatics Code of Practice for the avoidance of Hazards Due to Static Electricity.

e. JSP 375 MOD Health and Safety Handbook. ie CDM Regulations, PUWER and LOLER.

SECTION 4 – TESTING

4.3.10. The purpose of this section is to outline who has what responsibilities and to what standards, pneumatic, hydraulic and earth testing is to be carried out. The aim of testing is to prove the construction of the DPI prior to use.

4.3.11. **Earth Testing**. Earth testing is carried out upon completion of the construction phase and before any other testing is carried out. To ascertain who can carry out the testing and what levels of competency must be held on site refer to the Earthing Standards Flow Chart at Annex A and the DBFI Earthing Flow Chart at Annex B.

4.3.12. **Who**. The following personnel can carry out Earth Testing on a DPI:

a. **516 STRE (BP)**.

1) A practicing ME Electrician Class One or other military, civilian equivalent holding a City in Guilds 2391 Testing and Inspecting certificate.

4.3.13. **Responsibilities**. The following have responsibilities for the earth testing of DPIs.

a. **516 STRE (BP)**.

1) Provide a nominated Ftr U&P SNCO and or CofW (M) as a PinC.

2) Ensure that all DPIs are tested by a practicing ME Electrician (Class One) or other military, civilian equivalent holding a City in Guilds 2391 Testing and Inspection certificate.

4.3.14. **Guidance Note**. Static electricity is a bi product of the friction created between a pumped medium and the pipe surface. To prevent this build up of potential static electricity, all piped systems must be physically connected to the earth. In order to eliminate the conditions which lead to an electrostatic discharge all installations are to be bonded. Bonding eliminates electrostatic discharge by equalising electrical potential. Bonding is the physical connection (by means of a wire) of one system to another (dispense point to tanker or hydrant to aircraft) before dispensing or receiving product can take place. The bonding cable must remain attached until after the completion of the transfer and de-coupling.

4.3.15. **Standards**. The following standards are to be applied to the earth testing of all DPIs.

a. BS 5958-2:1991 Code of Practice for Control of Undesirable Static Electricity - Part 2.

b. PD CLC/TR 50404:2003 Electrostatics Code of Practice for the avoidance of Hazards Due to Static Electricity.

c. BS 7430:1998 Code of practice for Earthing.

d. JSP 375 MOD Health and Safety Handbook ie CDM Regulations.

4.3.16. **Pneumatic Leak Testing**. Pneumatic leak testing is testing conducted using compressed air. It is carried out upon completion of the Earth Testing and after a visual and physical inspection of the system. Before any associated works are conducted, a Safe System of Work (SSoW) regime is to be implemented by an Authorised Person Mechanical (AP Mech). In order to decide if the system requires an AP Mech refer to Authorised Persons Mechanical Flow Chart at Annex C.

4.3.17. **Who**. The following personnel can carry out pneumatic testing on a DPI under a SSoW regime provided by an AP Mech, when deemed competent:

a. **516 STRE (BP)**. A SNCO or JNCO Ftr U&P or Clk Wks (M) deemed competent by the OC.

4.3.18. Responsibilities. The following have responsibilities for the pneumatic testing of DPIs.

a. **516 STRE (BP)**.

1) Provide a nominated SNCO or JNCO Ftr U&P or Clk Wks (M) deemed competent by the OC.

2) Supervise and manage for the pneumatic leak testing all large DPIs.

3) When authorised by the OC MDA the max pneumatic test working pressure of 10 psi may be exceeded up to a maximum of 10% of the design pressure.

4) The Single Point of Contact (SPoC) for all technical matters to include the use of AP Mechanical systems for all DPIs.

4.3.19. **Guidance Note**. Before any pressure is introduced into the system the PinC must ensure that an independent safety device (Pressure Relieve Valve) (PRV) is fitted that cannot be isolated from the testing medium.

4.3.20. **Standards**. The following standards are to be applied to the pneumatic testing of all DPIs.

a. Pressure System Safety Regulations (PSSR) 2000. JSP 375 Vol 2 Lflt 30.

b. HSE Guidance Note GS4 Safety in Pressure Testing 1998. (Used for pneumatic leak testing).

c. JSP 375 Vol3 Chap 4 Mechanical Systems.

4.3.21. **Hydraulic Leak Testing**. Hydraulic leak testing is only to be carried out by the MDA, Hydraulic testing is to be carried out upon the completion of pneumatic leak testing. Before any associated works are carried out a SSoW is to be put in place including the use of an AP Mech.

4.3.22. **Who**. A SNCO / JNCO Ftr U&P or Clk Wks (M) deemed competent by OC 516 STRE (BP) can conduct hydraulic leak testing on a DBFI under a SSoW provided by an AP Mech.

4.3.23. **Responsibilities**. The following have responsibilities for the hydraulic testing of DPIs.

a. **516 STRE (BP)**.

1) Provide a nominated SNCO/JNCO as a PinC.

2) Produce bespoke Risk Assessments and Method Statements for the testing to be carried out.

4.3.24. **Guidance Note**. Before any pressure is introduced into the system the PinC must ensure that an independent safety device (Pressure Relieve Valve) (PRV) is fitted that cannot be isolated from the testing medium.

a. The max test pressure is not to exceed 150% of the normal system working pressure ie 80 psi working pressure = 120 psi test pressure.

b. The PRV must be adjusted to operate at 100% of the permitted test pressure. ie 120psi test pressure = PRV set to 120psi.

4.3.25. **Standards**. The following standards are to be applied to the pneumatic testing of all DBFIs.

a. Pressure System Safety Regulations (PSSR) 2000. JSP 375 Vol 2 Lflt 30.

b. HSE Guidance Note GS4 Safety in Pressure Testing 1998. (Used for Pneumatic Leak Testing).

c. JSP 375 Vol3 Chap 4 Mechanical Systems.

SECTION 5 – COMMISSIONING

4.3.26. The process of commissioning is the initial introduction of product to the system. All commissioning must be carried out in a controlled manner under a SSoW, supervised by an Authorised Person Petroleum (AP Pet). In order to decide if the system requires an AP Petroleum refer to Authorised Persons Petroleum Flow Chart at Annex D. Prior to the introduction of product the PinC must ensure that all plans / documents are in place as per the Master Check List (MCL), for example Pollution Control Plan and Spill Response Plan.

4.3.27. **Who**. The following personnel can carry out commissioning on a DPI under a SSoW provided by an AP Petroleum:

a. **516 STRE (BP)**. A SNCO / JNCO Ftr U&P or Clk Wks (M) deemed competent by the OC.

4.3.28. **Responsibilities**. The following have responsibilities for the commissioning of DPIs.

a. **516 STRE (BP)**.

1) Provide a nominated SNCO/JNCO as a PinC.

2) Produce bespoke Risk Assessments and Method Statements for the commissioning of all large, complex or complex DPIs under the guidance of an AP Petroleum.

4.3.29. **Guidance Note**. **Functional and Acceptance Tests**. Full functional tests of all equipment are to be conducted and witnessed by the Operating Authority (OA). This will include operating all pumps through their complete operating range, checking the operation of all safety devices, operating the system in all pumping and flow configurations, and checking indications on gauges and other instruments. The Valve Operation Chart (often known as an OXO chart) must be used to ensure safe operation of the installation.

4.3.30. **Standards**. The following standards are to be applied to the commissioning of all DPIs.

a. JSP 375 Vol3 Chap 5 Petroleum.

b. HSE Guidance Note GS4 Safety in Pressure Testing 1998. (Used for commissioning, functional test).

SECTION 6 – DBFI HANDOVER / TAKEOVER

4.3.31. The purpose of this section is to outline who has what responsibilities for the Handover / Takeover (HOTO) of a DPI and to what standards the documentation required, completed and held by the OA on completion.

4.3.32. HOTO of a DPI is to allow the PinC (construction, testing and commissioning phases) to formally hand the installation to the OA prior to the commencement of operations, or for the OA to formally hand the DPI over to the PinC de-commissioning on conclusion of all operations.

4.3.33. **Who**. The following personnel can carry out HOTO of DPI.

a. **516 STRE (BP)**. For HOTO to OA as PinC, a SNCO/JNCO Ftr U&P or Clk Wks (M) carrying out the duty of PinC construction, testing, commissioning or de-commissioning that is deemed competent by the OC.

b. **RLC Petroleum Operators** (Class One) **TSW and 1 ELS** (TFHE Qualified).

1) OA for HOTO from PinC construction, testing, commissioning or de-commissioning, a SNCO Class One Petroleum Operator deemed competent by OC Petroleum Sqn.

4.3.34. **Responsibilities**. The following have responsibilities for the HOTO of DPIs.

a. **516 STRE (BP)**. Provide PinC from construction, testing, commissioning or de-commissioning to HOTO of the installation to or from OA, and ensure documentation is correct in accordance with the Master Check List.

b. **RLC Petroleum Operators** (Class One) **TSW and 1 ELS** (TFHE Qualified).

1) Provide SNCO from OA for Takeover Handover from PinC construction, testing, commissioning or de-commissioning, and ensure documentation is correct in accordance with the Master Check List.

4.3.35. **Guidance Note**. **Handover Takeover of DPI.** The HOTO of a DPI is the final and process prior to having an operational DPI. The OA must witness full functional tests of all equipment. The PinC construction, testing, commissioning must ensure all relevant documents in accordance with the Master Check List are ready for HOTO to the OA. PinC is to train the OA in the use of the installation and ensure that all operators are competent in its use. This training must be recorded in a competency register that is retained in the H&S File and handed over to OA on the HOTO Board.

a. The OA is to ensure that all documentation provided by PinC is correct in accordance with the Master Check List and that all operators are aware of the contents of documentation such as, Spill Response Plan, Fire Plan and are competent to act and carry out actions in accordance with them.

b. The final process is for the PinC to formally convene a HOTO Board with all relevant stakeholders present. This meeting should have an agenda, minutes and a record, signed by all attendees. These documents along with the HOTO Certificate (signed by the OA) must be retained in the H&S File by the OA for the full life of the installation (until decommissioning).

c. Prior to the De-Commissioning of any installation the OA is ensure the installation is handed over to PinC of de-commissioning and again a HOTO Certificate has been signed. The PinC conducting the de-commissioning is to ensure all personnel are competent in the de-commissioning process and that all documentation and procedures are conducted in accordance with the Master Check List.

4.3.36. **Standards**. The following standards are to be applied to the Handover / Takeover of all DPIs, the PinC construction, testing, commissioning or de-commissioning is to liaise with OA and ensure the following has been applied in accordance with Master Check List.

a. Dangerous Substances and Explosive Atmosphere Regulations (DSEAR 2002) JSP 375 Vol 2 Lflt 56.

b. Pressure System Safety Regulations (PSSR) 2000. JSP 375 Vol 2 Lflt 30.

c. HSE Guidance Note GS4 Safety in Pressure Testing 1998. (Used for Pneumatic Leak Testing).

d. BS 5958-2:1991 Code of Practice for Control of Undesirable Static Electricity. Part 2.

e. PD CLC/TR 50404:2003 Electrostatics Code of Practice for the avoidance of Hazards Due to Static Electricity.

f. JSP 375 MOD Health and Safety Handbook ie CDM Regulations. LINK

SECTION 7 – OPERATOR MAINTENANCE OF DPI

4.3.37. A high standard of operator maintenance is required at all times on DPIs. This section cannot outline what is required and what standards are used to ensure the safe and effective maintenance of DPIs. Due to the bespoke nature of each installation the MDA will produce a O&M section within the H&S File that will outline the exact requirements, in detail and who is responsible. The Health and Safety File including all O&M, training competences and HOTO documentation will be formally handed to the OA at the HOTO Board.

SECTION 8 – DE-COMMISSIONING

4.3.38. The process of de-commissioning is the safe removal of all product from the system. All de-commissioning must be carried out in a controlled manner under a SSoW, supervised by an AP

Pet. Prior to the removal of product the PinC must ensure that all plans / documents are in place as per the Master Check List, ie Pollution Control Plan and Spill Response Plan.

4.3.39. **Who**. The following personnel can conduct de-commissioning on a DPI under a SSoW provided by an AP Petroleum:

a. **516 STRE (BP)**. A SNCO / JNCO Ftr U&P or Clk Wks (M) deemed competent by the OC.

4.3.40. **Responsibilities**. The following have responsibilities for the de-commissioning of DPIs.

a. **516 STRE (BP)**.

1) Provide a nominated SNCO / JNCO Ftr U&P or Clk Wks (M) deemed competent by the OC.

2) Produce bespoke Risk Assessments and Method Statements for the de-commissioning of all large/complex DPI under the guidance of an AP Petroleum.

3) Produce bespoke Risk Assessments and Method Statements for the pigging of all DPI (if required) under the guidance of an AP Petroleum and AP Mechanical.

4.3.41. **Guidance Note. De-Commissioning.** The PinC de-commissioning must ensure that all personnel involved in the process are aware of all safety precautions and the correct response to spill or fire in accordance with fuel spill response plans and that all work is carried out under a SSoW, supervised by an AP Pet and that all the documentation and processes are correct in accordance with the Master Check List. PIGing operations are only to be carried out by the MDA under a SSoW, supervised by an AP Pet and AP Mechanical. When authorised by the OC MDA the max pneumatic pressure (used during PIGing) of 10psi may be exceeded up to a maximum of 10% of the design pressure.

4.3.42. **Standards**. The following standards are to be applied to the commissioning of all DPIs.

a. Dangerous Substances and Explosive Atmosphere Regulations (DSEAR 2002) JSP 375 Vol 2 Lflt 56.

b. Pressure System Safety Regulations (PSSR) 2000. JSP 375 Vol 2 Lflt 30.

c. HSE Guidance Note GS4 Safety in Pressure Testing 1998. (Used for Pneumatic Leak Testing and Pigging).

d. JSP 375 MOD Health and Safety Handbook ie CDM Regulations.

e. JSP 375 Vol3 Chap 4 Mechanical Systems.

f. JSP 375 Vol3 Chap 5 Petroleum.

SECTION 9 – RECOVERY

4.3.43. The purpose of this section is to outline who has what responsibilities for the recovery of equipment post de-commissioning of a DPI and what standards and documentation required.

4.3.44. **Who**. The following personnel are involved in the recovery process for DPIs:

a. **516 STRE (BP)**.

1) Provide supervision and management for the recovery of all DPIs.

2) Provide a PinC for the recovery of all DPIs.

4.3.45. **Responsibilities**. The following have responsibilities for the recovery of DPIs.

a. **516 STRE (BP)**.

1) Provide a nominated SNCO/JNCO Ftr U&P or Clk Wks (M) deemed competent by the OC.

2) Provide supervision and management for the recovery of all DPIs.

3) Ensure that all equipment is packed correctly and that all equipment documentation has been completed.

4.3.46. **Guidance Note. Recovery**. A PinC of recovery is to be nominated to ensure that all equipment documentation has been completed and that all equipments have been packed correctly deficiencies are correctly annotated and equipment that is unserviceable requires a AF 1043 to be raised and the relevant authority to sign it. All equipment needs to be vented in an open air environment for a minimum of 24 hours prior to being packed. The mode of transport that it is being returned in needs to be identified (land, sea or air) and prepared in accordance with the relevant regulations and the correct transport documentation completed as per the Master Check List.

4.3.47. **Standards**. The following standards are to be applied to the recovery of all DPIs.

a. International Carriage of Dangerous Goods by Road. (ADR)

b. International Maritime Dangerous Goods Code. (IMDG)

c. International Rule for Transport of Dangerous Substance by Railway. (RID)

d. Internatinal Air Transport Association. (IATA)

e. JSP 375 MOD Health and Safety Handbook, ie CDM Regulations, PUWER and LOLER.

SECTION 10 – MTFI

4.3.48. Refer to Part 3 Chap 1 Motor Transport Fuel Installation.

Earthing Standards Flow Chart

Annex A to
JSP 317 5th Ed
Part4
Chapter 3
DPI

Is the Site within a Military Works Area
(A MWA is declared at a time of warfighting until formally rescinded by higher military authority).

Yes

It is the responsibility of the person in charge (PinC) to ensure that JSP 375 and 317 are followed as Far As is Reasonably Practicable (AFARP).

No

Is the system going to operate/ pump any product including water?

Yes

All major components complete with Earthing Spike must be Earthed to <10Ω

The following assemblies must also be Earthed individually to <10Ω:
Standard Manifold
Filter (s) 4"
Crossing Point Assemblies
Stone and Sand Trap
PIG Trap

The pipelines and hoses that make up the rest of the system are to achieve a resistance to earth of $<10^{6}\ \Omega$

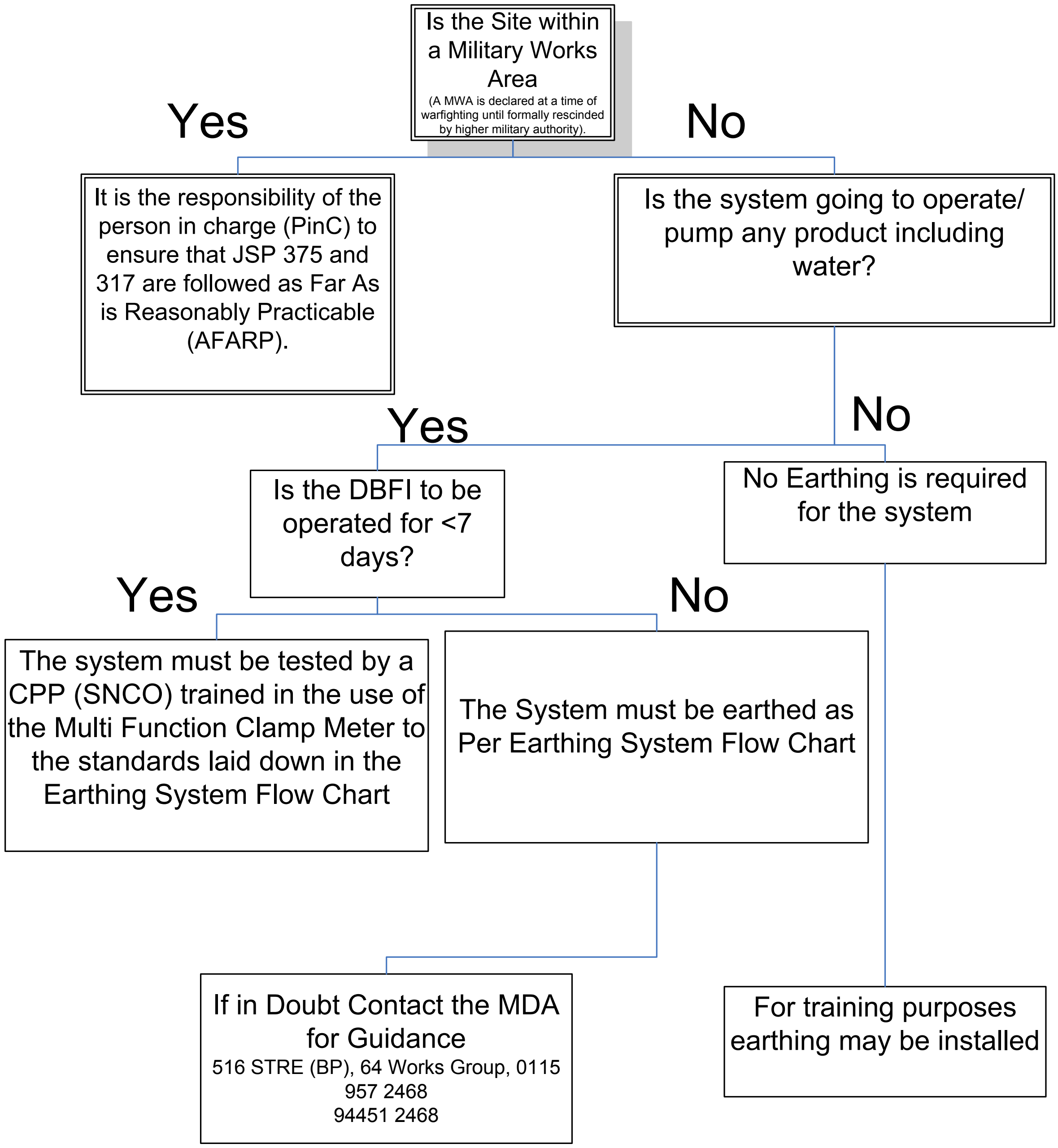
If in Doubt Contact the MDA for Guidance
516 STRE (BP), 64 Works Group, 0115 957 2468
94451 2468

