



Defence Works Functional Standard
Specification 031

Internal Cleaning of Fuel Tanks



DEFENCE ESTATE ORGANISATION (WORKS)
MINISTRY OF DEFENCE



Defence Works Functional Standard
Specification 031

Internal Cleaning of Fuel Tanks

AIRFIELDS AND BULK FUELS GROUP
DEFENCE ESTATE ORGANISATION (WORKS)

Ministry of Defence

London: The Stationery Office

© Crown copyright 1996. Published for the Ministry of Defence under licence from the Controller of Her Majesty's Stationery Office.

Applications for reproduction should be made in writing to The Copyright Unit, Her Majesty's Stationery Office, St Clements House, 2-16 Colegate, Norwich NR3 1BQ

ISBN 0 11 772489 0

Foreword

This document is for the use of Top Level Budget Holders (TLBHs) for application by the Project Sponsors, Property Managers (PROMs), Establishment Works Consultants (EWCs), Works Service Managers (WSMs) and other parties involved in the internal cleaning of fuel tanks on the MOD Estate.

This Standard is expected to be used principally by EWCs, WSMs and tank cleaning Contractors: it replaces DOE/PSA Standard Specification (M&E) No 114 TOL Tanks - Preparation for Inspection and Maintenance Cleaning'.

Amendments to this Functional Standard will be advised by DEO(W) Technical Bulletin, issued to PROM and TLBH Works Staff. It is the responsibility of the user to check with the PROM or Project Sponsor if amendments have been issued. There is a feedback sheet at Annex C for suggested changes or developments to the document.

Technical advice and assistance on MOD petroleum matters can be obtained from DEO(W). Approaches may be through local DEO(W) offices or directly to the petroleum Technical Authority, (DEO(W) TA):

Head of Bulk Petroleum Installations
Airfields and Bulk Fuels Group
Defence Estate Organisation (Works)
Blakemore Drive
SUTTON COLDFIELD
West Midlands
B75 7RL

Notwithstanding that this document sets out guidance for specialist works concerning tank cleaning and is the MOD preferred solution, its use does not absolve a PM or WSM from any responsibility for tank cleaning, neither does its existence constrain him from using alternative methods, providing such alternatives can be demonstrated to provide a result of equal safety, quality and cost effectiveness.

This Standard has been devised for the use of the Crown and its Contractors in the execution of contracts for the Crown. The Crown hereby excludes all liability (other than liability for death or personal injury) whatsoever and howsoever arising (including, but without limitation, negligence on the part of the Crown its servants or agents) for any loss or damage however caused where the Standard is used for any other purpose.

Compliance with a DEO(W) Functional Standard will not of itself confer immunity from legal obligations.

Abbreviations

DEO(W)	Defence Estate Organisation (Works)
DWS	Defence Works Services
EA	Environment Agency
EWC	Establishment Works Consultant
GRP	Glass Reinforced Plastic
MOD	Ministry of Defence
PM	Project Manager
PROM	Property Manager
SEPA	Scottish Environmental Protection Agency
TA	Technical Authority
TLBH	Top Level Budget Holder
WSM	Works Services Manager

Contents

	Page
FOREWORD	
ABBREVIATIONS	
CONTENTS	
1 GENERAL REQUIREMENTS	1
1.1 INTRODUCTION	
1.2 AIM	
1.3 DEFINITIONS	
1.4 REGULATIONS	
1.5 STANDARDS	
2 SAFETY REQUIREMENTS	5
2.1 INTRODUCTION	
2.2 REQUIREMENTS	
3 PRE-CLEANING ACTIVITIES	7
3.1 INSPECTION REQUIREMENTS	
3.2 TAKING TANKS OUT OF SERVICE	
3.3 GAS-FREEING	
4 CLEANING PROCEDURES	11
4.1 INTRODUCTION	
4.2 EXTENT OF THE CLEANING PROCESS	
4.3 METHODS OF CLEANING INTERNALLY COATED TANKS	
4.4 METHODS OF CLEANING UNCOATED TANKS	
4.5 STANDARDS OF TANK CLEANLINESS	
5 CLEANING FREQUENCY	15
5.1 INTRODUCTION	
5.2 FREQUENCY OF INSPECTIONS	
5.3 PARAMETERS INDICATIVE OF IMMEDIATE TANK CLEANING BEING REQUIRED	
6 DISPOSAL OF WASTE	17
6.1 INTRODUCTION	
6.2 REQUIREMENTS	

7 RETURNING THE TANK TO SERVICE

19

7.1 INTRODUCTION

7.2 REQUIREMENTS

ANNEXES

ANNEX A—TANK CLEANING CERTIFICATE

ANNEX B—PRECAUTIONS SPECIFIC TO PRODUCT GROUPS

ANNEX C—CHANGE SUGGESTION FORM

Section 1 General Requirements

1.1 INTRODUCTION

The internal cleaning of tanks fulfils several requirements:

- to remove hazardous products for safe disposal.
- to reduce the risk to personnel during internal modification work.
- to aid invasive inspection procedures (eg. non-destructive wall thickness checks) for determining the condition of the tank.
- to ensure no cross contamination of product should the tank use change.

This Standard has been issued to reflect the latest health and safety guidelines, environmental constraints and to comply with current MOD requirements.

This Standard does not cover the cleaning of chemical containing tanks. However, the same principles apply but specific advice on the hazards and precautions should be obtained from the supplier of the relevant chemicals.

1.2 AIM

The aim of this Functional Standard is to:

- a. Provide the Contractor with details of the methodology required to undertake safe and thorough cleaning procedures.
- b. Advise the Contractor and WSM or PM of the demarcation of responsibilities concerning each stage of the cleaning and reinstatement process.

1.2.1 Arrangement

The document is arranged in the following manner, to achieve the aim:

- a. Section 1 defines the applicable standards and regulations.
- b. Section 2 advises the safety requirements to be employed.
- c. Sections 3 and 4 provide details of the cleaning processes required.
- d. Section 5 gives guidance on tank cleaning intervals.
- e. Sections 6 and 7 provide details on waste disposal and recommissioning.

1.3 DEFINITIONS

The terms used within this Standard shall be read as having the definitions given below:

Contractor: The company employed to carry out tank cleaning work on a site.

Establishment Works Consultant (EWC): The organisation responsible for the provision of specialist examinations, surveying, scheduling, financial assessments and overseeing services in support of the PROM of the Establishment.

Flammable: Refers to any solid, liquid or vapour which is easily ignited. For ignition of gases the volume of gas in air (%) must be between the lower and upper flammable limits.

Gas-free: A tank is considered to be gas-free when the concentration of flammable gases is within safe prescribed limits. The term does not imply absence of toxic gases or sufficiency of oxygen for tank entry.

Project Manager (PM): An official of the MOD or commercial representative responsible for the purpose of management and administration of the works covered within this Functional Standard. For work within the remit of the WSM, the term PM shall be read as WSM.

Property Manager (PROM): An MOD official responsible for conducting the day-to-day property management business at the Establishment.

Project Sponsor: The representative of the TLBH responsible for the delivery of the project through all stages.

Preferred: This indicates the course of action to be pursued when there is a choice between acceptable alternatives.

Pyrophoric scale or deposits: Normally finely divided ferrous sulphide formed in the presence of mercaptans or hydrogen sulphide. It is capable of such rapid oxidation on exposure to air that heating to incandescence can occur.

Scale: Solid matter including rust adhering to tank surfaces.

Sludge: Semi-liquid or solid matter remaining in a tank after removal of clean fuel.

Technical Authority: Branch of DEO(W) with responsibility for providing authoritative technical works advice.

Works Services Manager (WSM): The organisation responsible to the PROM for planning, organisation and managing operation, maintenance and repair of plant and facilities, and the design and construction of new works up to a specific value on the MOD Establishment for which it is appointed.