No

No Earthing is required for the system

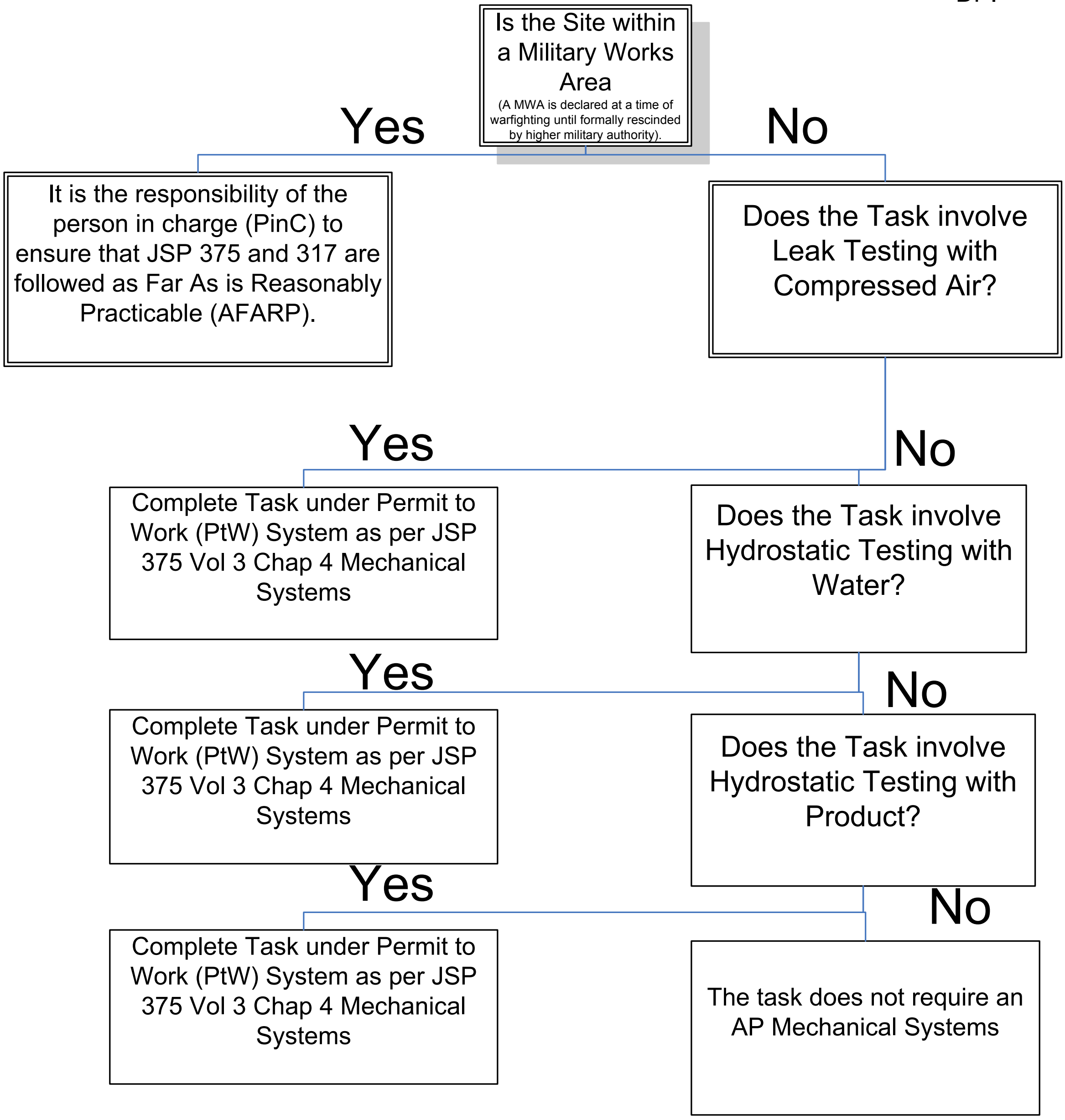
For training purposes earthing may be installed

DPI Earthing Flow Chart

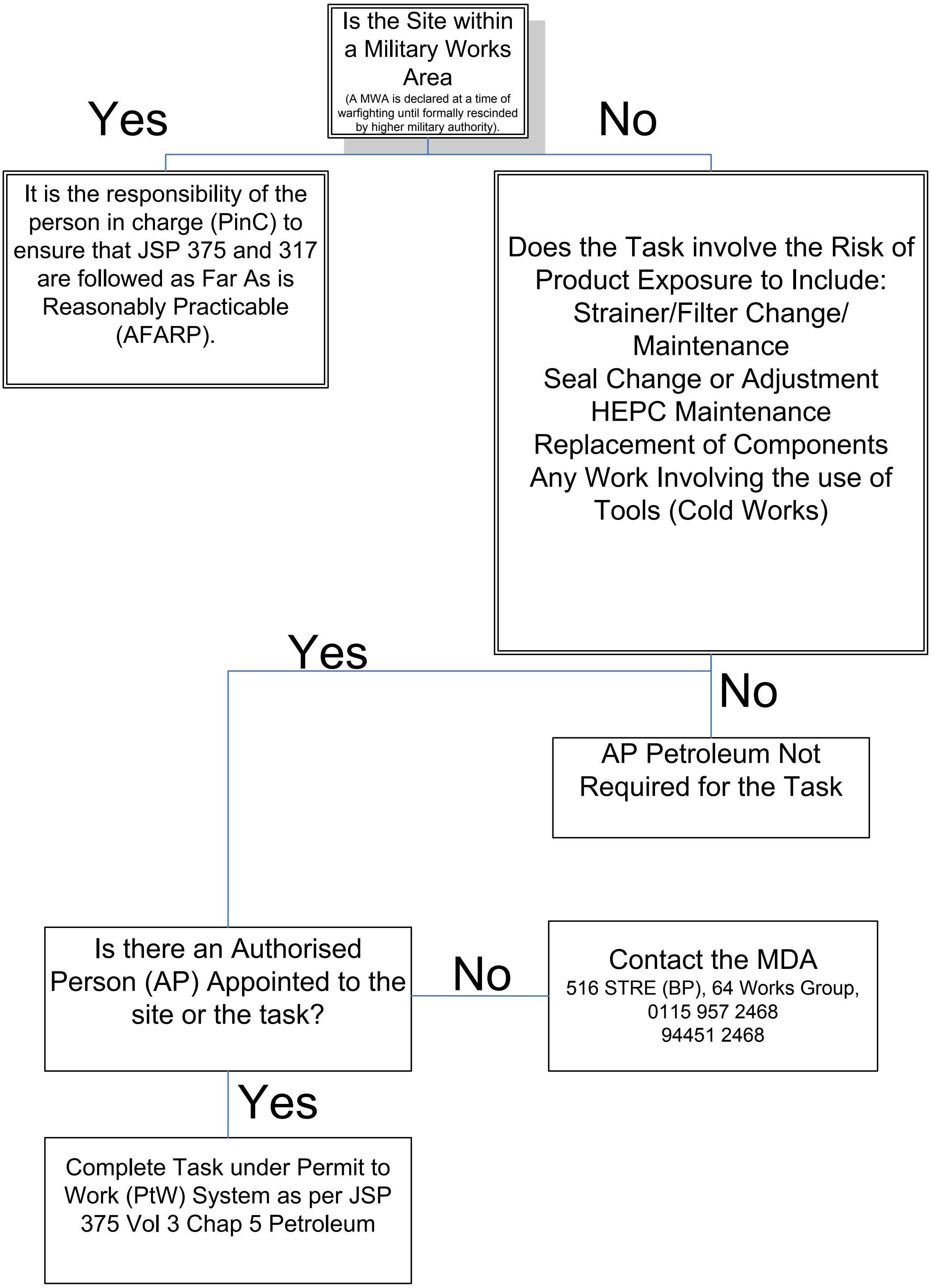


Authorised Persons Mechanical Flow Chart

Annex C to Part4 Chapter 3 JSP 317 DPI



Authorised Persons Petroleum Flow Chart



MASTER CHECK LIST

This check list is to be used to ascertain the required documents for each stage of a project. To progress a stage in a task all of the documents listed for the previous section must be present.

REQUIRED DOCUMENTS/TASK	Design	Construction	Testing	Commissioning	Handover	O&M	Decomissioning and Deconstruction	Recovery	Notes
Tasking Request (Note 1)	√	√	√	√	√	√	√		1. Request for Specialist Engineer Tasking
SON/SOR	√	√	√	√	√	√	√		
Task File/DTO	√	√	√	√	√	√	√		
Recce Report (Note 2)	√	√	√	√	√	√	√		2. Using Recce Report Format at Annex F
JSP 317+375 (Note 3)	√	√	√	√	√	√	√		3. Responsibilites and Standards Design Phase
MDA Approved Dwgs (incl DSEAR Zoning)	√	√	√	√	√	√	√		
Siting Board (Note 4)		√	√	√	√	√	√		4. An official agreement on the use of the site and surrounding areas
Site Diary (Note 5)		√	√	√	√	√	√		5. To be compiled by the PinC to contain a written record of all occurences on site
Method Statements (Note 6)		√	√	√	√	√	√	√	6. To be checked and signed by PinC before construction commences
Risk Assesments (As per note 6)		√	√	√	√	√	√	√	
Statement of Known Services to incl Permit to Dig (Note 7)		√	√	√	√	√	√		7. Issued by land owner/manager e.g. DE or RPC Uk to include Dwgs of knwon services
Competency Registers (Note 8)		√	√	√	√	√	√	√	8. For all persons on site, highlighting key competencies e.g. MHE operators, Aps etc
First Aid Plan (As per Note 6)		√	√	√	√	√	√	√	
Fire Plan (As per Note 6)		√	√	√	√	√	√	√	
Spillage Plan (Note 9)		√	√	√	√	√	√	√	9. To be integrated with existing Plan where possible, must be checked by environmental
Appointments Register (PinC etc) (Note 10)		√	√	√	√	√	√	√	10. Must include an official appointmets chart ahowing who is responsible. Must highlight
As Built Dwgs (Note 11)			√	√	√	√	√		11. MDA Produced and signed drawings
Incorporated Stores List			√	√	√	√	√		
Valve Operation Chart (Note 12)			√	√	√	√	√		12. Checked, signed and dated by PinC. Must match As Built Drawings, valve numbers
Nominated OA (As per Note 10)			√	√	√	√	√		
Earth Testing Certificate (Note 13)			√	√	√	√	√		13. To be carried out as per Earthing Standards Flow Chart
Permit to Work (PtW) for Air and Hyd testing			√	√	√	√	√		
Air Leak Testing Certificate (Note 14)			√	√	√	√	√		14. To be carried out as per AP Mechanical Flow Chart
Hydraulic Testing Certificate (Note15)			√	√	√	√	√		15. To be carried out as per AP Mechanical Flow Chart Hydraulic Testing Certificate
PtW Petroleum (Note 16)			√	√	√	√	√		16. Issued by an Appointed AP Petroleum/TFHE
Commissioining Method Statement (Note 17)				√	√	√	√		17. To be checked and signed by PinC before commissioning commences
OA to witness Functional and Acceptance Tests				√	√	√	√		
OA to receive site familiarisation training (Note 18)				√	√	√	√		18. OA PinC must complete a competency register of all persons witnessing tests and
IER Certificates (Note 19)				√	√	√	√		19. Checked and sign Sect 3 DBFI Installation and T&C Approval Certificate
Calibration Certificates (As per Note 19)				√	√	√	√		
H&S File (Note 20)					√	√			20. To be collated by PinC/OC of construction. Must contain all documents listed
HOTO Board (Note 21)					√	√			21. Must be an official meeting with minutes taken and all parties agree to the HOTO
HOTO Certificate (Note 22)					√	√			22. To be signed by OC construction force and OC OA and witnessed
Site Log (Note 23)						√			23. To be collated by PinC of OA and contain details of all actions and operations on site
Competencty Register (Note 24)						√			24. To be collated by PinC of OA. Must be checked and updated when required e.g.
Review of Spill Plan, Risk Assesments, Standing Instruction, Fire Plan, Oxo Charts, DSEAR Dwgs and RAs, (Note 25)						√			25. Documents must be reviewed every 6 months. MDA to review site every 6 months
Review of IER and Calibration Certs (Note 26)						√			26. Book IER inspections and Calibrations at least 90 days prior to run out date

Part 5

Chapter 1 (Sponsor FGSR Hazard)

POLLUTION, PREVENTION AND CONTROL - GENERAL

SECTION 1 – INTRODUCTION

5.1.01. The MOD Policy for the Management of Safety and Environmental Protection is set by the Secretary of State for Defence and is detailed in JSP 375, Volume 1. As a major user of petroleum products, the MOD has a particular duty to protect the environment from oil pollution. To fulfil this duty, the MOD must ensure that procedures, equipment and training are in place to prevent oil pollution or, in the event of a spillage, to contain and recover the oil with minimum environmental damage.

5.1.02. This Part of the JSP defines MOD policy for the prevention and control of oil pollution, which encompasses pollution by any petroleum product and chemical products covered under the MOD's Emergency Pollution Response Service contract.

5.1.03. Definition **of Spillage** For the purposes of this publication a spillage is an "uncontrolled release of product from the Primary Container Part 2 Chapter 8 pipeline, tank, road tanker, refueller, vessel or other container) in which it was held".

SECTION 2 – SCOPE

5.1.04. To ensure that as many aspects relating to pollution prevention and clean-up are covered this Part of the JSP has been expanded to include information considered both essential and helpful to the user.

5.1.05. Chapter 2 - **Pollution Control Planning**. This Chapter provides guidance on bringing together a unit plan to control pollution that may occur due to the unit's activities.

5.1.06. Chapter 3 - **Pollution Risk Assessment**. This Chapter outlines the need for a unit to conduct a Risk Assessment of its F&L activities to highlight the areas of risk and the potential impact of a spillage incident.

5.1.07. Chapter 4 **Inland Pollution**. This Chapter defines Inland pollution including land, inland waterways and shoreline / harbour areas. In each case the chapter outlines the legislative requirement and includes information on the liaison with other agencies and stakeholders

5.1.08. Chapter 5 **Inland Pollution Reporting.** This Chapter details the hierarchy of inland spillage reporting (Tier 1, 2 and 3) reporting process and explains the MOD Forms used to report inland spillages.

5.1.09. Chapter 6 **Maritime Pollution.**

5.1.10. Chapter 7 - **Maritime Pollution Reporting.**

5.1.11. Chapter 8 – **Spillage Response Plan** This chapter gives guidance on the legal requirements for the production of a Unit Spillage Response Plan (USRP) and the items to be considered when planning a response. The planning structure requires units to designate incidents into Tiers which equate to their clean up capability, and any assessment must take account of the sensitivity of the site, the capabilities of the unit concerned, and the hazards posed by the products handled.-

5.1.12. Chapter 9 - **Pollution Control Sorbents and Equipment**. This Chapter deals with the Pollution Control Sorbents (PCS) and Pollution Control Equipment (PCE) that are available in-service and touches on the local purchase of supplementary items.

5.1.11. Chapter 10 - **Emergency Pollution Response Service Contract UK, NI & International Maritime Waters**. This Chapter details the services provided by the MOD's emergency spillage response contractor within the UK, NI and International Maritime Waters and the actions required of a unit/authorised person to activate the contract.

5.1.12. Chapter 11 - **Emergency Spillage Response Contract outside UK & NI**. This Chapter details the arrangements for emergency spillage response outside the UK and NI that need to be carried out by Theatre Commands.

SECTION 3 – LEGISLATION & MOD BULK FUEL IMPLICATIONS

5.1.13. The most likely environmental hazard arising from a F&L spillage is the contamination of surface watercourses, groundwater supplies, or coastal waters. Environmental legislation therefore focuses on the environmental effects of F&L pollution on water sources.

5.1.14. It is policy that, within the UK, the MOD will comply with Environmental law and any additional requirements arising from international treaties and protocols to which the UK is a signatory. Overseas, the MOD will apply UK standards where reasonably practicable and in addition comply with relevant host nations' standards. Where the MOD has been granted specific exemptions, disapplications or derogations from legislation, international treaties or protocols, Departmental standards and arrangements are to be introduced which will be, so far as reasonably practicable, at least as good as those required by the legislation. It is UK Government Policy that the polluter pays.

5.1.15. The environmental policy lead on pollution legislation is detailed in JSP 418 Volume 2 Leaflet 2, The MOD Sustainable Development and Environment Manual. JSP 418 is framed to ensure activities of the MOD are conducted in compliance with the law and international conventions. However, JSP 418 does not provide specialist guidance on the prevention and clean up of oil pollution. This JSP has been notified as the lead for such matters and it is the purpose of this Part of JSP 317 to provide suitable guidance.

LEGISLATIVE DEVELOPMENT

THE WATER RESOURCES ACT 1991

5.1.16. The Water Resources Act 1991 (WRA 91) consolidated existing water laws. With regards to water pollution WRA 91 (Section 104) defines "Controlled Waters" and covers practically all natural waters in England and Wales. Controlled waters are defined in Scotland by the Control of Pollution Act 1974. In Northern Ireland Articles 7-10 of the Water (NI) Order 1999. "Controlled Waters" are defined as follows

a. Estuarine and coastal waters up to 3 nautical miles offshore.

b. Inland fresh surface waters which include rivers, lakes, ponds, streams, canals, and reservoirs.

c. Groundwaters which are contained in underground strata.

ENVIRONMENTAL PERMITING REGULATIONS 2010 (EPR)

5.1.17. The parts of the WRA 91 that deal with water offences and permits have been replaced by the Environmental Permitting Regulations 2010 (EPR). The EPR regulates discharges into Controlled Waters via a permitting regime managed by the Environment Agency (EA) and is based on the polluters pay principle which requires polluters to pay for the environmental costs of their discharges into controlled waters. This EPR is broadly mirrored in Scotland as; The Water Environment (Controlled Activities) Scotland Regulations 2005. The EPR has the potential to specifically impact the following MOD bulk fuels areas.

a. Bulk storage of "Petrol"

b. Storage of waste F&L

c. Pollution from bulk fuel storage sites.

BULK STORAGE OF "PETROL"

5.1.18. Part 2, Section 1.2 of EPR, identifies that the storage of "*Petrol*" in "*Terminals*" or the loading / unloading of "Petrol" (MOD Class I fuels – e.g. ULGAS, AVGAS) into or from "*Road Tankers*" is defined as a Part B activity. This means that the activity may have the potential to produce air pollution. The Part B regime (Local Air Pollution Control) regulates air polluting emissions and Local Authorities are the Regulators.

5.1.19. "Petrol" and "Terminal" are defined in the EPR. It is highly likely that these definitions encompass AVGAS bowsers and Aviation BFIs issuing AVGAS into bowsers. It may also include BFIs storing ULGAS and issuing bulk ULGAS into Jerricans. Operators of such sites shall apply via their respective Local Authorities for Part B permits as appropriate.

5.1.20. Part 2, Section 1.2 of EPR also identifies the unloading of “Petrol” (ULGAS) into stationary storage tanks at a service station (MOD MTFI) if the total quantity of Petrol unloaded in a 12-month period is greater than 500m^3 (500,000 litres). Operators of such sites are responsible for identifying their annual ULGAS throughput and shall apply via their respective Local Authorities for Part B permits as appropriate.

STORAGE OF WASTE F&L

5.1.21. Permits or exemptions under the EPR are not required to cover the **temporary** storage of waste at the place of production. MOD establishments fit the criteria of being a premise; therefore any waste produced by the 'MOD' can fall under the establishment’s hazardous waste producer code. It must, however be managed by the establishment. Units within the establishment can produce hazardous waste and move it to the central compound within the establishment boundary, without consigning it (an internal note may be used). Once hazardous waste is bulked up it is then consigned off the station / establishment in accordance with current Hazardous Waste regulations (JSP 418 Vol 2 Leaflet 3) and must go to a site covered by a permit or exemption.

5.1.22. The EPR state that storage of waste F&L with a flashpoint below 21°C **is not exempt**. Operators of such hazardous waste sites are responsible for identifying whether they store waste F&L with a flashpoint below 21°C and shall apply via their respective Local Authorities for Part B permits as appropriate.

POLLUTION FROM BULK FUEL STORAGE SITES

5.1.23. Under the mandate of the EPR, Regulators will no longer issue consents to discharge from OWI. Section 12 (and 38) of the EPR states, “it is an offence to cause or knowingly permit a water discharge activity or groundwater activity unless it is authorised by an environmental permit”

5.1.24. Historically under the previous regime; permits to discharge from class 1 or 2 OWI were obtained from the regulator / sewage operator (OWI see Part 2 Chapter 9). However, EPR states that discharges of F&L out of / from **new OWI *will not*** be issued; as any release from an OWI will be considered as a pollution offence into Controlled Waters.

ENVIRONMENTAL PROTECTION ACT 1990

5.4.25. The Environmental Protection Act 1990 Part IIA Section 78A(2) defines contaminated land as being: “any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:

"(a) ***Significant harm*** is being caused or there is a ***significant possibility*** of such harm being caused; or

"(b) ***Pollution of controlled waters*** is being, or is ***likely*** to be, caused".

THE CONTROL OF POLLUTION (OIL STORAGE) (ENGLAND) REGULATIONS 2001

5.1.26. The Control of Pollution (Oil Storage) (England) Regulations 2001 requires that above ground storage tanks over 200 litres must be provided with secondary containment (a bund or drip tray) to ensure that any leaking or spilt oil cannot enter controlled waters. Further information can be found at the Environment Agency, Pollution Prevention Guidelines – PPG 21 Above ground storage tanks, PPG 26 Storage and handling of drums and intermediate bulk containers (IBCs), and the DEFRA Guidance note for the Control of Pollution (Oil Storage) (England) Regulations 2001.

5.1.27. The general requirements for all storage of oil on MOD sites are as follows:-

a. Oil shall be stored in a container, which is of sufficient strength and structural integrity to ensure that it is unlikely to burst or leak in its ordinary use.

b. The secondary containment system should be impermeable to oil and water and there should be no direct outlet when connecting the bund to any drain, sewer or watercourse, or discharging onto a yard or unmade ground.

c. The capacity of the secondary containment system must provide storage of at least 110% of the tanks maximum capacity. If more than one container is stored, the system must be capable of storing 110% of the biggest containers' capacity or 25% of the total tank capacity within the bund, whichever is the greater.

5.1.28. The regulations do not apply to the following activities, processes or infrastructure within the MOD:

a. Any container with a storage capacity of 200 litres or less.

b. Any container which is situated in a building or wholly underground.

c. On any premises used as a private dwelling if the storage capacity of the container in which it stored is 3500 litres or less.

THE WATER ENVIRONMENT (OIL STORAGE) (SCOTLAND) REGULATIONS 2006

5.1.29. The Water Environment (Oil Storage) (Scotland) Regulations are broadly in line with The Control of Pollution (Oil Storage) (England) Regulations 2001. The Water Environment (Oil Storage) (Scotland) Regulations 2006 requires that above ground storage tanks over 200 litres, stored outside ***or in buildings*** must be provided with secondary containment (a bund or drip tray) to ensure that any leaking or spilt oil cannot enter the water environment. Whilst SEPA would prefer use of “traditional” tank secondary containment system within buildings, the 110% secondary containment requirements of the Scottish Regulations may be met within the building itself by construction of an impermeable floor and lip on doorways.

APPLICATION OF THE CONTROL OF POLLUTION (OIL STORAGE) (ENGLAND) REGULATIONS 2001& THE WATER ENVIRONMENT (OIL STORAGE) (SCOTLAND) REGULATIONS 2006 IN THE MOD

5.1.30. If there is a requirement to store 205 litre drums, Intermediate Bulk Containers (IBCs) at permanent locations, the secondary containment area must be designed and constructed as a permanent piece of infrastructure in accordance with current building regulations. Units may purchase temporary “bunded” containers for 205 litre or IBCs, but must ensure that they are compliant with the respective regulations.