1.4 REGULATIONS

The completed work, and all aspects of the execution thereof, shall comply with all relevant latest enactments, statutory instruments, regulations and codes including the following where applicable:

- a. The Factories Acts and Regulations made thereunder.
- b. The Health and Safety at Work Act and Regulations made thereunder.

- c. The Control of Pollution Act and Regulations made thereunder.
- d. The Environmental Protection Act and Regulations made thereunder
- e. The Control of Substances Hazardous to Health Regulations.

1.5 STANDARDS

The Works shall comply with the latest editions of appropriate standards including:

- a. British Standards
 - BS 5345 The Selection, Installation and Maintenance of Electrical Apparatus for use in Potentially Explosive Atmospheres.
Part 1: General Recommendations.
- b. Institute of Petroleum Standards
 - IP 16 Tank Cleaning Safety Code
- c. American Petroleum Institute Standards
 - API 2015 Planning and Managing Tank Entry from Decommissioning Through Recommissioning
- d. Health and Safety Executive Guidelines
 - CS 15 The Cleaning and Gas-freeing of Tanks containing Flammable Residues
- e. MOD Standards
 - JSP 375 Joint Service Health and Safety Handbook
 - DWS Functional Standard 07 The Inspection, Maintenance and Testing of Equipment Installed at Petroleum Installations—Mechanical & Electrical
 - DEO(W) Functional Standard Internal Coating of Aviation Fuel Tanks Specification 032
 - DEO(W) Functional Standard Petroleum Safety Rules and Procedures 03

Throughout this Functional Standard reference is made to DEO(W) Safety Rules and Procedures 03. At sites where it is not yet implemented the earlier DOE/PSA MEG Volume 8 Section 53 applies.

Where there is a discrepancy either between the requirements of this document and those listed in clauses 1.4 and 1.5 herein, or between the documents listed in clauses 1.4 and 1.5 themselves, such discrepancy shall be referred to the PROM or WSM for resolution.

It should be assumed that the resolution will be in favour of the most onerous requirement.

Section 2 Safety Requirements

2.1 INTRODUCTION

- a. This Standard calls for the use of substances and procedures that may be injurious to health if adequate precautions are not taken. It refers only to the technical suitability and in no way absolves the Contractor from statutory obligations relating to health and safety at any stage.

2.2 REQUIREMENTS

- a. The Contractor shall be fully responsible for all safety measures relating to cleaning processes. This includes, but is not limited to, the provision of adequate ventilation arrangements in confined spaces to deal with any hazardous atmospheres created by the processes, the earthing and bonding of equipment and the provision of the correct personal and respiratory protective equipment for the working environment.
- b. The works on tanks must be controlled in accordance with the DEO(W) Functional Standard Safety Rules and Procedures 03—Petroleum. The WSM or PM may advise of special precautions which apply to the particular installation.

A formal assessment of the risks associated with the cleaning task at the particular location must be performed and presented in writing at the planning stage of the project so that additional task related safety measures are fully identified for implementation

- c. The WSM or PM will advise the Contractor of any hazards associated with a tank's previous usage and special precautions that shall be taken when working in a tank which has at any time contained lead products.
 - d. Refer to Annex B for precautions specific to product groups.
 - e. Tanks which have contained leaded petrol will still retain organic lead compounds which have been absorbed into the tank plates. Consequently even after the tank has been cleared of sludge and scale a toxic atmosphere will still exist. Forced ventilation of the tank and the use of breathing apparatus together with protective clothing is to be continued for as long as personnel are inside, or within the immediate vicinity of tank openings.
 - f. The entry to buried, horizontal tanks at motor transport fuelling installations is not permitted. These tanks generally do not have adequate access arrangements for personnel wearing personal protective equipment.
-

- g. The Contractor shall be conversant with and implement the requirements of JSP 375 Joint Service Health and Safety Handbook and the Control of Substances Hazardous to Health.
- h. The Contractor shall install a windsock to determine the prevailing wind direction and hence ensure that all potential spark producing equipment is located a minimum distance of 10 m upwind.
- i. All equipment shall be bonded to the tank and earthed to prevent the build-up of static electricity.

Section 3 Pre-cleaning Activities

3.1 INSPECTION REQUIREMENTS

- a. The operational history of the tank as regards the liquids that have been stored in it should be checked. The physical and chemical properties of these tank contents and any associated deposits should be assessed for expected behaviour under tank cleaning conditions. Particular attention should be paid to properties such as flash point, electrical conductivity, lead content, toxic additives and hydrogen sulphide.
- b. Before the tank is taken out of service any sludge or sediment should be minimized by operational measures eg. dilution or chemical addition. The subsequent volume of sludge should then be estimated.
- c. Tank drawing and inspection records should be consulted for details that may influence the cleaning process eg. potential pockets or drainage systems. A visual external inspection of the tank should complement the review, taking into account proposed drainage routes, recirculation loops and positive isolation positions.
- d. Tank roofs shall be externally inspected only after records have been reviewed for potential corrosion problems and then by a minimum of two persons. Provision of breathing apparatus should be considered based on tank contents and location of vents. An inertia reel lifeline is required when areas to be inspected are not surrounded by handrails.
- e. The tank surrounds should be inspected to ascertain access possibilities, firefighting resources and potential sources of ignition.

3.2 TAKING TANKS OUT OF SERVICE

- a. Tanks should be emptied to the maximum extent by using the normal operational piping system. Where tanks cannot be emptied completely using the conventional system special measures should be considered such as temporary connections to low drains, the introduction of water to raise the product level or vacuum pumping.
- b. After the tank has been emptied all connecting pipes shall be emptied and flushed with water.
- c. All water used for clearance and flushing is to be collected for separate treatment or disposal unless its quality is acceptable for the normal interception system. Refer also to Section 6.

- d. Double isolation is required from all piping systems connected to the tank (refer to para f for drain systems). This is to be accomplished as close to the tank shell as possible utilising tight shut-off valves, blinds, spades or pipework removal. If valves are to be closed then they are to be protected against inadvertent operation by the use of pneumatic or electric isolation of the actuator. In the case of manual valves the handwheels are to be removed.

Pipework disconnection may result in release of hydrocarbon vapours therefore proper selection of equipment and personal protective apparatus is required.

- e. Any relief valve discharges into the tank should be blanked off. A review of the relief system is required to ensure that any blinding off will not impair the integrity of the rest of the site system.
- f. Drain systems shall be isolated from the tank unless the cleaning procedure requires the use of the system. In such cases measures are to be taken to ensure the prevention of backflow from other sources.
- g. All tank mounted electrical equipment (except earthing and bonding cables) is to be isolated at the distribution system.
- h. Tank cathodic protection systems shall be disconnected 24 hours before any work is to commence to allow depolarization to take place.

3.3 GAS-FREEING

- a. Precautions, types of equipment to be employed, acceptable work levels, gas monitoring and recording methods are detailed in DEO(W) Functional Standard Safety Rules and Procedures 03—Petroleum.
- b. During gas-freeing the tank atmosphere may be in the flammable range for a certain period of time. To shorten this period, rapid gas-freeing rates are generally recommended. It may however be preferable to reduce the rate of vapour expulsions from the tank by limiting the number of tank openings used or by partially closing them off, this decision will be dependent on the tank environment and the prevailing weather conditions.
- c. As hydrocarbon vapours are heavier than air and tend to concentrate at the tank base, vapours should be discharged at high level and low level openings should remain closed. Before opening any manholes the internal pressure should be equalized with the atmospheric pressure by opening a small aperture eg. a drain or dip tube connection.
- d. The following methods of gas-freeing are acceptable for fixed roof and horizontal tanks.
 - (i) Filling the tank with water via a bottom connection or a top connection with an internal downpipe. To avoid the formation of static electricity the filling rate should be slow until the inlet nozzle has been covered. The water level must be limited to the cylindrical part of the tank and consequently vapours remaining in the roof space may still cause the atmosphere to be unsafe after draining. Valve arrangements on the inlet and drain systems are required to enable

full control to be attained. During draining, adequate numbers of apertures must be opened to prevent internal vacuum conditions occurring.