5.1.31. Where existing bulk fuel sites are not fully compliant with the regulations or the requirements of the regulations are not appropriate for technical reasons (for example - complex installations), the Environment Agency / SEPA will take a pragmatic approach in line with their enforcement policy. This view will be acceptable by the Environment Agency / SEPA as long as the objectives of the regulations can be achieved through an equivalent level of protection to the environment, taking into account both the risks to the environment and costs to the operator. In any case, where the regulations are not being fully applied, a detailed Risk Assessment showing safety measures and controls put in place must be prepared.

SECTION 4 - MARITIME / SHORELINE LEGISLATION / REGULATIONS APPLICABLE TO MOD BULK FUEL ACTIVITIES

INTERNATIONAL MARITIME CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS 1973, AS MODIFIED BY THE PROTOCOL OF 1978 (MARPOL 73/78)

5.1.32. The International Maritime Organisation (IMO), a specialised agency of the United Nations, has established international regulations which set minimum standards for vessels in order to control pollution at sea. The principle regulations dealing with various discharges of pollutants from ships are found in the *International Maritime Organisation’s Convention for the Prevention of Pollution from ships 1973*, subsequently modified by the Protocol of 1978, collectively known as *MARPOL 73/78*. These have been adopted with the consent of maritime nations across the world. MARPOL regulations apply directly to vessels in international waters and, are applied through national legislation in territorial waters. The UK is a signatory to MARPOL and is committed to implementing its requirements; the MOD is required to comply with MARPOL legislation.

5.1.33. Article three of the 1973 Convention (MARPOL 73/78) contains information with respect to its application. The Secretary of State for Defence has issued an Environmental

Policy statement to meet the regulatory requirements of MARPOL and other like legislation, detailed at JSP 418, and is to be applied across Defence.

5.1.34. It is therefore MOD policy (JSP 418) to comply with the letter and the spirit of UK and international environmental regulations to which the UK is a signatory without, where at all possible, compromising the operational capability of the MOD. Regulations covering the various sources of ship generated pollution are contained in six annexes of the MARPOL 73/78 Convention, which are then implemented through specific UK legislation such as *Environmental Protection Act 1990, Control of pollution Act (Landed Ships Waste) 1987 and 1989, the Merchant Shipping (Prevention of Oil Pollution) Regulations 1995*, the Waste Acts and relevant Statutory Instruments (SIs).

APPLICABILITY

5.1.35. MARPOL Annex I - Prevention of Pollution by Oil entered into force 2 October 1983 and is enacted in the UK by the Merchant Shipping (Prevention of Oil Pollution) Regulations 1995. It applies to all Government Owned vessels on government business where it is reasonable and practicable for them to comply without affecting their operational capability.

WASTE BEING LANDED FROM SHIPS AND THE DUTY OF CARE

5.1.36. Waste oil and other wastes contaminated with oil are classified as Hazardous Waste by the *Hazardous Waste* (*England and Wales) Regulations 2005*, and in Scotland the *Special Waste Regulations 1996.* The *Environmental Protection Act 1990* from which there is no Crown Immunity, places certain responsibilities on the disposers of waste. Part II Sect 34 of the Act covers waste and places a ‘Duty of Care’, the general principle of which is that the responsibilities of a waste for disposal rest with the waste producer. The legal requirements of the Act extend to all types of waste landed from HM ships. It is normal practice for HM Naval Bases to provide the appropriate waste disposal facilities that may normally be expected to be landed from ships, but it is the waste producer’s responsibility to ensure that correct disposal action has been taken.

INTERNATIONAL CONVENTION ON OIL POLLUTION PREPAREDNESS, RESPONSE AND CO-OPERTAION – (OPRC 98)

5.1.37. The OPRC 1998 Regulations are the principal legislation on counter pollution from a harbour authority *and oil handling perspective.* In particular the OPRC obligation arises for: -

a. Any harbour and oil handling facility offering berths alongside, on buoys or at anchor, to ships over 400 gross tonnes (GT), or oil tankers of over 150 GT.

b. Any harbour and any oil handling facility which the Secretary of State has served the harbour authority or operator with a notice that he is of the opinion that maritime facilities are undertaken at the harbour or facility which involve a significant risk of discharge of over 10 tonnes of oil.

c. Any harbour and any oil handling facility which the Secretary of State has served the harbour authority or operator a notice stating that he is of the opinion that it is located in an area of significant environmental sensitivity, or in an area where discharge of oil or other substances could cause significant economical damage.

5.1.38. The OPRC 98 Regulations state that harbour authorities or oil handling facilities identified at 5.1.35 must have either:

a. A minimum level of pre-positioned oil spill combating equipment commensurate with the risk involved and programmes for its use.

b. A programme of exercises for oil pollution response organisations and training of relevant personnel.

c. Detailed plans and communication infrastructure for responding to an oil pollution incident.

d. Sufficient pollution control equipment to adequately deal with a Tier 1 spill.

e. Have in place a contract with a competent oil spill response company that has the capability to respond to a Tier 2 spill. There is no requirement for a harbour authority or oil handling facility to actually have in place arrangements with a competent response company, but there must be a formal agreement in place to ensure that a response will be guaranteed in the event of an accident.

SECTION 5 - STANAG 7102 – ENVIRONMENTAL PROTECTION HANDLING REQUIREMENTS FOR PETROLEUM HANDLING FACILITIES AND EQUIPMENT

5.1.39. STANAG 7102 covers the responsibilities of both host nations and deployed units with regard to the minimum environmental requirements that nations should adopt during petroleum handling operations on both fixed and tactical fuel handling installations.

BIBLIOGRAPHY

1. Environment Agency Pollution Prevention Guide 21 (PPG 21).

2. JSP 375 – MOD Health and Safety Handbook.

3. JSP 418 – The MOD Sustainable Development and Environment Manual.

4. Maritime and Coastguard Agency – Oil Spill Contingency Plan Guidelines for Ports, Harbours and Oil Handling Facilities.

5. International Maritime Convention For The Prevention Of Pollution From Ships 1973, As Modified By The Protocol Of 1978 (MARPOL 73/78.

6. The Control of Pollution (Oil Storage) (England) Regulations 2001.

7. The Water Environment (Oil Storage) Scotland) Regulations.

8. STANAG 7102.

9. International Convention On Oil Pollution Preparedness, Response And Co-Operation – (OPRC98)

10. Environmental Permitting Regulations 2010 (EPR).

11. Water Resources Act 1991

Part 5

Chapter 2 (Sponsor FGSR - HAZARD)

POLLUTION CONTROL PLANNING

SECTION 1 – INTRODUCTION

5.2.01. No one plans to pollute. Most MOD sites have the potential to cause significant environmental harm and to threaten water supplies and public health. This publication, when read in conjunction with JSP 418, provides guidance on how to minimise the risk of an incident occurring. However, there will always be a residual risk of a spillage or fire that could cause significant environmental problems. In addition to the obvious threat posed by chemicals and oils, even materials that are non-hazardous to humans, such as food and beverages, can cause serious environmental harm. The run-off generated in the event of a fire can also be very damaging.

5.2.02. The environmental impact of such an incident may be long term and, in the case of groundwater, may persist for decades or even longer. As a result, the legal consequences and clean-up operations can be costly. Rivers, sewers, culverts, drains, water distribution systems and service ducts all present routes for pollutants to travel off-site. As a result, the effects of a discharge may not be evident on site but may become apparent some distance away.

5.2.03. In most cases, an incident of this kind need not result in serious environmental damage, providing appropriate pollution prevention measures are in place or immediately available. The key to this is to carryout Pollution Control Planning supported by a Unit Risk Assessment, see Part 5, Chapter 3, from which a Unit Spillage Response Plan (USRP) can be developed, see Part 5, Chapter 7.

SECTION 2 - AUTHORITY

5.2.04. To ensure that the results of the planning process are formally recognised and authorised for application across the unit, it is essential that the requirements of this Part of the JSP 317 be recognised at all levels from Unit Commander/Head of Establishment down. This recognition can be gained through the unit Environmental Action Group (EAG) which is a mandatory requirement of JSP 418, Chaired by the Unit Commander/Head of Establishment or his delegated representative. The management of a pollution prevention strategy through the EAG and the appointment of a Pollution Control Officer (PCO) at each unit, provides a focal point for the identification of risks and the preparation of pollution control plans. The key to effective pollution prevention is to ensure that staff are aware of the risks and of the potential consequence of failure to comply with the policy and procedures.

5.2.05. The Unit Commander/Head of Establishment must appoint a PCO in person. The PCO must have the minimum competencies to carry out the duties as detailed in paragraph 5.2.6. They are also required to authenticate the USRP in the Foreword.

SECTION 3 – RESPONSIBILITES OF A PCO

5.2.06. Once appointed, the PCO shall ensure that the minimum level of pollution prevention control and procedures are complied with. Using this JSP and the list below as a generic guide, the minimum responsibilities are as follows:

a. Management of Pollution Prevention Strategy by:

1. Providing a focal point for the identification of site F& L risks.

2. Preparation and publication of Unit Spill Response Plans (USRP).

b. To identify / be made aware of any temporary F& L storage on site (bulk or packed). Assess the risk and incorporate into the USRP.

c. To ensure that Pollution Control Teams (PCT) are available, and competent.

d. Liaise with Maintenance Management Organisation (MMO), Project Aquatrine, Aspire Defence or any other PFI Contractor and agree local arrangements for access to infrastructure by Emergency Pollution Response Service (EPRS) PCT during any spill.

e. Liaise with (MMO), Project Aquatrine, and other PFI Contractor and obtain current site drainage map.

f. Identify and manage site main Pollution Control Points.

g. Maintain a record of site / unit spill training.

h. Maintain a record of all significant unit Tier 1, 2 and 3 spills.

i. Maintain a record of Establishment Spillage Register. (MOD F 7771)

j. Ensure that all units within the establishment, (including units on detachment / exercise) are maintaining a Unit Spillage Register (Part 5, Chapter 8, Annex D) and that all spillages are being reported to the PCO on a periodic basis proportionate to the risk.

k. Ensure that SPILLREPs, POLREPs are promptly raised and reported upon completion of spillages. (Including significant spillages subsequently identified by the PCO upon receipt of Unit Spillage Registers).

l. Carry out initial investigation of spill trends identified from SPILLREPs, POLREPs Unit / Establishment Spillage Registers, and report to Command.

m. Ensure that the USRP is periodically reviewed, reviewed after significant changes to site process, reviewed after Tier 2/ 3 spillages or after a number of Tier 1 spillages have occured.

n. To attend all unit spillages during working hours.

o. To carry out the duties of the Incident Spill Controller when attending a unit spillage.

p. To be the units' focal point when the EPRS Contractor or other specialist contractor / agency is called out during any site spillage.

q. To ensure that all satellite / detached units, and BFCVs operating away from parent station have access to appropriate amounts of PCS and are authorised to call on the EPRS contractor if required.

SECTION 4 – ASSESSING THE POTENTIAL FOR POLLUTION

5.2.07. Health and Safety and Environmental legislation requires preventative and protective measures to be taken to ensure the safety of personnel and the environment. So that every aspect is considered a formal planning exercise should be conducted to ensure all areas are suitably covered. As with all planing operations, there are a number of phases to be addressed so that the correct and most usable information is gained to formulate a robust pollution control plan. The following points should be considered at the planning phase:

a. Unit/Site Risk Assessment (see Part 5, Chapter 3).

b. Pollution prevention measures including

(1) Design, construction and maintenance standards

(2) Safe operating procedures.

c. The effects of inland or marine pollution.

d. Pollution control facilities (bunds, interceptors and BFCV parks etc) and availability of Pollution Response Equipment and suitably trained and equipped personnel.

e. The Unit's actions in response to a pollution incident to include the Unit Spillage Response Plan (see Part 5, Chapter 7).

5.2.08. Contingency planning is a continual process, it should not be considered complete after the first draft has been raised but should be subject to a review process to maintain its currency. A review cycle process is shown at Part 5, Chapter 7.

SECTION 5 – POLLUTION CONTROL PLANNING PRINCIPLES

5.2.09. Units are to ensure that the following principles are adopted:

a. Plan to prevent a pollution incident.

b. In the event of an incident, do not put yourself or others at risk.

c. Minimise the effects or impact of a pollution incident, act swiftly to minimise, contain, recover and dispose of the spillage. Restore the environment.

d. If your unit can't cope, call out the people who can (see Part 5, Chapter 9).

e. Report the incident (see Part 5, Chapter 8).

BIBLIOGRAPHY

1. JSP 375 – MOD Health and Safety Handbook

2. JSP 418 – MOD Sustainable Development and Environment Manual

3. Environment Agency Pollution Prevention Guideline 21 (PPG 21)

Part 5

Chapter 3 (Sponsor FGSR - HAZARD)

POLLUTION RISK ASSESSMENT

SECTION 1 - INTRODUCTION

5.3.01. An environmental risk occurs when a hazard (e.g. process, activity or substance) has the potential to cause a harmful impact on the environment. That part of the environment which is, or could be affected is known as a receptor. Receptors include humans, flora and fauna, the built environment and water resources. The presence of a hazard alone does not constitute a risk; a risk is only present if there is a means by which the hazard can impact on the sensitive receptors. The connection between the hazard and receptor is known as the pathway, and all three elements together constitute a source-pathway-receptor (S-P-R) linkage.

5.3.02. Environmental risk assessment is the process whereby S-P-R linkages are identified and evaluated. If any of the three elements are absent then there is no complete link and thus an acceptable risk can be managed. An example of acceptable risk management that breaks this particular S-P-R linkage are the use of compliant F&L storage procedures and effective drainage systems. The magnitude of a risk is a function of the consequences of pollution and the likelihood that such pollution will occur. The risk assessment should not be seen as a 'one and only' process, but should be re-addressed at regular intervals, and revised to take into account any significant changes to the site engineering and operation, and any alteration to the environmental context of the facility. An example of which would be the development of adjacent land which could result in the provision of additional migration pathways and receptors.

5.3.03. Before any credible preventative measures and Unit Spillage Response Plan (USRP) can be designed, a detailed Site/Environmental Risk Assessment will need to be carried out. The aim of a risk assessment is to identify all potential pollution risks and their effects on the environment if a spillage incident were to occur. JSP 375 Vol 2, leaflet 23 provides guidance for carrying out site risk assessments. JSP 418, Vol 1 Chapter 11, provides guidance on Environmental Management Systems and associated Risk Assessment processes.

5.3.04. The risk assessment should highlight any significant risks and indicate the optimum engineering and operational control systems required to mitigate the identified risks. This would include the most suitable means of checking for leakage including accounting checks. Furthermore, it would be expected that the risk assessment would include contingency plans for the protection of the environment in the event of a pollution incident. Factors to consider are fire fighting strategies and water run –off management. Fire fighting foam and water will emulsify any released F&L, and will render useless any oil separator in a remote containment system. Identification of significant hazards can be subjective and be influenced by experience, local environmental sensitivity and management controls and procedures.

5.3.05. The guidance that is provided in this part of the JSP is not prescriptive. It seeks to make those personnel responsible for F&L facilities aware of the hazards from their operations and enable them, in line with their legal obligations, to adopt a practice of identifying, assessing and controlling risks. With the large number of facilities involved, considerable variation in equipment, site design, systems and work practices exists. The contents of this publication can only be used as guidance and the reader will need to use discretion where the guidance does not match the exact circumstances of the site.

TEMPORARY FIELD STORAGE

5.3.06. In addition to the guidance given above units are to ensure as part of their pre-deployment Recce, the appropriate Defence Training Estate (DTE) office is to be made aware of any intention to store F&L products (bulk or packed) no matter how small in the field. Special instructions and reporting procedures applied by the DTE are to be incorporated into the unit USRP, such instructions will highlight areas that must be avoided such as; Aquifers by class, Natural Watercourses and Sites of Special Scientific Interest (SSSI). For large scale field deployments particularly those involving Bulk Fuel Installations (BFI) or Bulk Fuel Carrying Vehicles (BFCV) the Army HQ Petroleum Inspectorate are available to Commanders to assist with any risk assessment relating to an affective Environmental Protection Plan (EPP) prior to deployment.

5.3.07. Units are to ensure at the end of operations/exercise and prior to any re-deployment detailed site clearance is to take place with a member of the ATE staff. Where large scale temporary fuel facilities have been established, i.e. BFI or BFCV Parks or Exchange Points (XP), service Petroleum Inspectorates are to give site clearance.

SECTION 2 - ASSESSING THE RISK

5.3.08. During F&L operations a release of product could occur, not only from a storage tank but also from ancillary equipment during the movement of product to and from the storage facility. The release of product could occur during any of the following activities:

a. **Delivery**. Spillages might occur during delivery of product to a facility. These range from minor loss during uncoupling of delivery pipes to major loss, for example a split hose. Particular care is needed when the person responsible for the delivery is unfamiliar with the facility.

b. **Storage**. Failures in the integrity of the tanks and associated pipe work could result in a significant loss of product. Older tanks are most likely to be single skinned and constructed from steel. Buried pipe work, especially steel pipe work, may suffer accelerated corrosion if not correctly insulated, provided with cathodic protection or it could be compromised by damage if insufficiently protected from traffic etc. This combination of factors would indicate the greatest potential for leakage to occur. The integrity of the tanks could also be compromised by damage.

c. **Dispensing**. During dispensing, loss of product can occur either from the pipe work connecting a tank to the dispensing system, or during the dispensing process. The potential for leakage is increased with the number of joints along the pipe work. A particular risk is posed in situations where spillage is likely to be directly to the water environment, eg during refuelling of ships and boats.

d. **Drainage**. A significant risk to groundwater can occur if appropriate surface and subsurface drainage is not incorporated into the design and construction phase, see Part 3, Chapter 1. The drainage system should be designed to convey potentially contaminated water and spills to suitable interceptors. See Part 2 Chapter 9 for OWI design and operation.

e. **Maintenance and repair**. Significant environmental risks to the water environment could result during the course of maintenance and repair works undertaken during the lifetime of the storage facility.

5.3.09. The degree of risk to groundwater posed by the release of product during these activities will depend on the engineering and operational control measures in place, and on the location of the facility.

RISK OVERVIEW

5.3.10. To gain a full appreciation of a unit's potential risk, the following 5-step approach should be adopted:

Step 1. Take a fresh look at your unit and its facilities, their design, surroundings, operation and maintenance programmes, and identify where a pollution source or risk may exist.

Step 2. For each area of the unit and operation, consider who / what could go wrong, and who could be affected.

Step 3. Address the findings from Step 2 and decide if precautions are enough to guard against anything going wrong or if more should be done.

Step 4. Record your findings.

Step 5. Consider when a review is needed.

RISK IDENTIFICATION

5.3.11. The highest perceived risks exist where there is human involvement, movement or transfer of products, bulk storage and storage of high-risk products. These should be identified when undertaking a Risk Overview and detailed on a Risk Assessment proforma, an example of a risk assessment proforma is available at JSP 375 Vol 2, Annex C. Some of the main factors which need to be taken into account when conducting the Pollution Risk Assessment are detailed below:

a. **Unit Activities**. These can be split into two distinct areas:

(1) Within-Unit operations including the activities of lodger units, contractors and other non-MOD organisations.

(2) Deployed operations and activities including exercises and deployments; a separate risk assessment should be raised for each exercise or deployment.

b. **Location/geography**. This entails the identification of structures and equipment to prevent releases, and the location of surface watercourses, rivers, streams, lakes, reservoirs etc.

c. **Groundwater Vulnerability**. Groundwater provides around two thirds of drinking water supplies. Its vulnerability is dependent on the type of Aquifer present (an Aquifer is an underground water-bearing layer of rock), the soil and rock type and the depth of water. Soils of high vulnerability are sandy/limestone soils and those of low vulnerability are clay rich soils. There are 3 classifications of Aquifers: Major, Minor and Non-Aquifers. A considerable number of MOD establishments are located above groundwater supplies and a unit may find that it is located above an Aquifer. The Environment Agency has developed Groundwater Vulnerability maps for all areas of England and Wales. Copies for individual areas are available through HMSO. For unit locations and training areas the PROM should be able to provide advice.

d. **Drains**. The location and identification of both foul and surface water drains, intercepted areas and the interceptors that serve those areas. 'Foul water' is water that requires treatment at a sewage works before it can be discharged into the surface water environment. 'Surface water' drains discharge directly to rivers and reservoirs etc.

e. **Tasks**. High-Risk operations such as refuelling, receipt and issue from storage tanks and handling and movement of packed stocks.

f. **Products**. Petrol, oil, heating oil, diesel, lubricants, chemicals and solvents and other environmentally damaging products that may be stored, handled by or used on a unit.

g. **Quantities**. This refers to the amount that will be handled which may provide an indication of the potential size of a spillage. It should be noted that spillage on water of one gallon of oil has the capacity to cover the area the size of approximately 2 football pitches (200 m^2).

h. **Frequency**. The frequency of handling, storage, delivery and transfer.

i. **Decommissioning**. Decommissioning activities range from the complete closure and removal of an installation, to the replacement of individual tanks or lengths of pipe work. During decommissioning of storage facilities, product could be lost to ground as a result of either deliberate or accidental release during dismantling and removal of the tanks and pipe work. In addition, a risk could arise off-site if contaminated tanks and pipe work are not disposed of in an appropriate manner. It is preferable to remove all permanently redundant tanks. If tanks are left in-situ, a risk could arise if any residual product remains in the tank as the integrity of the equipment would no longer be maintained or monitored.

POLLUTION RISK ASSESSMENTS

5.3.12. As a minimum Pollution Risk Assessments should also consider the following factors:

a. **Hazard Identification**. What polluting materials are on site? Frequency of F&L processes / operations?

b. **Compliance**. Complying with relevant regulations and good practice will reduce risk.

c. **Competency**. Ensure all relevant personnel involved in F&L operations are suitably trained.

d. **Procedures**. Ensure that procedures exist for normal and emergency operations, and that they are adhered to.

e. **Wet stock Management**. Provision of leak detection and wet stock monitoring systems will reduce risk by ensuring that any potential F&L discrepancies are accounted for.

f. **Delivery**. Are there overfill prevention systems installed? Does the site have a separate tanker stand area? Is it bunded? Are delivery pipes clearly labelled? Are the correct delivery procedures being followed?

g. **Storage**. Age of tanks and pipe work? Groundwater in relation to storage tanks? Construction, materials? Maintenance and inspection regimes?

h. **Operational Security**. Security against vandalism. The risk of spillage due to the third party activity of trespassers or sabotage by an intruder. Risks from potential terrorist activity, and on operations from enemy activity should also be considered.

i. **Drainage**. What is the geology of the site? Are there any aquifers within the locality?

j. **Maintenance.** On condition maintenance? Pressure testing of pipe work etc?

k. **Pollution Control Sorbent (PCS)**. Existence of Pollution Control Points, Pollution Control Response Teams, and containment / prevention measures.

l. **Personnel**. Number of persons at risk including lone workers, eg vehicle mechanics, operators, and storemen. Numbers of contractors on site (operators / casual staff and brought in maintainers)

m. **Records**. Spillage history relating to previous usage. Land Quality Assessments (LQA)

SECTION 3 - REDUCING THE RISK

5.3.13. To reduce the level of risk that may be present there are a number of measures that a unit can take to ensure that the potential to pollute is minimised. With little extra effort or cost a unit can help itself greatly in the fight against pollution.