Before this method is selected a check on the tank foundations and structural design of the tank must be undertaken to ensure they will withstand the imposed water load. If the water is of an appropriate quality it may be disposed of via the site interception system provided a check of the drainage and interception system is undertaken to ensure that it is capable of coping with the required volume.

- (ii) Filling the tank with inert gas via a bottom connection or a top connection with an internal downpipe. To avoid the possibility of the light inert gas escaping without displacing the vapours only small roof apertures should be opened. Inert gases are hazardous, consequently precautions are required which are to include the use of breathing apparatus.

Care must be taken in the selection of the gas. Carbon dioxide will form a mist of ice particles on expansion which are highly electrically charged, hence it should not be used when the tank atmosphere is in the flammable range. Nitrogen is suitable under all circumstances but to avoid static accumulation a slow filling rate should be used.

- (iii) Natural air ventilation may be used by opening multiple roof manholes that are as far apart as possible. To aid vapour clearance an upwind manhole may be fitted with a windsail and a downwind manhole with a flexible duct reaching to the tank bottom. The windsail shall not be made of a synthetic material as electrostatic charges can occur.
- (iv) Forced or induced air ventilation may be installed by using extractors or air blowers. Extractors (one per tank) or air blowers (one per tank) should be positioned on roof manholes fitted with electrically conductive flexible ducts reaching to the tank bottom. All other roof manholes should be open. Alternatively an air blower may direct air through a shell manhole via a conductive flexible duct. All equipment is to be earthed and bonded.

The selection of equipment should take into account the hazardous area classification and temperature requirements (normally Zone 1 and T4 to BS 5345 Part 1) and the possibility of incendive sparking.

The opening of manholes and attachment of equipment to tanks which are not gas-free is a hazardous operation requiring the use of breathing apparatus.

- e. For tanks not covered by sub-para d. specialist advice will be required. In particular tanks built into rock caverns will require additional extractors and blowers whilst those which have protective brick or concrete walls will have a tank annular space within which vapours can accumulate.
- f. Tanks which have stored material containing hydrogen sulphide or sulphur compounds are susceptible to the formation of pyrophoric scale on the roof and walls and pyrophoric deposits in the bottom sludge. To avoid the possibility that this scale will heat by exothermic

oxidation and cause ignition of other deposits the use of natural air ventilation is preferred. When pyrophoric deposits are suspected the flooding of the tank bottom by water should be considered.

- g. Any illumination necessary for inspection (and subsequent cleaning) activities shall be certified to Zone 1 and T4 requirements in accordance with BS 5345 Part 1.
- h. When tanks are partitioned no internal access is permitted until the entire tank has been gas-freed.

Section 4 Cleaning Procedures

4.1 INTRODUCTION

The extent of cleaning is dependent on the reasons why the tank is to be cleaned. A range of possibilities therefore exists according to the reasons for the cleaning and the condition experienced upon an inspection at an early stage in the process.

It is recommended that after initial gas-freeing the tank is inspected to ascertain the full extent of the cleaning process.

4.2 EXTENT OF THE CLEANING PROCESS

The following examples indicate the situations which can be expected during an inspection and the suggested extent of the cleaning process.