5.3.14. Correct operating procedures and a robust maintenance regime form the major elements of risk mitigation. If appropriate procedures are developed and followed correctly, not only will the risk of a pollution incident occurring be reduced dramatically, but also the damage caused by an incident can be minimised.

5.3.15. It should be noted that measures adopted to mitigate risks to the environment will overlap with those to control the fire hazard, and every effort must be taken to ensure that there is full integration between the two, see Part 2, Chapter 8. Furthermore, any measures that prevent the significant loss of product will have economic benefits for the unit, appropriate accounting actions for the loss of product are detailed at JSP 886.

5.3.16. Some of the measures that can be taken are as follows:

a. **Housekeeping, Husbandry and Security**. The highest possible and practicable standards are to be maintained as they provide very effective preventative measures.

b. **Storage Areas**. Chemical and petroleum product storage tanks and packed stock storage areas (including waste products tanks) must be sited in a secure bunded area, ideally covered by a roof to exclude rainwater. The area should have an impervious base (eg hard concrete) and be surrounded by a liquid-tight bund wall resistant to attack by the stored product. Bunds must comply with the relevant legislation as stated in Part 5, Chapter 1. Provision of leak detection equipment, overfill protection devices and alarms. Further guidance on storage area construction is at Part 3, Chapter 1.

c. **Drains**. An up-to-date drainage plan must be maintained by the unit, normally by the MMO, so that the pathway of any spillage may be calculated. Drains should be maintained in a serviceable condition without any breaks that could allow pollution to flow directly into the sub-soil. It is beneficial to have the drain covers colour coded, red for foul water and blue for surface drains.

d. **MTFI/Kerbside Refuelling/F&L Points**. These areas are one of the busiest F&L installation on a unit with the highest degree of human involvement, most of who will not be fuels specialists. Every possible precaution must be taken to minimise the potential for spillage. All MTFIs are to have intercepted drainage of the appropriate type and capacity.

e. **MT Yards/Service Areas**. Vehicle wash water and trade effluent is not to be discharged to watercourses or through interceptors. See Part 2 Chapter 9 for OWI design and operation.

f. **Maintenance**. A regular maintenance and inspection programme is the most effective method of ensuring that environmental safeguards are in good condition and in working order. Bunds are to be checked for faults, decay and the build-up of rainwater. Interceptors are to be checked and cleaned routinely. See Partt 2 Chapter 9 for OWI design and operation. It is vital that a detailed plan of works is adhered to when any maintenance or repair work is carried out.

g. **Training and Supervision**. It is essential that only properly trained and supervised personnel be authorised to operate an installation. Plans must be tested to ensure that procedures are adequate to prevent and/or minimise pollution and environmental damage. Unit spillage response plan exercises should be carried out regularly and at least at the required intervals. Staff, especially key staff, must be aware of their responsibilities and duties within the plan.

h. **Emergency Materials**. It is important that Pollution Control Sorbents (PCS) be provided at Pollution Control Points (PCP). The strategic positioning of PCPs will ensure the minimum delay in response to a spillage incident. PCPs are to be stocked appropriately; they must be maintained and should be clearly identifiable.

i. **Pollution Control Response Team**. The team must know their duties and responsibilities. They should be trained and fully conversant in spillage response. Units should be aware of the contractor or agency to be called in to assist in Tier 2 and 3 incidents.

j. **Inspections**. Regular and comprehensive inspections by unit fuels staffs will provide an overview of the condition and operation of the installation. Inspection by the FLC or FGSR will provide additional guidance on any requirements where installations do not meet statutory requirements.

SECTION 4 - REGISTER OF THE RISKS

5.3.17. It is a defined responsibility of the unit Environmental Protection Officer (EPO) to maintain a complete register of at least the significant environmental impacts and regulations. The register will be subject to management review on an annual basis. On completion of a Risk Assessment, the author must submit a copy to the EPO for action and entry on the register. An up-to-date copy of each register entry is to be held by the line manager/supervisor responsible for the activity

Part 5

Chapter 4 (Sponsor FGSR - HAZARD)

INLAND AND SHORELINE POLLUTION

SECTION 1 - INTRODUTION

5.4.01. Inland pollution is taken to include both pollution of the land and pollution of controlled waters resulting from MOD activities. Controlled waters describe practically all natural waters (inland freshwaters; waterways, rivers, lakes, ponds; groundwater /aquifers, estuaries, coastal and territorial waters. More in-depth definitions and a description of relevant environmental legislation are detailed in JSP 418, Volume 2, leaflet 2 for contaminated land and water pollution.

5.4.02. Environmental Regulators in the UK are the Environment Agency (EA - England & Wales), Scottish Environment Protection Agency (SEPA – Scotland), and the Environment & Heritage Service (EHS – Northern Ireland). The Maritime Coastguard Agency (MCA), Queen Harbour Master (QHM), and Local authorities are principal points of contact for contaminated land, shoreline, and beach pollution issues in England & Wales.

5.4.03. Many overseas countries hosting MOD facilities or operations have comprehensive environmental legislation, which considers the effects of pollution and contamination, in some cases incorporating heavy penalties for causing an offence.

5.4.04. Any spill that results in external agency or Regulator involvement will automatically classify it as a Tier 2 spill and will therefore need to be reported in accordance with Part 5, Chapter 8.

SECTION 2 - THE NATURE OF INLAND POLLUTION AND LEGISLATION

LAND POLLUTION

5.4.05. The behaviour of spilled F&L and the relative response strategies for spills on land are different to those of marine or freshwater environments. Spills on land pose their own specific problems and will need to be dealt with on a case by case basis. Where a spill is on an impermeable surface designed to retain F&L (e.g. tank bund or fuelling bays) it may be readily recovered, though in many instances there is risk of spilt material entering a drainage system if not prevented. However, if the fuel is spilled on a permeable surface, such as topsoil, sand, or porous rock (e.g. limestone or chalk) then it is very likely to soak in below the surface (at a rate dependant on many factors) with the potential to reach underlying groundwater (where such exists).

5.4.06. Groundwater, or waters existing near surface in soils, is especially vulnerable to F&L spills. In many areas groundwater aquifers provide a significant resource for public and private drinking water supply and agricultural use. Indeed, many sites on the MOD estate contain one or more dedicated drinking water wells within their boundaries. It is also

important to recognise the potential for groundwater to act as a pathway for spilled product, possibly enabling pollution migration away from the incident site.
5.4.07. The presence of underground infrastructure including drains, soakaways, foundations, services, ducts and conduits can have a significant impact on the lateral extent of land and groundwater contamination, and also aid rapid migration of F&L during and following a spill. Many of these features are able to convey spilled F&L, through a further migration mechanism via the high permeability packing material surrounding them (e.g. sand and gravels around drains and freshwater mains).

5.4.08. There are instances where land pollution is not discovered until some time after the event (remote sites, below ground pooling etc), where the spillage has resulted from a long-term leak, poor infrastructure condition or insufficient inspection. Legacy issues have also occurred where previously unidentified underground pipework or storage tanks have been damaged during unrelated site excavations or investigations.

5.4.09. Following a spill to land or where evidence suggests legacy contamination may exist, it will be necessary to undertake a limited Land Quality Assessment (LQA) specific to the area to determine the associated risk to human health, the environment and infrastructure (buildings and services).

5.4.10. Where product enters permeable ground it is likely that the Regulator will need to be notified if there is a possibility of polluting controlled waters, or of uncontrolled spill migration, or there is deemed to be a significant risk to human health or the environment.

5.4.11. Environmental Regulators have powers to enforce remediation (clean-up) of land and groundwater following a significant pollution incident – at the polluters cost. However, it is generally preferable to remediate voluntarily, prior to enforcement by the Regulator (potentially minimising works and public relations costs).

5.4.12. Specialist advice on LQA can be found in the, *"Contaminated Land Management Land Quality Assessment (LQA) Management Guide"*, published by the DIO Construction Support Team. Units can also seek advice from their respective Command LQA advisors, see table 5.4.1 for details.

Command	Advisor
All MOD Estates	DIO Construction Support Team – Environmental Services, GPTN: 94461 2071
RN Establishments	DE&S Environmental Science Group, GPTN: 93556 7944
DE&S Establishments	DE&S Environmental Science Group, GPTN: 93556 7944
Army Establishments	CESO Army, Netherhaven. GPTN: 94321 8552
RAF Establishments	INFRA 4 – DCOS, Air Spt RAF GPTN: 95429 7266 / 7246 / 7223
Defence Training Estate (DTE)	10 Regional sites managed by DTE Training Estate Delivery. GPTN: 94381 2172
All MOD Estates	The current EPRS Contractor (this service will incur a charge to the unit-see Part 5 Ch 9 for details)

CTLB	CTLB Establishments CESO (CTLB), GPTN: 935230248

Table 5.4.1 Points of Contact for Contaminated / Polluted Land

INLAND WATERS

5.4.13. Oil is the commonest water pollutant. Spilt fuel can also affect littoral zones and banks surrounding freshwater bodies with potentially damaging effects on local aquatic ecosystems. Drinking water supply is also vulnerable to spilt F&L, if municipal or private abstraction points on freshwater systems become tainted.

5.4.14. A volume estimation table of F&L spill on water is detailed in Table 5.4.2. This emphasises the extent of visible impact how little amount F&L can have on water. Note this table is for approximation purposes only and does not take into consideration of meteorological / climatic conditions and is based on a light crude oil on still water.

Visual Colour on Water Surface, SILVERY SHEEN, (Approximate thickness = 10^{-4} mm).	
Area (m^2)	Amount (Ltrs)
100 m^2 - 5000 m^2 (10 m x 10 m – 70 m x 70 m)	0.5 Ltr
10,000 m^2 (Approx 100 m x 100 m)	1 Ltr
370,000 m^2 (Approx 600 m x 600 m)	30 Ltrs
1,000,000 m^2 (Approx 1000 m x 1000 m)	68 Ltrs
2,500,000 m^2 (Approx 1.6 km x 1.6 km)	190 Ltrs

Table 5.4.2 Volume Estimation Table

SECTION 3 – INITIAL RESPONSE AND RECOVERY FOLLOWING A SPILL INLAND

5.4.20. F&L spills are varied in nature and are dependent on local situations. However the effective initial response to all spills depends largely on the application of a contingency plan. (Unit Spill Response Plan- USRP and Pollution Control Sorbents (PCS) are widely available through the MOD contract All of the white PCS products are hydrophobic (repel water) and can therefore be used to adsorb F&L on both the land and water environment.

5.4.21. On no account should dispersants be used to disperse spills on freshwater bodies or on areas of infrastructure where the resultant contaminated water can either enter other water systems, or OWI. Dispersants should only be used with the explicit instruction of the Regulator.

5.4.22. Specialist training on Practical Pollution Prevention is available at Specialist Training School RAF Halton. (Application details are available on the RAF Halton *Intranet web-site and also within JSP 418*).

5.4.23. A limited amount of specialist Pollution Control Equipment (PCE) (Inflatable booms, weir skimmers, tanker rollover kits etc) is sponsored by BFU PT, Tel BT 0117 91 35362, DFTS 9352 35362. PCE is available upon request; however units will have to justify the requirement by increasing their ranging and scaling.

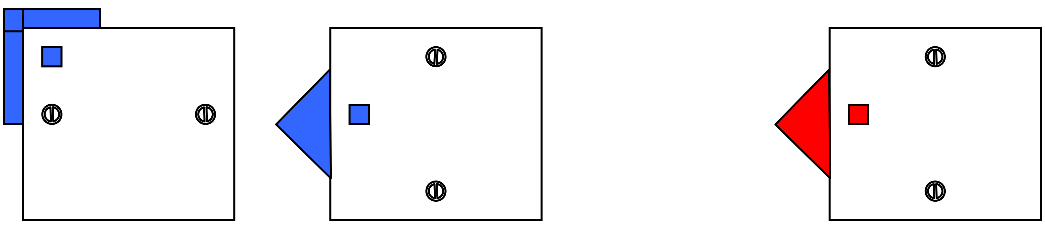
5.4.24. The EPRS Contractor has specialist PCE and trained competent operators available on a callout basis, (see Part 5, Chapter 10 for details).

SECTION 4 - RAIN WATER DRAIN MARKINGS

5.4.25. Some drainage systems have interceptors built into them. See Part 2 Chapter 9 for OWI design and operation. However, these facilities have a finite capacity and once full will no longer prevent the product from travelling further down the drainage system, ultimately to receiving controlled waters or foul sewer. Routine inspection and maintenance of OWI and associated drainage is therefore imperative. As part of a pollution response programme it may also be feasible to apply PCS to drains (with authority from Aquatrine ALR), or install bungs so that the product can be retained at a suitable point to minimise environmental impact.

5.4.26. The unit should have a full and explicit drainage plan or map, normally accessed via the MMO, showing all foul and rain water drains, their flow direction, interceptors and outfall points. The information on this plan will assist the PCO with containment planning and help with decision making of how and where to deploy his assets. These drainage plans should be identified in the Unit Spill Response Plan (USRP) – see Part 5, Chapter 8 for details.

5.4.27. Another proactive measure, which units are strongly advised to adopt, is to mark all drain covers with a colour code and direction of flow for the drain to which it relates (with authority from Aquatrine ALR). Two colour markings are in general use, red for foul drains and blue for rain water drains. The markings are applied to manhole covers as shown in Fig 5.4.1. A marking at the edge of the cover indicates the flow direction of the drain and a corresponding mark is made on the cover to ensure correct orientation of the cover following removal and refitting. It is important that covers are not swapped with another drain."



Example of rain water drain markings　　Example of foul water drain marking

Fig 5.4.1 Colour Coded Markings of Drain Manhole Covers

SECTION 5 - SHORELINE SPILLS

RESPONSIBILITIES AT NAVAL BASES AND DEPOTS

5.4.30. Ships Staff are responsible for dealing with pollution **on board** HM and MOD vessels, irrespective of location ***JSP 430*** Naval Base / Depot QHMs are responsible for pollution cleanup within Dockyards and associated waters (Controlled Waters) i.e. once any spilled F&L has been released **from a vessel** and enters the harbour. Naval Base Commanders are to be prepared to deal in emergencies with MOD generated pollution both within their own waters and outside their own waters in support of other MOD authorities.

5.4.31. The Naval Base Commander (QHM) is responsible for the clearance of unattributable pollution and for overseeing or assuming control of the direction of counter pollution operations where they are beyond the control of the polluter.

5.4.32. Naval Base Commanders (QHM) have the further duty of initiating deterrent measures within waters under their control. This involves ensuring that all MOD vessels and vessels under MOD charter understand the requirement to report "off ship" pollution incidents promptly, and that all incidents are properly investigated to establish the cause.

RELATIONSHIP BETWEEN SHORELINE MOD ESTABLISHMENTS AND QHM / HARBOUR MASTERS

5.4.33. UK & NI based MOD shoreline Units / Establishments are to identify whether their activities fall into any of the caveats of paragraph 5.1. If so; then MOD units and establishments that are situated on the shoreline must comply with paragraph 5.4.29. To ensure compliance of paragraph 5.4.29. Sites must produce a USRP that includes both land and marine activities that occur on their sites. (See Part 5 Chapter 2, Chapter 3, Chapter 8). The USRP must also consider neighbouring sites activities; pollution, particularly marine pollution; as it has no respect for administrative boundaries.

5.4.34. UK & NI based MOD shoreline Units / Establishments that fall into any of the caveats of 5.4.28 a-c; must also consider the need for appropriate accredited Tier 1 maritime spill response training. Training requirement requests must be forwarded to the respective TLB CESO organisation. The CESOs will then coordinate the training requirements and liaise with OC EP STS Halton for availability on the new accredited Tier 1 maritime spill response course.

5.4.35. The Naval Base QHM or civilian Harbour Master **must** be aware of any potential risks that could occur on shoreline MOD establishments, therefore these sites **must** ensure a formal mechanism is in place with the respective QHM / Harbour Master to identify pollution risks and spill response activities . Sites must forward their USRP to the QHM /Harbour Master, and also receive the QHM /Harbour Master "Port Plan" and ensure that the USRP dovetails into the "Port Plan". For marine spills, the QHM / Harbour Master "Port Plan" takes primacy over the USRP. The extent of formal cooperation between MOD Shoreline establishments and Naval Base QHM / civilian Harbour Master should include joint training and exercising of likely scenarios that have been identified from the pollution risk assessment. It is important to understand that while all UK & NI based MOD shoreline Units / Establishments have access to a fully accredited Tier 2 EPRS Contractor (Part 5 Chapter 9), the QHM /Harbour Master may call on his own Tier 2 Contractor if the need arises. In this case, *the polluter pays principle* still applies and MOD sites will be responsible for paying the charges for the services provided by the QHM / Harbour Master Tier 2 Contractor.

5.4.36. A questionnaire is enclosed at (Annex A) to assist UK & NI based MOD shoreline Units / Establishment operators in assessing their sites on the basis of targeted questions and to take further action necessary.

SECTION 6 - CLEARANCE OF POLLUTION FROM MOD BEACHES

5.4.37. Prime responsibility for cleaning up polluted beaches and other shorelines rests with QHM and Local Authorities, except for MOD owned or controlled land without public access. (The Local Defence Land Agent is responsible for agreeing responsibilities with the Local Authority). Commanding Officers of properties with a water frontage without public access must prepare contingency plans defining the action to be taken when pollution incidents occur. The plans should be prepared in conjunction with the local Defence Land Agent, DIO, local and Statutory Harbour authorities and local Conservation and Fisheries Officers. The plans should deal with the handling of oil and hazardous chemicals. Action should also be taken periodically to clear up other material, which is hazardous or unsightly.

5.4.38. Pollution from F&L should be immediately reported to the MCA, the Defence land Agent, the relevant local Pollution Control Authority and the affected establishment's Property Manager. Significant F&L pollution of navigable waters should be notified to the appropriate Naval Base/Depot PCO with a view to initiating preventative and abatement action. The costs of local clean–up are to be recorded to permit a claim against the polluter, should one be identified.

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Annex A to
Part 5 Chapter 4
JSP 317

SHORELINE SPILL MANAGEMENT COMPLIANCE FOR SHORE ESTABLISHMENTS

Serial	Question	Reference *n*
1	Which category does your sit fall within under the merchant shipping (OPRC) regulations 1998 i.e. a, b, c or d or do you think your establishment fits into more than one category?	JSP 317 art 5.5.07 Merchant Shipping (OPRC Convention) Regulations 1998 (SI 1998 No 1056)
2	Does your site have a unit spillage response plan (USRP)? a. If yes, does it cover spills that could occur in your adjacent marine area? b. Does your USRP cover spills that may occur from your neighbour's activities? c. To what tier level does it operate to? d. Is tier 2 response covered by the Braemar Howells contract or would you contact the local QHM? e. Is the QHM aware of your risks; is there a mechanism in place ensuring the QHM holds a current copy of the site USRP?"	JSP 317 Pt 5 Ch 7 JSP 317 Pt 5 Ch 2 JSP 317 Pt 5 Ch 3 EA PPG 21 MCA Guidelines for Ports paragraph 2.1 MCA Guidelines for Ports Section 3.
3	In the event of a tier 2 spill and you use the assistance of your local QHM for spill response: a. What level of agreement do you have with the QHM e.g. Tier 2 response only? b. Is the agreement in the form of a MoU or do you just have a reciprocal verbal agreement to include their contact details in your USRP? c. Does the QHM employ a subcontractor that would provide the response? d. What equipment and support does the QHM support provide? e. In the event of a tier 2 spill does your site	JSP 317 Pt 5 Ch 7 JSP 317 Art 5.5.20 MCA Guidelines for Ports Section 3 (3.9) MCA Guidelines for Ports Annex A 9- A11

	have responsibility for spill recovery actions iaw the USRP or does QHM take responsibility using the harbour spill plan? Is this agreed and practised? *(e.g. Whose tier 2 contractor is called out –MOD EPRS contractor or QHM tier 2 contractor? Responsibility to release press statements, contacting external agencies etc)*	
4	What is the total quantity of fuels & lubricants on your site that have the potential to spill into marine waters? a. Does your site also have any of the following: b. TFBDS- towed flexible barge discharge system; floating manifold; floating / subsea pipelines; beach storage sites; SPM –single point mooring. c. If yes, are these activities covered in your USRP? Are these activities covered by the QHM response (if you use them).	JSP 317 Pt5 Ch 3 JSP 317 Pt 5 Ch 3 JSP 317 Pt5 Ch 7 EA PPG 21
5	What environmentally sensitive areas are close to your site that could be adversely affected by a marine spill?	JSP 317 Art 5.5.07 JSP 317 Pt 5 Ch 3
6	What methods of containment / recovery do you currently have to cope with marine spills? a. Do you require specific pollution control equipment for marine areas that would aid you in dealing with a spillage before the tier 2 response arrived? E.g. Marine booms.	JSP 317 Art 5.5.08(a) JSP 317 Pt 5 Ch 3 JSP 317 Pt 5 Ch 7 MCA Guidelines for Ports Annex A 5 – A7
7	What training has staff received in the use of the pollution control equipment and managing marine spills in general? a. Do you carry out programmed training / exercises / table top exercises with QHM / harbour master?	JSP 317 Art 5.5.08(b) JSP 317 Pt 5 Ch 7 MCA Guidelines for Ports paragraphs 3.20 - 3.21 MCA Guidelines for Ports Annex J 9-J13

Part 5

Chapter 5 (Sponsor FGSR Hazard)

INLAND / SHORELINE INCIDENT / SPILLAGE REPORTING

SECTION 1 – GENERAL

5.5.01. The legislative requirement to report incidents is laid down in the *Reporting of Injuries, Diseases and Dangerous Occurrences Regulations- (RIDDOR) (Statutory Instrument No 3163/1995),* which has been translated into MOD Health and Safety Handbook JSP 375 Volume 2 Leaflet 14.