Case	Action
1. Internally coated aviation fuel tanks, undergoing periodic internal inspection. a) Coating perfect, no solid or micro-biological contamination. b) As a) but areas of the coating are suspect. c) Solid or micro-biological contamination.	—After inspection no further cleaning. —Dry off suspect areas for more detailed investigation. —Wipe down all surfaces until dry and clean.
2. Uncoated aviation fuel tanks, undergoing periodic internal inspection. a) No solid or micro-biological contamination. b) Solid or micro-biological contamination. c) Major corrosion or structural problems.	—Remove rust and scale in accordance with the table in section 4.4. —Remove rust, scale and surface dirt in accordance with the table in section 4.4. —Ascertain extent and seek specialist advice.
3. Steel petrol tanks. (Refer to Section 2.2 for access limitations) a) No signs of corrosion. b) Corrosion present.	—After inspection no further cleaning. —Remove rust, scale and surface dirt in accordance with the table in section 4.4.

<p>4. GRP petrol tanks. (Refer to Section 2.2 for access limitations)</p> <p>a) No solid contamination.</p> <p>b) Solid contamination.</p>	<p>—After inspection no further cleaning.</p> <p>—Wipe down all surfaces until dry and clean.</p>
<p>5. Diesel and distillate grade fuel oil.</p> <p>a) No solid or micro-biological contamination.</p> <p>b) Solid or micro-biological contamination.</p> <p>c) Major corrosion or structural problems.</p>	<p>—Remove rust and scale in accordance with the table in section 4.4.</p> <p>—Remove rust, scale and surface dirt in accordance with the table in section 4.4.</p> <p>—Ascertain extent and seek specialist advice.</p>
<p>6. Residual grade fuel oil.</p> <p>a) No solid or micro-biological contamination.</p> <p>b) Solid or micro-biological contamination.</p> <p>c) Major corrosion or structural problems.</p>	<p>—Remove rust and scale in accordance with the table in section 4.4.</p> <p>—Remove rust, scale and surface dirt in accordance with the table in section 4.4.</p> <p>—Ascertain extent and seek specialist advice.</p>

4.3 METHODS OF CLEANING INTERNALLY COATED TANKS

All surfaces shall be wiped down with absorbent rags and sponges until they are dry and clean to the touch.

4.4 METHODS OF CLEANING UNCOATED TANKS

All surfaces shall be cleaned as appropriate to the type of fuel contained and the surface condition in accordance with the following:

Product	Rust and Scale	Surface Dirt
Aviation fuel	Wire brush and scrape until all scale and loose material is removed.	Wipe down until clean and dry to the touch. Do not use detergents. Only use kerosene type solvents.
Petrol	Wire brush and scrape until all scale and loose material is removed.	Wipe down until clean and dry to the touch. Do not use corrosive solvents.
Diesel and distillate grade fuel oil	Wire brush and scrape or water jet until all loose material is removed.	Wipe down until clean and dry to the touch. Do not use corrosive solvents.
Residual grade fuel oil	Wire brush and scrape or water jet or steam jet and scrape until all loose material is removed.	Water or steam jet or scrape down to parent metal or paint.

4.5 STANDARDS OF TANK CLEANLINESS

a. Hot Work Standard

This is the degree of cleaning required to enable hot work to take place in the tank. After removal of all product and sludges the tank must be tested to demonstrate a gas-free condition. The gas-free condition applies to all void spaces and under the tank bottom plates.

After the tank plates have been cleaned to show a waxy, greasy film they are to be washed to a metal finish. This may be achieved by:

- hot water washing.
- cold water spray or jetting under high pressure.
- diesel washing.
- kerosene washing.
- chemical washing with detergents.
- manual wiping.

The cleaning method selected will depend on the product stored, the degree of cleanliness already achieved and the local means available. If diesel washing is selected then it should be applied at very low pressure, the tank atmosphere continuously monitored and the residue washed off the walls with water.

Washing with hydrocarbons having a higher volatility than kerosene is prohibited.

The selection of any detergents should be considered carefully taking into account any toxic vapours that may be released.