5.5.02. Inland / shoreline F&L spills have the potential to contaminate land and pollute Controlled Waters (5.04.01) in contravention to the EPR 2010.

5.5.03. Controlled Waters are defined by WRA 91; spills which migrate from land establishments into coastal waters, and spills from vessels in harbours are to be reported by **the spill originator**. MOD units shall report all significant F&L spillages as SPILLREPs, or POLLREPs as appropriate. Spills from Shoreline Establishments / vessels in harbours are also to be reported to the QHM / Statutory Harbourmaster as the QHM / Statutory Harbourmaster has a duty of care for pollution response in harbour areas that they manage. See Part 5 Chapter 4 for demarcation of responsibilities in shoreline areas.

5.5.04. MOD Major Accident Control Regulations (MACR) reporting may also be required in accordance with JSP 498.

5.5.05. The spillage reports within this chapter have been designed to meet the environmental requirements of JSP 418.

SECTION - 2 RIDDOR

5.5.06. RIDDOR, SI 3163/1995, identifies the reporting action to be complied with when work related accidents and dangerous occurrences occur. There is also a requirement to report any diseases or medical disorders proven to be caused by contact with petroleum products, such as poisoning due to Benzene or Lead in Petrol, skin cancer, and occupational dermatitis. Reportable dangerous occurrences within fuels storage and handling applicable to RIDDOR are: -

a. Dangerous occurrence on a Pipeline

b. A road tanker carrying a dangerous substance, overturns, suffers serious damage, catches fire or the substance is released.

c. Sudden uncontrolled release in a building of 100kg (approximately 125 litres), or more of flammable liquid.

d. Sudden uncontrolled release in the open air of 500kg (approximately 625 litres), or more of flammable liquid.

SECTION - 3 MAJOR ACCIDENT CONTROL REGULATIONS

5.5.07. *Control of Major Accident Hazard Regulations* (COMAH) is UK legislation made under the *Health and Safety at work Act (HSWA) 1974*. It has been developed in response to a European

Union *(EU) Directive (96/82/EC)* under the terms of the European Communities Act 1972 and for technical legal reasons cannot be applied to the Military Forces or Defence Establishments of Member States.

5.5.08. MOD - *Major Accident Control Regulations (MACR),* discharges that policy in the context of prevention of a Major Accident (MA) and the mitigation of consequences to human health and or the environment should one occur. The MOD Competent Authority (CA) is empowered by 2^{nd} Permanent Under Secretary (2^{nd} PUS) to introduce and regulate MACR, this is affected through JSP 498.

5.5.09. **MACR Reporting**. Establishments should notify the MOD MACR CA of an incident as defined at JSP 498, Chap 1.

SECTION 4 – SPILLAGE REPORTING

5.5.10. The MOD spillage reporting system is based on the capability for containment and clean-up of an incident. The MOD applies 3 Tier spillage classification system based on this capability and the simplest definition of these Tiers is as follows:

a. **Tier 1:** Operational spills where the clean up is entirely within the unit / establishment capability.

b. **Tier 2:**

i) Spillages that require assistance from another Service unit.

ii) Spillages that require assistance from external civilian contractors/ specialists

iii) Spillages reportable to Environmental Regulators that have resulted in the “pollution” of controlled waters / groundwaters or other environmentally sensitive areas.

iv) Spillages reportable under RIDDOR.

c. **Tier 3:** Spills beyond the capability of local and regional resources that requires major external or national assistance.

5.5.11. The reporting of the extent of an incident utilises the Tier system and the SPILLREP reporting system shall be raised:

SECTION 5 – INLAND SPILLAGES

5.5.12. All *significant* inland spillages from Tier 1 to Tier 3 should be reported using the SPILLREP procedure using (MOD Forms MOD Form 7772 –MOD Form 7773).

5.5.13. All spillages are to be recorded in the originating Unit / Section Spill Register. The Pollution Control Officer (PCO) is to collate all units / section spill registers into the Establishment Spill Register MOD Form 7771. The PCO is to investigate reported spills and instruct originating units as necessary to raise subsequent SPILLREPs as appropriate. The PCO is to maintain the Establishment Spillage Register, which is to be retained by the establishment for the life of the site.

5.5.14. The term significance is a qualitative statement and is not solely based on the quantity of product spilled; (quantity - 5.5.10 (b) (iv)); but is based of the consequences of the resultant spill.

5.5.15. Example; (but are not limited to) a 5 litre fuel spill on runway will have a greater consequence than the same amount spilled in a in a work shop. Both will be entered onto the unit spill register, but the former would be expected to be reported as a Tier 1 SPILLREP based on the greater significance of the spillage, and the urgent need for runway clearance / spill clean-up.

5.5.16. Units are reminded that in addition to a SPILLREP, any accident / incident that occurs on an equipment or system and results in a spill may need to be investigated by the Equipment Sponsor. Any additional investigation required should be reported through existing procedures established by units' respective chain of command. The SPILLREP is not the mechanism to report equipment failure, operator error etc.

5.5.17. Where units are on detachment / exercise, the DTE manager / host PCO / Liaison Officer, must be informed immediately of any spillage occurring on the site, irrespective of quantity spilled. The DTE manager / estate PCO may have on-site knowledge, appropriate specialist equipment to aid in a more efficient spill clean up than that of the visiting unit. The visiting unit maintains responsibility with regard to the cause of the spill and subsequent clean-up costs, irrespective of the extent of assistance offered by the host.

5.5.18. The SPILLREP procedure requires a report in 2 parts. An initial (Part 1) report, MOD Form 7772 issued by e-mail is used to alert staffs that an incident has, or is occurring. Part 1 reports shall be submitted within 12 hours of an incident, to enable support staffs to provide and co-ordinate assistance where necessary. A follow–up (Part 2) report provides staff with information, which will be used to support equipment requirements and quantify the financial expense of pollution spills. Part 2 reports (MOD Form 7773) shall be issued at the conclusion of the spillage incident or at convenient points during an extended clean-up process; any number of successive Part 2 reports may be submitted. Subsequent Part 2 reports should have the same serial number as its Part 1 report. Once cleanup is complete a final SPILLREP Part 2 shall be submitted detailing closure action and all costs incurred.

5.5.19. Recipients for Part 1 & Part 2 SPILLREPs (MOD Form 7772 –MOD Form 7773) are, **DSEA-DLSR-FGSR-Hazard**, and the respective FLC / TLB Incident Reporting Office / CESO / Fuels Role Office, as required.

5.5.20. In the absence of any e-mail capability, SPILLREP Part 1 & Part 2 reporting can be carried out by facsimile or signal format. See Annex A for details.

SECTION 6 – INSHORE MARINE / SHORELINE SPILLAGE REPORTING

5.5.21. F&L spills which migrate from land establishments into coastal waters, and spills from vessels in harbours are to be reported by **the spill originator** in accordance with their reporting procedures (SPILLREP / POLREP as required). However, once F&L has entered the inshore marine environment (Controlled Water), the responsibility for marine spill cleanup and subsequent reporting lies with the MOD QHM, Statutory Harbour Master, and relevant Local authority. Relationship between shoreline MOD establishments and QHM / Harbour Master is detailed at Part 5 Chapter 4.

5.5.22. Once any F&L has entered the marine environment MOD QHM, Statutory Harbour Master, relevant Local authorities are duty bound to clean up spillages in accordance with MCA approved maritime spillage response plans in accordance with *section 293 of the Merchant Shipping Act*

1995, amended by the *Merchant Shipping and Maritime Security Act 1997*, *Marine Safety Act 2003*; and the *Marine and Coastal Act 2009.*

5.5.23. The spillage reports within this chapter have been designed to meet the environmental requirements of JSP 418, and the *Merchant Shipping (Oil Preparedness, Response and Co-operation Convention) Regulations 1998*; guidelines for which are within the Maritime and Coastguard Agency (MCA) Oil Spill Contingency Plan Guidelines for Ports, Harbours and Oil Handling Facilities Manual.

BIBLIOGRAPHY

1. Statutory Instrument 1995 No 3163 – The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995.

2. Environmental Protection Act 1990 (EPA 1990)

3. Environment Act 1995 (EA1995)

4. Water Resources Act 1990

5. Statutory Instrument 2001 /2954 - Control of Pollution (Oil Storage) (England) Regulations

6. Environmental Permitting (England & Wales)Regulations 2010

7. The Water Environment (Controlled Activities) Scotland Regulations 2005

SPILLREP PART 1

1. The fields in a SPILLREP should contain the following information. Fields A to L should be used as subject headers for a standard Message Text Format when distributing a SPILLREP in signal format. Signals are to be produced in accordance with ACP 121(H) and ACP 121 UK-SUPP2 . Respective FLC / TLB incident reporting office/ CESO / fuels role office is to be addressed as required. FGSR Hazard is to be an informed by using the following address DSEA-DLSR-FGSR-Hazard.

Part A **Location / Unit**. The location of the spill, e.g. unit, installation/building number, off-unit location.

Part B **Spill Date/Time** All timings are to be given as local because of the possibility that civilian authorities may be involved.

Part C **Assessed Tier** The Unit's assessment of the seriousness of the spill.

Part D **Short Description Including Equipment Type** A short description of the incident, to include equipment type (e.g. UST, Lynx Helicopter, Harrier Aircraft, underground pipework etc.)

Part E **Product(s) & Qty Spilt**. Enough information to identify the product(s) and an initial assessment of the quantity/volume spilt.

Part F **Contained Y**/N to indicate whether the product has been contained, or whether it has been released into the environment.

Part G **Water Course Affected**. Yes or No with amplifying details where possible to indicate which watercourse, surface drainage or aquifer the product has entered.

Part H **Initial Point of Contact and Tel No**. An initial POC at the unit reporting the spillage.

Part J **UPCO Point of Contact**

Part K **Actions carried out by UPCO**.

Part L **Cross References** Required so that SPILLREPs cross-referenced with other single service reporting procedures (IRIS,DINC, NSINC, and AINC)

SPILLREP PART 2

2. The fields in a SPILLREP Part 2 should contain the following information. Fields A to J should be used as subject headers for a standard Message Text Format when distributing a SPILLREP Part 2 in signal format.

Part A. **Part 1 Changes** Any changes to the Part 1 report, or information that would have been sent if no Part I report was transmitted. If no changes are required, then say so

Part B. **Cause of Spill** Indications of the causes are given in Table 5.8.3. The term "inadequate Procedure" should be used to indicate an incident caused by correct application of an inadequate procedure. If Category 2 or 6 are used, detail the investigations carried out by unit/command/service authorities and the findings of the investigations

Part C. **Environmental Impact** Describe the environmental impact of the spillage.

Part D. **External Agencies involved** List and describe the involvement of external agencies. These could range from assistance from other Service units, to assistance from contractors, and other Government Agencies. Ensure that any contact with the Environment Agency and other environmental enforcement agencies are fully detailed. A unit calling on the EPRS during a spill automatically categorises this to a Tier 2 spillage

Part E. **Media Involvement** Describe the Media involvement, and list occurrences.

Part F. **Costs** List and describe the costs, excluding VAT, involved. At the very least break the costs down as indicated below, and, if needs be, detail the costs on attached sheets. The **minimum** level of detail is as follows.

(1) Cost of the product lost and that Re-graded for other use.

(2) Contractors charges, whether off the MOD EPRS Contract, or whether from a specific contract.

(3) Manpower / labour/ equipment costs. Identify the costs incurred by service personnel MOD employees or other civilian staff involved in clean up operations. (For example personnel involved during call out procedures as per USRP). Identify equipment costs (e.g. hire charges for portable storage facilities, downtime/ repair costs for polluted / contaminated equipment).

(4) Cost of claims on MOD. If this is not available then give a reference, which will allow the costs to be extracted from the relevant MOD Claims Branch.

Part G **Recommendations and Remedial Action** Comment on recommendations or lessons learnt.

Part H. **Formal Inquiry/Court Proceedings**. Indicate whether the incident has required a Unit or Board of Inquiry, and whether Court proceedings have been initiated/Completed. If an inquiry or court case has been completed indicate the findings, and list the prosecutions.

Part J. **Closure** If continuation work and / or land remediation is required, units are to send periodic updates to DF&FS informing them of progress. On completion of remediation / repair work, the PCO is to inform DF&FS of closure. Further information on land remediation can be found in paragraph 5.07.06.

Cause of Spillage	Category
Act of God	1
Sabotage	2
Equipment Failure (Equipment Failure (Including equipment type e.g. UBRE, Lynx, Harrier, underground pipework, etc. Equipment fault report serial Number is also required)	3
Operator Error	4
Inadequate Procedures	5
Third Party Damage	6

Table 5.A1 - Spillage Causes

Part 5

Chapter 6 (DSEA-DMR-SSMO)

MARINE POLLUTION

SECTION 1 – GENERAL

5.6.01. Marine F&L spills have the potential to pollute the offshore Marine Environment in contravention to the *UN Convention on the Law of the Sea 1994 (UNCLOS),* and subsequent daughter legislation *(MARPOL 73/78);* as well as impacting the inshore marine / shoreline environment in contravention to the Water Resources Act 1991 (WRA 91).

SECTION 2 - RESPONSIBILTIES

5.6.02. The emphasis on maritime pollution must be prevention rather than cure and personnel have a responsibility to comply with the regulations and legislation in accordance with MOD Policy. It is MOD policy that maritime pollution emanating from MOD vessels, shall be cleared using MOD counter pollution resources. Where these are insufficient the assistance of the Maritime Coastguard Agency (MCA), Marine Pollution Control Unit (MPCU) and where necessary, Local Authority or commercial resources should be called for. The following principles apply:

a. The polluter shall clear or employ others to clear the pollution.

b. The polluter (or his insurers) shall meet all reasonable costs of clearing the pollution.

5.6.03. The MOD has established an Emergency Spill Response (EPRS) Contractor Part 5, Chapter 10 who may assist with cleanup in UK/NI territorial waters, PJOB locations and international maritime waters depending upon the size and nature of the spill. Generally the Ship or Establishment will account for its own pollution clean-up using their UIN. If this is insufficient the TLB will pay for clean up from its UIN, failing this, an application can be made to the Treasury to fund the cost of clean-up and remediation dependant upon the environmental, economic severity.

5.6.04. Navy Comd have emergency procedures in place to respond to significant maritime spillages from HM and RFA vessels operating in international maritime waters. The Fleet Accident Response Organisation will be the lead for casualties at sea.

RESPONSIBILITIES AT SEA

5.6.05. “Attributable” pollution incidents must be dealt with, where possible, by the polluter or his agent. The prime responsibility for ensuring that “attributable” and “unattributable” pollution is dealt with speedily and effectively, and for taking control of operations where it is evident that the pollution is beyond the capabilities of the polluter, lies with the MPCU, or if in foreign waters the equivalent authority.

SECTION 3-OIL AND OILY WATER MIXTURES

5.6.06. MARPOL requires all ships to limit the oil content in any discharged water and include an automatic stopping device to prevent discharge in excess of 15 ppm. *Merchant Shipping (Prevention of Oil Pollution) Regulations 1995* applies.

5.6.07. In special Areas defined by the International Maritime Organisation (IMO) relating Annex I are in force. These are the Baltic Sea area, the North Sea area, the Mediterranean Sea area, the Black Sea area, the RED Sea area, the Gulf area, Gulf of Aden and the Antarctic.

5.6.08. Ships Oil Pollution Emergency Plans (SOPEPs). An Oil Record should be maintained which details specific operations concerned with the movements of oil and tank cleaning. A ships oil pollution Emergency Plan (SOPEP) should be maintained by the ship in accordance with *MARPOL 73/78*.

SECTION 4 – MARINE OIL SPILLAGES

GENERAL

5.6.09. Maritime pollution is defined here to include both pollution of the sea outside of the area of responsibility of the WRA 1991. Pollution of the maritime environment may originate from land-based sources or discharges from vessels at sea.

5.6.10. COs and Heads of Establishments who are responsible for / have knowledge of a pollution incident at sea or in a harbour are responsible for reporting such incidents to the relevant Coastguard and Harbour authorities as soon as possible. In UK territorial waters, this includes Maritime Coastguard Agency and the relevant Queen Harbour Master / Statutory Harbour Authority and Local Authorities as appropriate.

5.6.11. All spillages originating on board HM vessels are likely to pollute the shoreline / inshore marine environment shall be reported by the CO using the POLREP procedure as described at Part 5 Chapter 7. Once the spillage is no longer contained on board and enters the harbour , the vessel CO (spill originator) is to comply with the Naval Base CO (QHM) procedures and reporting is to be in accordance with the Inland reporting system at Part 5 Chapter 5, using the SPILLREP procedure (MOD Form 7774).

5.6.12. All spillages originating on board HM vessels and entering international maritime waters re to be reported by the CO using the POLREP procedure as described at Part 5 Chapter 7.

BIBLIOGRAPHY

1. Statutory Instrument 1995 No 3163 – The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995.

2. Statutory Instrument– Merchant Shipping 1998 regs

Part 5

Chapter 7 (DSEA-DMR-SSMO)

MARINE POLLUTION REPORTING

SECTION 1 – GENERAL

5.7.01. All spillages originating from HM vessels are to be reported by the CO using the POLREP Procedure as described in this chapter.

5.7.02. Offshore maritime pollution is defined to include pollution of the sea outside of the area of responsibility of the WRA 1991 (Part 5 Chapter 6). Pollution of the maritime environment may originate from land-based sources or discharges from vessels at sea.

5.7.03. COs and Heads of Establishments who are responsible for / have knowledge of a pollution incident at sea or in a harbour are responsible for reporting such incidents to the relevant Coastguard and Harbour authorities as soon as possible. In UK territorial waters, this includes Maritime Coastguard Agency and the relevant Queen Harbour Master / Statutory Harbour Authority and Local Authorities as appropriate.

5.7.04. The POLREP report is designed to alert MOD and civil agencies involved in marine oil pollution matters, which is based on the Bonn Agreement 1969. POLREP reports are raised in 2 parts (POLREP and POLREP/SITREP). Any number of successive Part 2 reports (POLREP/SITREP), which provide supplementary information, may follow an initial Part 1 report.

5.7.05. The POLREP procedure requires a report in 2 parts. An initial (Part 1) report, (MOD Form 7774) issued by e-mail is used to alert staffs that an incident has occurred. SITREPs may be used to inform MCA TLB / MOD Fuels & Gas Safety Regulator Section during extended spillage clean up operations. Situation reports should be sent using the standard POLREP report format (MOD Form 7774) and identified as POLREP *n* SITREP *n.* SITREPs should update information rather than reiterate it using only the applicable fields required.

5.7.06. Recipients for POLREPs (MOD Form 7774) are MCA – Coastguard Rescue Co-ordination Centres, the respective FLC / TLB incident reporting office / CESO / fuels role office as required; and DES SE Land-FGSR-Hazard.

5.7.07. Navy Comd have emergency procedures in place to respond to significant maritime spillages from HM and RFA vessels operating in international maritime waters. The Fleet Accident Response Organisation will be the lead for casualties at sea.

5.7.08. In the absence of any e-mail capability, POLREP reporting can be carried out by facsimile or signal format. See Annex A for details.

BIBLIOGRAPHY

1. Statutory Instrument 1995 No 3163 – The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995.

2. Statutory Instrument– Merchant Shipping 1998 regs

1. The fields in a POLREP should contain the following information. Fields A to N should be used as subject headers for a standard Message Text Format when distributing a POLREP in signal format. Signals are to be produced in accordance with ACP 121(H) and ACP 121 UK-SUPP2 . MCA - Coastguard Rescue Co-ordination Centres, respective FLC / TLB incident reporting office/ CESO / fuels role office are to be addressed as required. FGSR Hazard is to be an information addressee using DSEA-DLSR-FGSR-Hazard.

2. The requirements for precedence, protective markings and distribution will vary dependent on the nature of the incident and the potential effects. Guidelines for the author can be found in the Ships Oil Pollution Emergency Plans or for maritime pollution from land sources, or ships reported by land sources.

3. The following points are also provided as guidance:

a. Groundings, collisions or breakdowns of oil tankers or other vessels carrying pollutants, including bunkers, should be treated as potentially serious incidents with a classification of "probable" until proved otherwise. The use of link calls to masters of ships concerned is often the best method of getting up–to-date and positive information.

b. Local pollution response plans should be compatible with the National Contingency Plan.

c. Care should be taken to avoid undue escalation of unconfirmed incidents with consequent misleading publicity.

POLREP PART 1

4. The fields in a POLREP PART 1 should contain the following information. Fields A to N should be used as subject headers when distributing a POLREP Part 1 in signal format.

Part A **Classification of Report**. This will fall into one of the following categories:

(1). Doubtful.
(2). Probable.
(3). Confirmed.

Part B **Date and Time Pollution observed/Reported and Identity of Observer/Reporter** Time should be in 'Local'.

Part C **Position and Extent of Pollution** By latitude and longitude if possible, state range and bearing of some prominent landmark and estimated amount of pollution (e.g. size of polluted area, number of tonnes of oil spilled, or number of containers, drums etc lost.) When appropriate, give position of observer relative to pollution.

Part D Tide and Wind Speed and Direction

Part E Weather Conditions and Sea State Brief explanation of weather conditions and sea state at the time of the spillage and forecast, if available

Part F Characteristics of Pollution Give type of pollution, e.g. oil (crude or otherwise), packaged or bulk chemicals or garbage. For chemicals give proper name or UN number if known. For all, give also appearance, e.g. liquid, floating solid, liquid oil, semi-liquid sludge, tarry lumps, weathered oil, discoloration of sea, visible vapour. Any marking on drums, containers etc should also be given.

Part G Source and Cause of Pollution From a vessel or other undertaking. If Pollution is from a vessel, say whether as a result of an apparent deliberate discharge or a casualty. If the latter; give a brief description. Where possible, give name, type, size, nationality and Port of Registry of polluting vessel. If the vessel is proceeding on its way, give course, speed and destination where possible.

Part H Details of Vessels in the Area To be given if the polluter cannot be identified and if the spill is considered to be of recent origin.

Part J Photographs and Samples Whether photographs or samples have been taken for analysis

Part K Remedial Action. What remedial action has been taken or intended, to deal with spillage.

Part L Forecast. Forecast of likely effect of pollution (e.g. arrival on beach) with estimated timing.

Part M Names. Names of other organisations and States informed other than addressees.

Part N Any Other Relevant Information. Any other relevant information (e.g. name of other witnesses, reference to other instances of pollution pointing to source)

FINAL SITREP (Closure Action)

5. **Content**. The final SITREP should be sent using the standard POLREP report format and should always include the following information in the following fields.

Part G Source and Cause of Pollution The root cause of the spill. Fields listed in Table 5A 1 should be used to identify the cause of spill. As much detail as possible should be supplied, including references to any incident investigation or defect reports

Part L **Forecast** Should identify the extent of any apparent environmental impact

Part N – **Any other Additional Information**. Relevant information required by TLB, / FSAT could include:

(1). List and describe the involvement of external agencies. This could range from assistance from other Service units, to assistance from contractors and Government Agencies. Ensure that any contact with the Environment Agency and other environmental enforcement agencies are fully detailed.

(2). Describe any Media involvement, and list occurrences.

(3). List and describe costs, excluding VAT. The minimum level of detail is as follows.

i. Cost of product lost and that re-graded for other use.

ii. Contractors charges, whether off the MOD EPRS Contract, or from a specific contract.

iii. Manpower / labour/ equipment costs. Identify the costs incurred by servicemen / MOD employees or other civilian staff involved in clean up operations. (For example personnel involved during call out procedures as per USRP). Identify equipment costs (e.g. hire charges for portable storage facilities, downtime/ repair costs for polluted / contaminated equipment).

iv. Cost of claims on MOD. If this is not available the give a reference, which will allow the costs to be extracted from the relevant MOD Claims Branch

(4). Comment on recommendations or lessons learnt.

(5). Indicate whether the incident has required a Unit or Board of Inquiry, and whether the Court proceedings have been initiated / completed. If an inquiry or court case has been completed indicate the findings and list the prosecutions.

(6). Indicate whether any scientific or pictorial analysis has been carried out. This could include aerial photography of the spill site, sample analysis, or results of spill prediction modelling.

	POLREP Part 1	**POLREP Part 2**
Precedence	PRIORITY / IMMEDIATE	ROUTINE / PRIORITY
Protective Markings	RESTRICTED (with caveat)	RESTRICTED (with caveat)
SIC	ESJ 12E L4I	ESJ 12E L4I
Distribution	**To:** FLEET HQ	
Info copies are to be issued to all addressees annotated*	**Info:** DCSA COMCEN PLYMOUTH (for South Coast areas)	
	DCSA COMCEN FASLANE (for all other areas)	
	BRITMILREP (foreign military representative)	
	DES BATH	
	CINCFLEET	
	DEFPETCEN WEST MOORS	

Table 5B1 POLREP Precedence, Protective Markings and Distribution.

Part 5

Chapter 8 (Sponsor Log Comm, FLG Team)

POLLUTION CONTROL SORBENTS AND EQUIPMENT

SECTION 1 – GENERAL

5.8.01. The containment and clean–up of oil pollution requires the use of a specialist range of material, augmented by ancillary items such as plastic bags, shovels and sand bags. This chapter describes the specialist product range provided by the MOD contractor to contain and clean–up oil pollution; similar materials are in use with oil–spill clean–up companies. Detailed instructions on usage and maintenance are provided in the manuals accompanying each product.

5.8.02. Within the MOD specialist items of pollution control material are defined as either:

a. **Pollution Control Sorbent (PCS)**. Sorbent materials retain spilt liquids by a number of methods, these are identified as follows.

(1) *Adsorption,* which is a surface process whereby capillary action holds the liquid on the external surface of the material and in the void spaces between the material. (i.e. kitchen roll;- it adsorbs spilt liquid, but will release the liquid if the roll is squeezed)

(2) *Absorption,* is a process whereby the spilt liquid is retained within the material within its molecular structure. Liquids that have been absorbed into a material will not normally be released by the application of pressure onto the material.

(3) *Gelling,* this process is where a soluble material dissolves in a liquid, thereby producing a thick glutinous gel, resulting in a near solid form that assists in recovery.

b. **Pollution Control Equipment (PCE)**. PCE is major non–consumable equipment provided to contain and clean–up oil spillages. Specialist equipment such as Tanker Rollover Recovery Equipment (TRRE) allows the recovery / evacuation of fuel thus enabling tanker recovery after a rollover incident. PCE is managed and controlled by BFU PT at MOD Abbey Wood. Units should request its provision by contacting PSTN: 0117 91 35362, Mil: 9352 35362.

5.8.03. Training in the correct use of PCS and PCE is conducted at RAF HALTON as described in Part 2, Chapter 6.

SECTION 2 – PCS

5.8.04. The current MOD PCS contract uses adsorbent products manufactured from melt-blown polypropylene materials. PCS can be grouped into several categories as described at Annexes A to D. Annexes E to H identify the 4 types of spill kit available, their supplied contents and their typical uses. Units should carry out a risk assessment, based on their activities and subsequent pollution hazards (referring to the UPCO as appropriate) to identify the number and type of spill kits required for their activities. Major Spill Kits (NSN 63P/4235-99-8610225) are classed as “Permanent” (P class) items and units should be limited to the number of Major Spill Kits pre-determined by the unit PCO. A sample form is provided at Annex I to assist PCOs in the accounting of these items.

5.8.05. PCS is suitable for use on land and on inland waterways. It is less suitable for use in marine waters (other than in the corners of docks or basins). PCS is not suitable for use on choppy or fast moving water.

MOD PCS CONTRACT

5.8.06. All Pollution Control Sorbents provided through the direct supply contracts adhere to specifications ensuring conformance with the appropriate technical standards, compliance with legislation and compatibility with in-service equipment. Provision of these commodities from a central contract ensures commonality of the product wherever MOD units are operating and provides best value for money for the MOD as a whole. Without exception, all MOD units are to obtain all Pollution Control Sorbents from the DF&FS contract. Finance for PCS is held by the TLBs and is cascaded down to unit level. It is not funded by DE&S. Deliveries of PCS are supported by a MOD F640. Units are reminded that staffs responsible for receipting goods are to ensure that MOD F640 are completed and returned to the contractor within 30 calendar days of receipt. Units are instructed to insert their UIN, sign and stamp the brown copy of the MOD F640 and return it to the contractor in the envelope provided.

5.8.07. Under the Late Payment of Commercial Debts (Interest) Act 1998, suppliers of goods are entitled to claim interest on bills not paid promptly. **Any such claims will be made against the demanding Unit’s UIN**. It is imperative that the receipting of goods is carried out correctly by all civilian and service staff to ensure payments are made as promptly as possible.

5.8.08. All products listed in Annex J are available direct from the contractor. Because the PCS products are available in the UK within 48 hours, units are to maintain their PCS stock to an operational minimum proportionate to their particular risk. Units shall not stockpile unnecessary PCS, or demand excessive amounts of PCS when they have exhausted their PCS holdings. PCS for chemical clean up is not provided through this contract because of the high risks associated with the clean up of chemicals. Products available on this contract are not compatible with certain chemicals.

5.8.09. The contract also provides fee technical advice on product selection and suitability for pollution control and minor spill containment equipment. This technical advice can be obtained by contacting the contractor by phone or fax as detailed in Annexe K.

5.8.10. **Ordering Procedure**. To place demands with the current contractor, customers should phone the freephone number at Annex K between 0815 and 17:00 on workdays or the 24hour freephone answer phone service for orders outside office hours. Orders may also be faxed through to the contractor. In addition, authorised units may use the e-ordering facility (see Annex K). Units wishing to demand online must initially contact the contractor to set up an online account. All overseas orders must be confirmed by fax or e-mail within 24 hours. The details of the current contractor are contained in Annex K. When placing orders units are to quote the following:

a. Account Number (this will be allocated when placing the first order).

b. Unit Name.

c. UIN (Unit Identity Number).

d. Product.

e. Qty.

f. Priority.

g. Delivery Address.

h. Contact Name.

i. BT Contact Number.

j. Address where MOD F640 should be sent.

5.8.11.**Delivery**. Demands will be satisfied within 48 hours for delivery to MOD units within the UK. For overseas units, MOD customers are to inform the contractor of a suitable UK embarkation point for the PCS for onward dispatch. (For example Goods Inwards Section, JSCS (South) Bicester, or Naval Dockyards for RN/RFA vessels). When placing first orders, units will receive the MOD "on contract" catalogue detailing the 22 items provided on the direct supply schedule listed in AnnexJ. Any product purchased from the contractors commercial catalogue is underwritten at the unit's own expense and risk (Local Purchase Order-LPO).

5.8.12. **On-unit Storage and Positioning**. Ideally PCS should be stored as close to the point of use as possible. A competent person should carry out a unit site assessment of the amount of PCS required at the work place. The type and location of unit spill sites should be annotated on the unit spill site plan. To assist in this process, spill kits of various sizes have been placed on the contract. Units that have already procured local mobile spill kits / spill stations should retain such kits in service as long as they satisfy the above caveat. Units should designate areas at the work place where spill kits are deployed as Pollution Control Points (PCP) and should be identifiable by suitable signage.

5.8.13. **BFCV Spill Kits**. PCS is required to be carried on BFCVs, JSP 800 Volume 4b refers. BFCV spill kits (Minor Oil Spill Kit) are available from the contractor.

5.8.14. **Disposal**. PCS that has been used to clean up a spillage is classed as Hazardous Waste and is to be disposed of in accordance with current regulations. PCS is not to be left *in situ* longer than is required to soak up product (to saturation of the PCS being used) or to complete the clean up task. PCS can become a pollutant itself, if not cleaned away swiftly and disposed of correctly.

SECTION 3 – ANCILLARY ITEMS

5.8.15. Ancillary items are useful during clean–up operations; these items are not PCS/PCE and are not scaled for oil pollution use. Examples of ancillary items are given in Annex D.

PCS MATS / ROLLS/ PADS /PILLOWS

General

- Manufactured from Melt Blown Polypropylene.
- White in colour – signifies oil only sorption (hydrophobic).
- Grey colour (Barrel top mats, item 18 Annex J, universal mats item 20 Annex J) signifies universal – oil and water.
- White mats/rolls pads (items 4, 10, 11, Annex J) are anti-static.
- Assist in large area spill.
- Can be cut to suit. (not pillows)
- Can be used to protect, wipe, and adsorb.
- Mats will float on water –even when saturated.
- Suitable for incineration.

Typical Ground Uses

- Drip Tray liner
- Mats and rolls can be rolled to produce an instant boom to length.
- During a major spill the roll can be laid out over the F&L, loose sorbent placed over the roll to assist in recovery. Roll can then be rolled up, resulting in little or no loose sorbent to be swept up as it is contained within the roll.

Typical Water Uses

- Skimming F&L from water surface.

Notes

The PPPT course at RAF Halton and the F&L Managers' Course at DCLPA West Moors offer practical guidance in the application and correct operation of PCS.

PCS- SOCKS & BOOMS

General

- Manufactured from Melt Blown Polypropylene.
- White in colour – signifies oil only sorption (hydrophobic).
- Grey colour (Universal sock, item 13 Annex A) signifies universal – oil and water.
- Smaller socks predominantly land use
- Larger booms predominately water use
- Outer material has high tensile strength, supports item when saturated with F&L
- Socks / Booms have capability to be connected together
- Items will float on water even when saturated with F&L
- Can be incinerated

Typical Ground uses

- **Can be used as a "coffer dam".**
- **Divert spills around drains etc**

Typical Water Uses

- Can be used as both a sorbent and a retaining boom on waterways
- Quickly applied to waterways to reduce extent of spills.
- Can be used on flowing water to deflect spill from environmentally sensitive areas.

Notes

The PPPT course at RAF Halton and the F&L Managers' Course at DCLPA West Moors offer practical guidance in the application and correct operation of PCS.

LOOSE SORBENT

General

- Loose material, universal sorbent.
- Has sufficient bulk density to be practicably applied on outside environments without the sorbent being inadvertently dispersed.

Typical Ground Use

- Applied to otherwise inaccessible areas for other PCS products (corners).
- Used in conjunction with Rolls, Annex C (Swiss Roll).

Notes There is a possible slip hazard when loose sorbent is applied to lubricant spills on certain surfaces (painted floors, smooth concrete surfaces). Loose sorbent is a *sorbent* and not a *degreasant.* Upon removal of the spill there is on some occasions a stain remaining on the surface that can cause a slip hazard. Previous loose sorbents appeared not to produce a slip hazard because a layer of sorbent dust remained over the affected area, (therefore there was still a stain on the floor – covered in dust). The current product is significantly dust free thereby reducing the respiratory risks during handling. Units should be aware of this potential hazard and are to ensure that affected areas are immediately cleaned after loose sorbent removal post spillage.

The PPPT course at RAF Halton and the F&L Managers' Course at DCLPA West Moors offer practical guidance in the application and correct operation of PCS.

ANCILLARY ITEMS

1. Ancillary items on the current contract comprise of minor spill containment equipment that assist the user during F&L spills. These include drain covers and waste bags.

2. The drain covers are manufactured by a mould process and the largest available sizes have been placed on the contract. It is recommended that units with channel drains etc should not demand draincovers to block the whole length of the grating. Units should devise a suitable method of blocking the exit / outflow. This method should be carried out in consultation with the establishment MMO / Project Aquatrine Service Provider.

Hazardous material bags should only be used for sorbents contaminated with F&L.

The PPPT course at RAF Halton and the F&L Managers' Course at DCLPA West Moors offer practical guidance in the application and correct operation of PCS.

Annex E to
Part 5 Chapter 8
JSP 317

MINOR SPILL KIT

General

- High visibility vinyl bag.
- Very portable.
- White oil only PCS.
- Contains sufficient PCS to “absorb” approximately 40 litres.
- Contents 25 x Pads, 4 Socks, 1x cushion, 2x hazardous disposal bags.

Typical Uses

- For use on small sections, carried by vehicles, single aircraft detachments.
- Located adjacent to dispensing stations, discharge points on BFCVs.
- Contents within the minor spill kit are items on the contract.
- Units can replenish / adapt minor spill kit to suit requirement.
- Kits must be used on spills situations only and contents must be replaced so that sorbents are always available for an emergency.

Note

The PPPT course at RAF Halton and the F&L Managers’ Course at DCLPA West Moors offer practical guidance in the application and correct operation of PCS.

Annex F to
Part 5 Chapter 8
JSP 317

UNIT SPILL KIT

General

- High visibility mobile trolley.
- Very portable.
- White oil only PCS.
- Contains sufficient PCS to “absorb” approximately 241litres.
- Contents 120 x Pads, 12x Socks, 10x Cushion, 10x Hazardous disposal bags.

Typical Uses

- For use in larger workshops, aircraft hangars, MT workshops.
- Located at BFCV and Tank parks.
- Units shall carry out suitable risk assessment to identify correct quantity of unit spill kits.
- Quantity and location are to be entered on unit spill plan.
- Contents within the minor spill kit are items on the contract.
- Units can replenish / adapt unit spill kit to suit requirement, (loose sorbent).
- Kits must be used on spills situations only and contents must be replaced so that sorbents are always available for an emergency.

Note

The PPPT course at RAF Halton and the F&L Managers’ Course at DCLPA West Moors offer practical guidance in the application and correct operation of PCS.

MAJOR SPILL KIT

General

- High visibility weatherproof mobile trolley suitable for outdoor stowage.
- Fitted with removable carbon impregnated rubber wheels.
- Portable.
- Capable for forklifting on both axis.
- White oil only PCS.
- Contains sufficient PCS to “absorb” approximately 746litres.
- Contents 200 x Pads, 50 x Socks, 8x (120mm x3000mm) Booms, 50 x socks, 15 Cushions, 30 x Hazardous disposal bags.

Typical Uses

- To be used as a contingency for the establishment spill plan.
- Minor establishments, RN warships, MOD and RFA operated vessel limited to a maximum of 5 major spill kits.
- Major establishments limited to a maximum of 10 major spill kits.
- Unit Pollution Control Officer is to risk assess, authorise, and control requirement (see Annex J).
- Quantity and location are to be entered on unit spill plan.
- Contents within the major spill kit are items on the contract.
- Units can replenish / adapt unit spill kit to suit requirement, (loose sorbent).
- Kits must be used on spills situations only and contents must be replaced so that sorbents are always available for an emergency.

Note

The PPPT course at RAF Halton and the F&L Managers’ Course at DCLPA West Moors offer practical guidance in the application and correct operation of PCS.

Annex H to
Part 5 Chapter 8
TO JSP 317

MOBILE UTILITY SPILL KIT / LIGHTWEIGHT MOBILE UTILITY SPILL KIT

General

- Both kits are contained in transparent vinyl bags with tamperproof seals.
- Very portable.
- Grey universal / maintenance PCS only.
- Mobile Utility Spill Kit can adsorb approximately 18 litres. Lightweight Spill Kit can adsorb approximately 8 litres.
- Mobile Utility Spill Kit contains 12 Universal mats, 3 Universal socks, 2 Disposal bags and ties. Lightweight Spill Kit contains 8 Universal mats, 1 Universal sock, 2 Disposal bags and ties. All contents can be demanded independently from the contract.

Typical Uses

- Both kits are available for “green fleet” utility vehicles, and units with portable diesel generators.
- Advantage of these kits is that they can adsorb coolant fluids as well as fuel.
- Units can replenish adapt spill kits to suit requirement.
- Kits must be used on spill situations only and contents must be replaced so that sorbents are always available for an emergency.

Note

The PPPT course at RAF Halton and the F&L Managers’ Course at DCLPA West Moors offer practical guidance in the application and correct operation of PCS.

Annex I to
Part 5 Chapter 8
JSP 317

APPLICATION TO INCREASE MAJOR SPILL KIT HOLDINGS

UNIT	

UIN		**Tel No**	

Qty of Major Spill Kits NSN 63P-4235-99-8610225 already held on establishment (Include other local purchased / local manufactured Major Spill Kits)	

Unit / Section Officers Justification					
Name		**Rank**		**Signature**	

PCO Comments	

Application supported by PCO		**YES / NO ***		*** (Delete as applicable)**	
Name		**Rank**		**Signature**	

Annex J to
Part 5 Chapter 8
JSP 317

CURRENT PRODUCT RANGE

NSN	item	Description	D of Q
9330-99-3867369	**1**	**Cushions, Oil Sorbent –** Cushion size 450 mm x 450mm.The outer cover is tear resistant, can support the weight of the pad when full and not impede the adsorption of oil. (10 per package). Sorption of quantity of OM 11 per item 8.3 L.	PK
6850-99-6605825	**2**	**Pillow, Oil Sorbent-** Pillow size 380 mm long by 550 mm wide) The pillow shall have a suitable system to allow a rope to be attached. The outer cover is tear resistant, and can support the weight of the pillow when full and does not impede the adsorption of oil. (10 per package). Sorption of quantity of OM 11 per item 10.2 L	CO
7930-99-2251531	**3**	**Loose (type II), Oil Sorbent**- Packed in 18.1kg polyethylene bags Sorption of quantity of OM 11 per bag 23.4 L	CO
9330-99-8821485	**4**	**Pad, Oil Sorbent**- Pad 410 mm x 510 mm is scuff resistant and anti static. (100 per package). Sorption of quantity of OM 11 per item 0.96 L.	PK
9330-99-1564505	**5**	**Sock, Oil Sorbent**- Sock is 75 mm in diameter by 1220 mm long. The outer cover is tear resistant, can support the weight of the pad when full and does not impede the adsorption of oil (10 per package). Sorption of quantity of OM 11 per item 4.3 L.	PK
4235-99-1891983	**6**	**Boom, Oil Sorbent**- Boom is 200 mm in diameter by 3000 mm long. The outer cover is tear resistant, can support the weight of the pad when full and does not impede the adsorption of oil The boom, at each end, shall have a system to enable them to be easily linked together or anchored, ensuring overlap. (2 per package). Sorption of quantity of OM 11 per item 47 L.	PK
4235-99-6653819	**7**	**Boom, Oil Sorbent**- Boom is 200 mm in diameter by 6000 mmm long. The outer cover is tear resistant, can support the weight of the pad when full and does not impede the adsorption of oil The boom, at each end, shall have a system to enable them to be easily linked together or anchored, ensuring overlap. (2 per package). Sorption of quantity of OM 11 per item 107 L.	PK
9330-99-8518280	**8**	**Boom, Oil Sorbent**- Boom is 120 mm in diameter by 3000 mm long. The outer cover is tear resistant, can support the weight of the pad when full and does not impede the adsorption of oil The boom, at each end, shall have a system to enable them to be easily linked together or anchored, ensuring overlap (2 per package). Sorption of quantity of OM 11 per item 32 L.	PK
9330-99-2031732	**9**	**Boom, Oil Sorbent**- Boom is180 mm in diameter by 1500 mmlong. The outer cover is tear resistant, can support the weight of the pad when full and does not impede the adsorption of oil The boom, at each end, shall have a system to enable them to be easily linked together or anchored, ensuring overlap (Approximately 4 per package). Sorption of quantity of OM 11 per item 23L.	PK
7920-99-7015712	**10**	**Roll, Oil Sorbent Large**- Roll is 1020 mm wide by 42 metres long is scuff resistant and anti static, (individually packaged). Sorption of quantity of OM 11 per roll 188 L	EA
9330-99-7018478	**11**	**Roll, Oil Sorbent Small**- Roll is 510 mm wide by 42 metres long is scuff resistant and anti static. (Individually packaged). Sorption of quantity of OM 11 per roll 96 L	PK
7920-99-0006673	**12**	**Minor Oil Spill Kit**- The contents of the kit consist of :- 25 x Pads (Item 4) 4 x Sock-oil absorbent (Item 5) 1 x Cushion (Item 1) 2 x Disposal bags / ties (Item 19)	PK

NSN	item	Description	D of Q
6850-99-7023031	**13**	**Sock, Oil Sorbent Alumino Silicate**- Alumino Silicate filled sock is 80mm in diameter 1220mm long. The outer cover is tear resistant, can support the weight of the pad when full and does not impede the adsorption of oil The boom, at each end, shall have a system to enable them to be easily linked together or anchored, ensuring overlap. (9 per package). Sorption of quantity of OM 11 per item 2.6 L.	PK
4235-99-8610225	**14**	**Major spill kit**- Weight of kit 86.2 kg. Dimensions 1220 mm x 1120 mm x 775mm. The contents of the kit consist of :- 200 x Pads (Item 4) 10 x Cushions (Item 1) 8 x Booms (Item 8) 50 x Sock (Item 5) 30 x Disposal bags / ties (Item 19)	EA
4235-99-8344287	**15**	**Unit Spill Kit**- Weight of kit 31kg. Dimensions 580mm x 10170mm x 740mm. The contents of the kit consist of :- 120 x Pads (Item 4) 10 x Cushions (Item 1) 10 x Sock (Item 5) 10 x Disposal bags / ties (Item 19)	EA
4235-99-1314864	**16**	**Draincover-** 1220 mm by 1220 mm by 13mm thick. Weight 23.86 kg. Item is manufactured from chemical resistant polyurethane.	EA
4235-99-5261641	**17**	**Draincover-** 1520 mm by 460 mm by 13 mm thick. Weight 10.5 kg. Item is to be manufactured from chemical resistant polyurethane.	EA
7920-99-3416081	**18**	**Barrel top mat**- Manufactured to fit existing supplied 205 L oil storage containers. Pad is scuff resistant. (25 per package). Sorption of quantity of OM 11 per item 0.86 L.	PK
8105-99-5261680	**19**	**Disposal Bags-** 1520 mm x 910 mm, 3 mm thick. Yellow bags with black warnings. Includes 200 mm nylon ties. (25 per package).	PK
7920-99-4953652	**20**	**Universal Mat-** Pad is scuff resistant 380mm x 510 mm (100 pads per bale). Packed in **non-**Antistatic polythene bags. Sorption of quantity of OM 11 per item 0.86L	PK
63P 4235-99-7290516	**21**	**Mobile Utility Spill Kit.** The contents of the kit consists of:- 12 x Universal Mats (item19) 2 x Disposal bags / ties (item 19) 3 x Sock Alumino Silicate (item 13)	EA
63P 4235-99-2130940	**22**	**Lightweight Mobile Utility Spill Kit.** The contents of the kit consists of:- 8 x Universal Mats (item19) 2 x Disposal bags / ties (item 19) 1 x Sock Alumino Silicate (item 13)	EA

Annex K to
Part 5
Chapter 8
JSP 317

CURRENT CONTRACTOR DETAILS

CONTRACT No	**DFG1a/0046**
CURRENT CONTRACTOR DETAILS	NEW PIG LTD Hogs Hill, Watt Place Hamilton International Technology Park Blantyre G72 0AH
CUSTOMER SERVICE TEL No (0815-1730 WORKDAYS)	0800 919 900
ANSWER PHONE No (SILENT HOURS)	0800 919 900
FAX No	0800 731 5071
TECHNICAL PRODUCT INFORMATION TEL No	0800 919 900
E-MAIL ADDRESS	Mod@newpig.com
PRODUCT MSDS AVAILABLE FROM	www.newpig.com/ukmod
MOD E-ORDERING / PURCHASING WEBSITE ***See below***	www.newpig.com/ukmod

Note: The MOD e-ordering/purchasing website is available to all authorised MOD sites.

Applications for a username and password are available by calling 0800 919 900 or email mod@newpig.com.

Part 5

Chapter 9 (Sponsor FGSR – Hazard)

SPILLAGE RESPONSE PLANS

SECTION 1 - GENERAL

5.9.01. There is a legal requirement for facilities that store, handle and distribute petroleum products to have spillage response plans in place. In some instances these plans may form part of a larger emergency incident plan (Major Accident Prevention Plan (MAPP) or Safety Report (SR)); there may also be a requirement for a copy of the plans to be submitted to Civil Authorities for information and/or authorisation. This guidance has been drawn up to assist in the development of a site specific Unit Spillage Response Plan (USRP) to mitigate the damage caused by spillage incidents. All MOD vessels, barracks, stations or establishments which handle hazardous substances, including petroleum products, are required to have a USRP. MOD (N) vessels are required to have spillage response plans for onboard spillage incidents and a Shipboard Oil Pollution Emergency Plan as required by Regulation 26 of MARPOL Annex 1. The main aim of each plan should be to describe the actions needed to provide an effective spillage response. Such plans are to be produced by the nominated specialist, generally the Pollution Control Officer (PCO), who would normally be the officer with responsibility for fuel handling and storage. Aquatrine Service Providers (ASP) must assist in the formation and amendment of an establishments USRP, and ensure its Contingency Plan is complementary to the establishments Emergency Plan.

5.9.02. The uniqueness of each unit, site or situation precludes the production of a USRP suitable for all units. Each USRP should be formulated from the information gained at the Pollution Control Planning (see Part 5, Chapter 2) and Pollution Risk Assessment (see Part 5, Chapter 3) stages as well as lessons learned from previous site pollution spillages. The basis of each plan should be to identify potential for incidents and provide direction and guidance to those involved in a spillage incident to set in motion all of the necessary actions to stop or minimise the pollution and to reduce its effects on the environment. It should also identify the personnel and equipment needed to respond to the incident. Full use should, therefore, be made of the Risk Assessment when drafting a plan. Examples of information / equipment contained in the USRP are:-

a. Holding of up-to date site plans of Bulk Fuels Infrastructure (including heating oil storage, standby generators), identifying underground fuel pipes, as well as adjacent utility underground pipework.

b. Holding of emergency repair equipment such as pipe clamps flanges, bungs / leak stoppers etc for infrastructure.

c. Location of all pre positioned Pollution Control Sorbent (PCS) kits.

d. Contingency plans identifying methods detailing the storage of contaminated waste “oily water”, emulsified oil, or fire fighting water/foam oily mixtures. (These mixtures can be produced in great quantities – many times the volume of the original amount of spilled F&L).

5.9.03. As detailed at Part 5, Chapter 2, the process of contingency planning is a continual one. Accordingly, a USRP should not be considered complete after the first draft has been raised but should be subject to a review process to maintain its currency and effectiveness. The review cycle process, shown at Annex A, should be adopted as a guide to the review of a USRP.

5.9.04. Spillages occur on MOD sites mainly due to equipment / infrastructure failures (worn seals or corroded pipe work); or, failure to comply with procedures (operator error, inadequate procedures, or lack of training). Therefore the responsibility (*the polluter),* lies always with the MOD.

5.9.05. In responding to a spill resulting from infrastructure / equipment failures, all relevant technical Subject Matter Experts (SME) already available should be employed at the earliest opportunity to prevent further environmental damage. Readily available in-service / on site agencies include:-

a. Defence Estate Facilities Manager / Property Manager.

b. Maintenance Management Organisations (MMOs) e.g. Regional Prime Contractors. (RPCs)

c. Integrated Service Providers (ISPs)

d. Aquatrine Service Providers (ASPs)

e. Defence Fire Risk Management Organisation (DFRMO)

f. Appointed Persons AP (Petroleum), AP (Electrical)

g. Pollution Control Officer (PCO) Pollution Response Teams (PRT)

h. Site Operators

5.9.06. When spillages on infrastructure / equipment have occurred resulting from failure in procedures; there is generally limited MMO responsibility. However the services of the MMO's should be sought at the earliest opportunity as the MMO's will be able to source plant equipment and machinery that may be utilised in support of spill response.

5.9.07. The Emergency Pollution Response Service (EPRS) Contractor (Part 5 Ch10) is available to support units / establishments to conduct clean up operations of F&L spillages that are beyond the capability of the unit /establishment and supporting SME. As such, the EPRS hold specialist Pollution Control Equipment (PCE) and specialist trained personnel in spill response. The EPRS main aim is to contain and clean up the initial spillage and to carry out remediation if tasked. Repairs of unserviceable infrastructure / equipment causing F&L spillages is not in the remit of the EPRS, as this is the responsibility of the MMO maintenance contracts.

5.9.08. Dependant on the severity or complexity of the spill, it is recommended that a "Task Force" be created by the establishment. The Task Force should be led by a suitably appointed officer (supported by the PCO), and clearly define each agencies role and responsibilities for the period of the spill. This could include agencies as listed in paragraph 5.9.05 above, as well as including the Emergency Pollution Response Service (EPRS) Contactor and Environmental Regulators. Details of examples of potential scenarios when such Task Forces are to be established, with outline TORS, should be included in the USRP.

5.9.09. Irrespective of the size and complexity of a significant spill, it is the responsibility of the establishment to co-ordinate the spill response programme by ensuring that all stakeholders involved in the project understand their duties. Guidance from the appropriate 4Cs manager should be sought with regard to ensuring that ***all*** Contractors (including EPRS Contractors) comply with AP (Pet) Safe Systems of Work (SSoW), and station Health & Safety policies as appropriate.

5.9.10. The greatest source of information available for establishments to produce viable Unit Spill Response Plans (USRP) is gained by lessons learnt from previous spillages on site. PCO's should record lessons learnt and formulate likely scenarios identified from their risk registers and spill history. These scenarios should then be used as tools for table top training and exercises. A list of likely scenarios (not exhaustive) is detailed below.

a. Leak from above ground storage tank – contained in bund.

b. Leak from above ground storage tank / pipeline / drum /Jerricans – not contained in bund. (Pathway / Receptor- impermeable concrete, drainage system, inland waters, soil – type of soil).

c. Leak from semi buried, underground storage tanks, underground pipelines (Pathway / Receptor, inland waters, into buildings, soil-soil type, sewage/ rainwater drains).

d. Leak from BFCV – on establishment / on detachment (Pathway / receptor issues).

e. Leak from storage tank / pipeline on fuelling jetty. (Pathway / Receptor- maritime).

SECTION 2 - FORMAT OF USRP

5.9.11. **Standardised Format**. The USRP should be produced to a standard format, the framework for this format is detailed within this Chapter and a worked example is found at the JSP 317 website. The content of the USRP will be specific to each unit and the information provided on the example copy of URSP is classed as advisory only, additional and supporting information should also be included where appropriate. The key points concerning the suggested format are:

a. The standard format is a framework – information contained within the framework of the USRP will be unit specific.

b. The adoption of the standard format across MOD will ensure the following:

1. Standardisation across MOD.

2. Improved understanding of USRPs by operators moving between units as the structure of the information, specifically the Annexes, should be the same for each unit.

3. Improved understanding by inspection and audit teams.

4. Improved integration with other emergency incident plans (MAPP/SR).

c. The key to success is sound decision-making, particularly in the early stage of the incident and at the decision of Tier categorisation.

d. The plan should be clear, concise, in plain English and easily understood. This is particularly relevant as distribution of the USRP outside the MOD may be envisaged, and normal Service-writing conventions may not be fully understood.

LAYOUT OF USRP

5.9.12. So that each unit's USRP meets the criteria detailed above, the layout of the contents is to be established as follows:

a. **Contents Page**. A full list of contents showing a breakdown of the content of the main document with a list of Annexes in **Bold** to emphasis their importance. The Annexes will detail the immediate actions and supplementary information, from the actions of an individual discovering a spillage to the reporting actions. The Contents Page should be clearly marked and the Annexes flagged to ensure swift and easy access to the 'actions to be taken' information detailed at the Annexes.

b. **Amendment Sheet**. A sheet detailing the amendment state of the USRP.

c. **Distribution**. A Distribution List is to be included. Distribution of the USRP, (both internal and external) is to include all relevant stakeholders (for example, Squadrons, Workshops, MTO, Guardroom, duty personnel packs, Regional Prime Contractors, Aquatrine Service Providers, Local Authorities etc, as required). There is also a requirement for units that qualify as a MACR site to have the USRP linked to either the Safety Report (SR) for MACR Top Tier Sites or the Major Accident Prevention Plan (MAPP) for MACR Lower Tier Sites. Unit distribution should be to all sections identified within the USRP and other key posts to allow ease of access to the plan when required.

d. **Unit Commander's/Head of Establishment's Foreword**. A foreword by the Unit Commander is required to authorise and empower the USRP and those named within it. The Unit Commander, or his delegated representative, should sign the Foreword to indicate the acceptance of the USRP's contents.

e. **Unit Safety and Environmental Organisation and Arrangement (O&A) Statements**. To support the Unit Commanders Foreword, a current copy of the unit/ establishment Safety, Health, Environmental Protection, and Sustainable Development O&A Statement as mandated by the current Secretary of State for Defence is to be enclosed.

f. **Definitions**. A list of definitions used within the USRP is to be provided to improve understanding of certain terms by personnel who may be unfamiliar with MOD acronyms and phraseology.

g. **Introduction**. An introduction to the USRP is to be provided to outline the following:

1. **Mission**. To prevent, contain, control and recover a spillage. The protection of the environment is of utmost importance, but not to the extent of endangering human life.

2. **Action Plan**. An outline of the USRP processes.

3. **Risk Assessment**. An outline of the unit Risk Assessment must be provided to indicate the potential risks that the USRP has been formulated to cover and details of local sensitivities including environmental sensitivities.

4. **Command and Control**. An outline of the actions to be taken by those named within the USRP. This must be based on a realistic assessment of the unit's ability to respond to the identified potential spillage scenarios.

5. **Service Support**. An outline of the unit's own support organisations, equipment and services, to include the Pollution Control Team, unit fire service, medical and DE FM organisations. Consideration must include the availability of trained response personnel, response equipment, transportation, communications, the mobilisation time, access to the potential clean-up sites.

6. **Outside Agencies**. An outline of the external agencies that may be contacted in support of a spillage incident, to include Local Authorities, Emergency Services, Environment Agencies, Coastguard and spillage response contractors.

7. **Command and Signal**. An outline of the reporting actions required.

8. **Communication**. Good communications are vital during a spillage incident. An outline of the communications to be used must include initial notification, subsequent mobilisation and ongoing operations by the Pollution Control Team. It is imperative that the unit confirms the actions to be carried out by the initial point of contact, normally the MOD Operator, to ensure that the cascade call-out system is complete. Do not forget to include notification to the Unit Commander and other key players.

9. **Media Actions**. An outline of the actions to be taken in the event of media interest. The details of the Unit Media Officer, normally the Community Relations Officer, are included so that appropriate actions may be taken to control the information provided media.

10. **Security**. An outline of the security actions to be taken in the event of a spillage to cordon and control the area around the spillage and any public interest that may occur.

11. **Health and Safety**. An outline of unit general and specific H&S considerations. The protection of human life is paramount. Under no circumstances are personnel to be exposed to unnecessary risk in the execution of a USRP.

12. **Disposals**. An outline of the process for the correct disposal of products, including waste, recovered after a spillage response.

h. **Training**. For an USRP to be effective all personnel that will be involved in the clean-up operation must have an understanding of their responsibilities. They must also be competent in their roles. An outline of the training requirements and the standards to be maintained for those named within the USRP must be included in the planning and review cycle process, see Annex A. It is also a requirement for all other unit personnel to have an understanding of the USRP and how to act and where to find information on the actions to be taken on discovering a spillage. This could be implemented in a number of ways including arrivals briefs and annual mandatory training (as with fire and military Common Core Skills (CCS) or Individual Defence Training (IDT)). If the establishment requires the ASP to participate in the testing of the USRP, the ASP must take the necessary steps to compliment its Contingency Plan so as to assist and co-operate with the establishment as set out in the AQUATRINE Agreement. PCO's must provide reasonable notice when requesting the services of ASP for any site exercises.

i. **Exercise/Practice**. For the plan to be of value it must be familiar to those expected to use it. USRPs are to be practised annually as a practical exercise for Tier 1 and 2 spillage response capability. The exercise should include the establishment of a command centre, deployment of personnel and equipment, interface with other plans and communications including those with outside agencies. Because of the degree of involvement with local agencies and executive/key players, Tier 3 incidents should be exercised on an annual basis and conducted as a desk–top exercise with local agency involvement (it may be beneficial to have a USRP exercise as part of a major unit or incident response exercise).

j. **Plan Review/Amendment**. A plan can become out of date, particularly with regard to contact details. An out of date plan can cause unnecessary delays, or worse, in the event of an incident. To ensure the plan remains accurate it must be reviewed at least annually and amended accordingly. Review and amendment should also take place following an incident or exercise.

k. **Records**. It is important to log and keep a record of all events during an incident. This will assist if a Board of Enquiry, court case, liability, compensation or reimbursement issues arise as a result of the incident. The record should include details of all actions taken, communications with outside agencies, a summary of all key decisions made and details of all expenditure incurred. This information will also be useful during the review of the plan following the incident. The record is to be maintained by a focal point, normally the Pollution Control Officer (PCO) and is to be retained for auditing purposes for a period of no less than 12 months.

l. **Reporting**. Reporting requirements are detailed at Part 5, Chapter 5. To enable the appropriate level of support to be provided by FLCs and FGSR, it is important that each spillage incident is reported on the MOD Forms MOD Form 7772 –MOD Form 7773). SPILLREP and a POLREP MOD Form 7774 must be raised and issued in the correct timeframes and contain accurate and relevant information. Pre-printed SPILLREP and POLREP forms should be contained within the USRP to minimise the length of time taken to raise a report. The templates shown on the JSP 317 website, where they should be used in reporting of spillages. Spillages are to be reported to the PCO and recorded in the Establishment Spill Register MOD Form 7771.). The PCO maintains the Spillage Register.

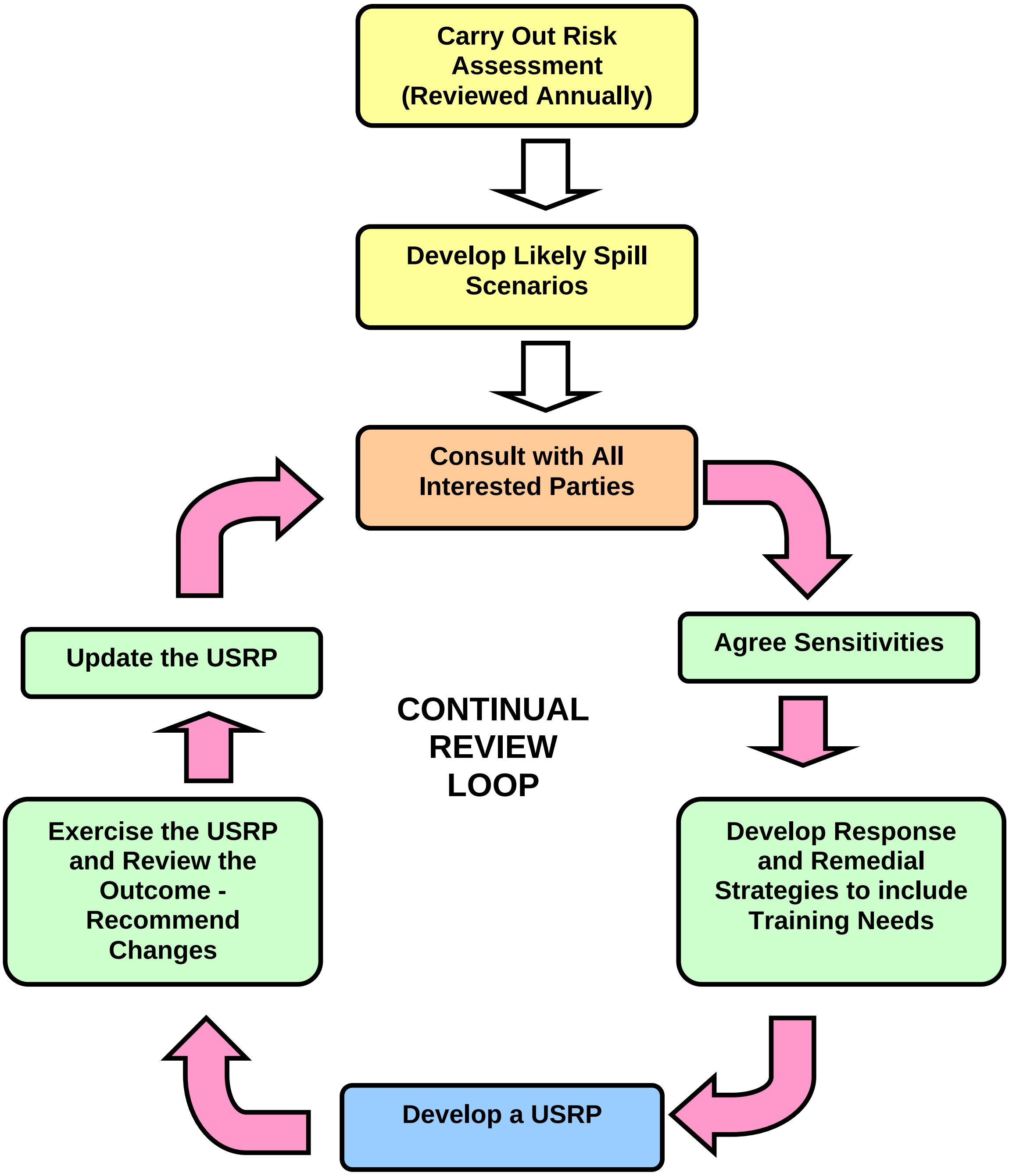
m. **Annexes**. In most events, the USRP will be utilised by those personnel acting in response to a spillage incident. In these instances it is crucial that the minimum amount of time is taken to find the information required to make effective decisions. To assist in this process, a standard layout of the key information is crucial. Therefore, the USRP Annexes are to contain the primary actions for spillage response. All Annexes within the plan should be clearly marked and flagged to ensure swift and easy access to the information required, it may also be useful to be able to remove pages for photocopying as required. To encourage every unit to complete a comprehensive and accurate USRP. Example copy of URSP can be down loaded from the JSP 317 website.

SECTION 3 - LAND REMEDIATION

5.9.13. There is a Memorandum of Understanding (MOU) between the Environment Agency and the MOD, which establishes the formal working arrangements between MOD and the Environment Agency. Annex 6 of the MOU specifically covers land contamination. (The MOU can be found in JSP 815). Once a site has been identified as contaminated land, the relevant regulatory authority has a duty to ensure that remediation takes place either voluntarily through the appropriate unit(s), or by serving a remediation notice. Under the Contaminated Land Regime (Part II), local authorities have a statutory duty to inspect their area to identify any 'contaminated land' and to ensure the remediation of any such land. As such, once a unit has gained control of a spillage situation, remediation of the spillage site may be required. Further detail on land remediation can be found in JSP 418, Vol 2.

Annex A to
Part 5 Chapter 9
JSP 317

UNIT SPILLAGE RESPONSE PLAN (USRP) REVIEW CYCLE PROCESS



Part 5

Chapter 10 (Sponsor Log Comm FLG Team)

EMERGENCY POLLUTION RESPONSE SERVICE (EPRS) CONTRACT – UNITED KINGDOM (UK) AND INTERNATIONAL MARITIME WATERS

SECTION 1 – GENERAL

5.10.01. After every conceivable precaution has been taken to ensure the safe storage, handling and transportation of F&L and other Hazardous Substances, there remains the possibility that a spillage may occur. In the event of a spillage, action is to be taken to contain the spill in accordance with the Unit Spillage Response Plan (USRP) (see Part 5, Chapter 9). The USRP details the levels of response that can be implemented from Tier 1 – fully within the Unit's capabilities, to Tier 2 and 3 that require external assistance. To guarantee that specialist external assistance is available an Emergency Pollution Response Service (EPRS) contract has been arranged. The contract provides response cover for spillages resulting from MOD activities.

5.10.02. The contract is brokered centrally and is provided by DE&S. **Units requesting services against this contract are responsible for paying the charges for the services provided against the agreed Schedule of Rates in the contract.**

5.10.03. Upon activation of this contract, the PCO / authorised person is to agree with the EPRS contractor the initial scope of works and is to validate and receive the EPRS contractor's work record daily, and/or whenever a change of scope of work is required. These daily work sheets are to be retained by the PCO / authorised person for financial records.

5.10.04. The EPRS contract provides an emergency response service to units that are unable to respond in-house to a F&L spillage. Units are encouraged to use existing MMOs (eg. DE, RPC, and Land Quality Assessment Teams) on excavation, plant repair, hazardous waste disposal, and remediation. Examples of MMOs / MOD specialists are detailed in Part 5, Chapter 9 and Part 5, Chapter 4, *Table 5.4.1*.

SECTION 2 – SERVICES TO BE PROVIDED

5.10.05. The following description of the services to be provided has been extracted from the contract. It may be used as a guide, but not as an authority, for contract action or bill payment.

5.10.06. **What the Contract covers; UK**. The EPRS provides a response capability 24 hrs a day, 7 days a week, 365 days a year to any incident involving the MOD and United States Visiting Forces (USVF) anywhere in the UK; this includes Coastal Waters (for the purposes of the contract, Coastal Waters are defined as those extending 3 Nautical Miles out from the Low Water Mark).

5.10.07. **What the Contract covers; International Maritime Waters**. The EPRS provides "global recovery" that meets the requirements of HM Warships, RFA, and MOD operated vessels (vessels operated by the Royal Logistic Corps). The EPRS contractor has the capability to arrive at a remote incident site by using their own resources on a no retainer basis. This contract **does not cover** MOD chartered vessels or Ships Taken Up From Trade (STUFT vessels), **nor** does it cover vessels operating in foreign national waters (including British Overseas Territories and Dependencies).

5.10.08. Commanding Officers of MOD vessels are to report to their respective chains of command in accordance with established procedures following a Tier 2 / Tier 3 spill in international maritime waters. The report will be via the duly authorised MOD representatives. For RN and RFA vessels this is via the Duty Fleet Controller, member of the Fleet Incidence response Cell (FIRC) or a delegated member of the Accident Response Organisation (ARO).

5.10.09. It is recognised that international conflicts may, from time-to-time, prohibit EPRS assistance and, in such cases, a formal Risk Assessment and Environmental Impact Assessment will need to be carried out. Duly authorised MOD representatives will need to demonstrate to the EPRS Contractor that the area is safe and secure before spill recovery commences. In such circumstances duly authorised MOD representatives and the contractor shall agree to mutually acceptable terms.

5.10.10. There maybe a requirement, in some circumstances, that the EPRS contractor is unable to provide autonomous logistical support to reach a spill in international maritime waters, or that the authorised representative is unwilling to pay for the transportation costs of the EPRS contractor. In these circumstances, the Defence Transport and Movements Agency (DTMA) may provide logistical support to the contractor. Dependent upon DTMA's capabilities, operational commitments, and the severity of the situation, a priority tasking by DTMA will be issued.

5.10.11. The response capability covers all oils (hydrocarbon based products) and chemicals used by the MOD. A list of oils and chemicals used by the MOD has been provided to the contractor. In some instances there may be an incident involving a product outwith this list; the contractor will respond to the incident if requested. This may incur charges not agreed within the contract and in this event advice should be sought from DE&S Commercial. The contractor will complete all actions required to rectify the spillage from providing fully trained and experienced personnel to final disposal of the waste product resulting from the clean-up operation and reinstatement of the damaged environment if required. The contract also provides an advisory service free of charge. Non urgent requests for advice can be made on the number detailed at Annex A. Advice during an incident can be requested on the Emergency Call-Out Number detailed at Annex A. This Contract does not replace existent Queens Harbour Master (QHM) contracts in place at the military ports at Plymouth, Portsmouth and Faslane, but it does provide an additional level of support to these contracts if required. This contract does not replace existing repair / maintenance contracts within the MOD estate. Repair to damaged plant infrastructure, including emptying of tanks, containers and pipelines etc are the responsibility of the MMO.

5.10.12. **Additional Services**. The contractor also provides a number of other services not covered by this contract, some of the services include training, consultancy on environmental matters and environmental audit. However, as with the on-contract services, units are responsible for paying charges arising from the use of these services. Additional services must not be activated using the Emergency Call-Out Number. The additional services may be obtained through the normal commercial telephone number detailed in Annex A.

5.10.13. **Timings**. Within the UK the Contract provides a response within 2 hours of an emergency call. However, for the Scottish Islands, and for the Highlands North and West of the Great Glen, a delay in this response time is anticipated. Any extension to the response time is to be agreed and authorised by the appropriate Environment Agency. For Emergency pollution response in international waters the EPRS contractor will deliver the appropriate manpower and equipment to a designated UK embarkation point within 8 hours. Units that experience an unacceptable delay in response time are to highlight the duration of the delay and the reason given by the contractor for the delay on the MOD F 7772 / 7773. Units are not to delay payment of charges due to an extended response time but are to notify their FLC and provide copies of the charges for verification. If there is a justification for a claim to be made against the contractor for an unreasonable delay, this will be staffed through DE&S Commercial.

5.10.14. **Equipment**. The contractor provides experienced supervisors and personnel, oil and chemical containment and recovery equipment and other specialist equipment, some of which are in pre-deployed support pack-ups located across the UK. In addition, suitable vehicles and aircraft for mobilising personnel and equipment to incident locations are provided. In the event of a very large spillage, the contractor has the capability to call upon additional support from other spillage response contractors to assist with the clean-up operation. The unit will be charged for any additional manpower and equipment that is called in support of the contractor, but these charges will be the same as on the Schedule of Rates; the unit will only pay the rate agreed for the contractor's services. If the unit has the capability to provide support to the contractor in the form of equipment (PCS/PCE) or transport, including air transportation, this will reduce some elements of the charges by the contractor (paragraph 5.10.10). Units are to ensure that this usage is fully authorised before being offered to the Contractor and that the Contractor agrees to the terms of the offer. When the international maritime element of the EPRS is used, units should be aware that they will continue to incur charges until all the contractor's equipment and manpower has been returned to its parent base. Full Service accounting actions are carried out on completion of the clean-up for any service items used by the contractor.

5.10.15. **Disposal of Waste**. The contract provides for the proper disposal, in accordance with the appropriate legislation, of waste product resulting from the clean-up operation. Documentary certification of the disposal will be provided to the Unit within 10 working days of the recovery. This ensures that the unit's duty of care for the correct disposal of the waste is discharged.

5.10.16. **Her Majesty's Revenue & Customs (HMR&C)**. The vast majority of F&L stored on MOD establishments is done so **without** the appropriate duty being levied by HMR&C. In the event of a large spill and the subsequent removal of F&L by EPRS contractor, the unit are to inform HMR&C on (02380 797569). This will allow HMR&C to deal with any duty implications. The unit are also to inform the relevant Fuels Management Team at Log Comms FLG Team;

a. Marine Fuels Manager 94379 x 4361

b. Aviation / Ground Fuels Manager 94379 x 4358

5.10.17. **Project Aquatrine**. Project Aquatrine is a PFI introduced by DE and encompasses all water infrastructure and systems on MOD establishments. The management of the infrastructure is the responsibility of the Service Provider (SP). Each establishment has unique site-specific water infrastructure issues (oil water interceptors, drainage culverts, etc), therefore the Unit PCO must liaise closely with the SP Authority Local Representative (ALR). This is to ensure that the UPCO has authority from the ALR that allows the EPRS contractor to gain access and apply pollution prevention techniques onto property "no longer owned" by the MOD during an emergency response. Emergency response may occur during the silent hours / weekends when the SP will not be on site. In all cases where the EPRS Contractor is requested to operate this interface in order to mitigate Environmental Incidents (EPRS contract and Project Aquatrine), the MOD will hold the EPRS Contractor harmless. Further information on Project Aquatrine can be found by contacting DIO, PMO Technical Advisor 94421 Ext 3222.

5.10.18. **Health and Safety**. The contract includes provision for employees and subcontractors to observe the obligations of the Health and Safety at Work Act and its statutory regulations where applicable; this includes full co-operation with the MOD to ensure the discharge of these duties. The contract requires compliance with any specific safety requirements in operation at MOD establishments or field exercise sites. Units are to ensure that the contractor's staff are fully briefed on the health and safety aspects of the incident site or area of Defence Infrastructure on which they might travel, or other MOD activity that may impact on the clean up operation, to ensure the MOD's duties are discharged. It should be remembered that the job of oil and chemical pollution clean-up is a hazardous one and that the contractor is a specialist in this field. If a unit has due cause for concern over any activity being carried out by the contractor, the unit should consult with the contractor to rectify the situation without prejudice to the clean-up operation. The protection of Human life remains paramount at all times.

SECTION 3 – EMERGENCY CALL-OUT PROCEDURES

5.10.19. The contract states that the MOD "….*by means of a responsible person may activate the Contractor's Emergency Spillage Response Service by telephone*". In practical terms this means that the Pollution Control Officer (PCO), as described in Part 5, Chapter 1, or authorised representative acting in accordance with the unit or site USRP may call-out the contractor. See the JSP 317 intranet page for guidance on the development of an USRP.

5.10.20. The PCO is responsible for passing details of the incident to the contractor. The contractor can be contacted via a free emergency call-out number detailed at Annex A.

Units are to ensure that that this telephone number is included within duty call-out arrangements and the USRP.

5.10.21. It is vital that the initial details, laid out at Annex B, are passed to the contractor when the call-out is initiated. As much information as possible should be offered to the contractor at the first instance so that an appropriate response can be activated.

SECTION 4 – PAYMENT PROCEDURES

5.10.22. Units requesting services against this contract are responsible for paying the charges for the services provided against the agreed Schedule of Rates in the contract, through the relevant bill paying branch.

Note: Payment of charges for the services provided will be claimed by the contractor within 4 weeks of the initial call out. For clean up operations lasting for more than 4 weeks, there is a requirement to pay for the services as they are provided and bills will be presented to units at the end of each 4-week period; the contractor will not carry the cost of the entire clean up until completion. The bills will be presented on the contractor's commercial invoice. Itemised bills, accompanied by an incident report, will be submitted to the PCO / Commanding Officer / Authorised MOD Representative for scrutiny and approval prior to being returned to the contractor for onward transmission to the relevant bill paying branch. As with the contract, the Schedule of Rates are classified COMMERCIAL and cannot be distributed to units. However, a full copy of the contract and Schedule of Rates is held by DE&S Commercial, to whom queries about the bill should be directed by units. FLCs will carry out scrutiny of bills as required.

5.10.23. Charges for Contractor services are to be fully detailed on the SPILLREP/POLREP Part 2; this is to provide cost information and notification of any budget implications to the FLC and TLB. For large spillage clean-up actions there may be a sizeable cost which may impact on the unit's budget estimate to the point where an overspend situation may be experienced. As incidents and accidents cannot be budgeted for, the costs associated with the overspend should be accepted by the unit budget staff and notified to the TLB without delay. This is not to impact on the payment of contractors' bills.

5.10.24. The contractor has the authority to chase late payment of bills, this may be directly with the unit or the bill paying branch. Units are strongly advised to ensure the timely authorisation of bills so that enforcement action is not required.

5.10.25. In general, the Polluter Pays Principle (PPP) is applied. This requires the cost of preventing pollution, or of minimising environmental damage due to pollution, being borne by those responsible for the pollution. There are, however, instances where the responsibility for the pollution may not be clearly evident to a unit. In these cases advice and direction should be sought from the FLC. The following examples of answers to commonly asked questions are provided as guidance:

a. **Pollution resulting from aircraft crashes**. Units having regional responsibilities for aircraft crash response and support will be nominated for Post CrashManagement (PCM). This includes the responsibility for pollution control. Part of this responsibility is that PCM units are required to pay for clean-up costs of pollution resulting from the aircraft crash; these include the contractor's bills and any other agency bills (EA/SEPA) involved in the clean-up operation.

b. **Pollution resulting from BFCV or Chemical Carrying Vehicle accidents**. When a vehicle carrying bulk fuels or chemicals or large quantities of packed stock is consigned from a unit, that vehicle remains the responsibility of the consigning unit to the point of delivery – the receiving unit. If the vehicle is involved in an accident outside of the consigning unit, the consigning unit is responsible for the pollution control aspects and paying for any costs associated with the clean up of that pollution. If the vehicle is involved in an accident on the estate of the receiving unit, that unit should implement its USRP and discharge its own pollution control duties.

c. **Pollution on MOD beaches**. There are some units that have responsibility for beaches on the Defence estate. It is the unit's responsibility to clean up pollution arising on the beach, even if the unit is not the originator of the pollution. If the clean up task requires the assistance of the contractor, the unit is to pay these costs also. Every attempt should be made to identify where the pollution came from so that recovery actions can be taken against the polluter to recover the costs of the clean up. It may be in the unit's interest to involve the local Environment Agency in the tracing the polluter so that they can take enforcement actions as necessary. If a unit intends to pursue recovery action, it is essential that the process be correctly staffed before any action is taken against the polluter to ensure that the position of the MOD is not compromised. The unit should approach their FLC to arrange consultation with the appropriate Service Legal Department and Chief Environmental Safety Officer (CESO) as required.

EMERGENCY POLLUTION RESPONSE SERVICE (EPRS) CONTRACTOR CONTACT POINTS

CURRENT EPRS CONTRACTOR	BRAEMAR HOWELLS LTD Ltd
EMERGENCY CALL-OUT NUMBER (24/7/365)	08700 73 77 66 73
COMMERCIAL TELEPHONE NUMBER (for additional services)	01646 697041
FAX	01646 663705
EPRS CONTRACTOR ADDRESS	Braemar Howells Ltd Ltd The MPSC, Milford Haven, Pembrokeshire, SA73 3AQ
EPRS CONTRACTOR WEB-SITE	www.braemarhowells.com/

Annex B to
Part 5
Chapter 10
JSP 317

INITIAL REPORT OF DETAILS TO BE PROVIDED TO SPILLAGE CONTRACTOR

1. Name of Unit.
2. Name of Contact.
3. Name, Post Title and Address (For Invoice).
4. Telephone Number.
5. Fax Number.
6. E–mail Address.
7. Type of Product: Oil or Chemical (with proper name and common user name).
8. UN Number.
9. Hazard Data Sheet (In full).
10. When did spill occur? Date and Time
11. Amount Of Product (In Litres). What is the capacity of the leaking vessel / container?
12. Is product still leaking?
13. Is it Contained? Yes / No. If No, is it likely to affect a watercourse and estimated time?
14. Where is it? River/Stream/Dock/Pond/Lake/Bunded area/Road/Yard/ Soil/Beach or other.
15. If on flowing river what is approximate current?
16. Have an Environment Agency been informed? Yes or No. If Yes, name of contact.
17. Name, Rank and number (of person raising report).
18. Parent Unit.
19. Location of Parent Unit.
20. Who is Incident Site Contact?
21. What are the Weather Conditions?
22. Are the Media Present?
23. Any other Relevant Information

Part 5

Chapter 11 (Sponsor Log Comm FLG Team)

EMERGENCY SPILLAGE RESPONSE - CONTRACT COVER OUTSIDE OF THE UNITED KINGDOM (UK) AND INTERNATIONAL MARITIME WATERS

SECTION 1 – GENERAL

5.11.1. Unlike the Emergency Pollution Response Service (EPRS) Contract for the UK and International Maritime Waters, (see Part 5, Chapter 10), there is no DF&FS sponsored EPRS contract for land units, deployments, and exercises outside of the UK. An extremely negative view is taken by host nations and national neighbours when pollution incidents occur resulting from MOD actions and every precaution is to be taken to ensure that the MOD position is not compromised. This issue is further complicated by the varying legislative standards of different host nation countries, and of particular sensitive environmental issues adjacent to MOD operations overseas.

INTERNATIONAL CONVENTION ON OIL POLLUTION PREPAREDNESS, RESPONSE AND CO-OPERTAION – (OPRC 98)

5.11.2. The OPRC 1998 Regulations are now the principal legislation on counter- pollution from a harbour authority and **oil handling perspective**. In particular the OPRC obligation arises for: -

a. Any harbour and oil handling facility offering berths alongside, on buoys or at anchor, to ships over 400 gross tonnes (GT), or oil tankers of over 150 GT.

b. Any harbour and any oil handling facility which the Secretary of State has served the harbour authority or operator with a notice that he is of the opinion that maritime facilities are undertaken at the harbour or facility which involve a significant risk of discharge of over 10 tonnes of oil.

c. Any harbour and any oil handling facility which the Secretary of State has served the harbour authority or operator a notice stating that he is of the opinion that it is located in an area of significant environmental sensitivity, or in an area where discharge of oil or other substances could cause significant economical damage.

5.11.3. The OPRC 98 Regulations state that harbour authorities or oil handling facilities identified at 5.11.2 must have either:

a. A minimum level of pre-positioned oil spill combating equipment commensurate with the risk involved and programmes for its use.

b. A programme of exercises for oil pollution response organisations and training of relevant personnel.

c. Detailed plans and communication infrastructure for responding to an oil pollution incident.

d. Sufficient pollution control equipment to adequately deal with a Tier 1 spill.

e. Have in place a contract with a competent oil spill response company that has the capability to respond to a Tier 2 spill. There is no requirement for a harbour authority or oil handling facility to actually have in place arrangements with a competent response company, but there must be a formal agreement in place to ensure that a response will be guaranteed in the event of an accident.

5.11.4. Regardless of global location or operational task, units are to ensure that every practical measure is taken to prevent pollution incidents, although there remains the possibility that a spillage may occur. In the event of a spillage, action is to be taken to contain the spill in accordance with the Unit Spillage Response Plan (USRP) (see Part 5, Chapter 9). It is even more imperative that the USRP effectively details the levels of response that can be implemented from Tier 1 – fully within the unit's capabilities, to Tiers 2 and 3 that require external assistance. Consideration should also be taken with regard to the unit's potential geographical remoteness, its close proximity to national neighbours and the potential ramifications of a spill occurring over sensitive environmental areas. ESS PT are the Equipment Sponsors for Pollution Control Equipment, (PCE) further details are available from BFU PT, MOD Abbey Wood, PSTN: 0117 91 35362, Mil: 9352 35362.

5.11.5. It is incumbent on units outside of the UK to guarantee that every practical means is taken to have specialist external assistance available to respond to Tier 2 and 3 incidents. It is accepted that there are some areas of the world that do not have Spillage Response Contractors. In these situations it is even more important that units conduct an in depth Risk Assessment of the potential for pollution and ensure that the USRP is as comprehensive as possible to cover all eventualities, utilising PCE from MOD sources as appropriate.

LOCAL EMERGENCY POLLUTION RESPONSE SERVICE

5.11.6. Where a unit is able to contract the services of a specialist contractor, a contract on similar lines to the UK contract is to be recommended. In some instances it may be beneficial for a group of units, via their respective Commands, in the same country or region to arrange for a contract that provides cover for the group. Overseas units are advised to make contact with other units that may be in a position to benefit from a group based contract to share the cost of any retainer fee that may be required. Advice on the content of a response contract can be obtained from DE&S Commercial.

SECTION 2 – TIER 2

5.11.7. Tier 2 response should be on stand-by for land, inland waterways and coastal waters for PJOBs, overseas units, land operations and major exercises. This stand-by response should be provided by contract, arranged locally through Theatre Command. Often a combination of contract and Service resources can provide the best solution. However, the response is to be based on a risk assessment and is to include appropriate pollution response equipment and men and vehicles at appropriate notice to move.

5.11.8. Incidents that would typically require a Tier 2 response include: BFCV roll-over, major incident at a BFI, a large vehicle falling into water, aircraft crash, incident when loading/unloading sea tankers/river barges at the shore.

5.11.9. Theatre or Exercise Headquarters are responsible for arranging appropriate Tier 2 cover. The Force Protection Cell task the Pollution Control Response Team (PCRT) and Engineer Support on advice of the PI staff officer. The PCRT is manned by Petroleum Operators. Specialists Army/RAF fuels units are equipped with PCE for specialist tasks such as Tanker Rollover Recovery.

5.11.10. Maritime Tier 2. Dedicated Tier 2 for maritime operations in International Maritime waters is contained in Part 5, Chapter 10.

SECTION 3 – TIER 3

5.11.11. Tier 3 response is likely only to be required for a major maritime incident. Advice may be obtained from the focal points detailed at Part 5, Chapter 7, Table 5.7.2.

BIBLIOGRAPHY:

1. Maritime and Coastguard Agency – Contingency Planning for Marine Pollution Preparedness and Response- Guidelines for Ports.

2. International Convention on Oil Pollution Preparedness, Response and Co-operation – (OPRC 98)