Wash water containing chemicals, detergents or oils will be detrimental to the efficiency of the site interceptors and will require additional treatment and disposal.

b. Inspection Standard

This is similar to sub-para. 4.5a. but requires a higher finish on welded and bolted areas. Any abrasives used should not contain silica.

c. Internal Coating Standard

Refer to DEO(W) Functional Standard Specification 032 'Internal Coating of Aviation Fuel Tanks'.

d. Decontamination for Demolition Standard

Each case should be reviewed and a detailed procedure developed.

Section 5 Cleaning Frequency

5.1 INTRODUCTION

The requirement for cleaning a tank is dependent on:

- whether it is subject to a specified periodic internal inspection
- the need to prevent cross contamination due to an intended change of product
- the need to internally modify the tank
- whether product contamination has occurred

In all cases the PROM is responsible for authorising cleaning operations.

5.2 FREQUENCY OF INSPECTIONS

- a. Petrol, diesel and distillate grade fuel oil containing tanks shall only be cleaned if a change of product is required or if there is a fuel quality problem.
- b. Aviation fuel containing tanks shall be cleaned in accordance with DWS Functional Standard 07 'The Inspection, Maintenance and Testing of Equipment Installed at Petroleum Installations—Mechanical & Electrical'.

5.3 PARAMETERS INDICATIVE OF IMMEDIATE TANK CLEANING BEING REQUIRED

- a. Change of use to aviation fuel containment from any other product.
- b. Change of use from one grade of lubrication oil to another.
- c. When heavy micro-biological contamination is present.

Section 6 Disposal of Waste

6.1 INTRODUCTION

- a. The disposal of waste is a Service responsibility because the Service/MOD is the owner of the waste. This Section is included because of the environmental implications of handling waste and the necessary interface between the Contractor and Service activities.
- b. The Service owner will require 48 hours notice prior to disposal of any waste which is to be classified duty free in order that the local Customs & Excise can be informed.
- c. The Contractor shall provide suitable handling equipment and vehicles to remove from site any sludge or scale which could give rise to dangerous conditions.
- d. The re-processing of contaminated fuel is the Service responsibility and arrangements should be in place to cater for duty free and duty paid products.

6.2 REQUIREMENTS

- a. The waste shall be disposed of in accordance with the:
 - Environmental Protection Act
 - Environmental Protection (Prescribed Processes and Substances) Regulations {for aromatic solvents}
 - Environmental Protection (Duty of Care) Regulations
 - Control of Pollution Act
 - Control of Pollution (Special Waste) Regulations {for lead and hydrocarbon substances}
- b. Possible methods of disposal include:
 - reprocessing.
 - incineration.
 - mixing into concrete
 - chemical fixation and solidification

The method of disposal is subject to the type of waste but as a general rule re-processing is preferred to incineration. Mixing into concrete is not recommended as lead vapours are produced in the process and the resulting concrete is of limited use as it cannot be used for load bearing purposes.

In certain circumstances it may be possible to dispose of contaminated water via the site interception system provided that independent laboratory samples and disposal volumes are acceptable to the local sewage authority and the EA or SEPA as appropriate.

- c. It is the WSM's responsibility to ensure that:
- the waste is transferred only by a registered carrier.
 - a description of the waste is provided to enable other persons to avoid contravention of the Environmental Protection Act.
 - the waste transfer note is provided in accordance with the Environmental Protection (Duty of Care) Regulations.
 - the waste is deposited or disposed of at a correctly licensed and managed facility.
 - the local Waste Regulation Authority is advised of the movement of any lead or hydrocarbon substances under the Control of Pollution (Special Waste) Regulations.

Section 7 Returning the Tank to Service

7.1 INTRODUCTION

It is the WSM's responsibility to ensure that the tank is clean, all services have been reinstated and that the tank has been put back into its operational mode.

In Naval Oil Fuel Depots cleaning of F-44 and F-76 containing tanks is undertaken by the depot personnel whilst other tanks are cleaned by Contractors under the supervision of the WSM. The WSM is responsible for bringing the tanks back into operational mode but the depot staff are responsible for bringing the tank back into service.

7.2 REQUIREMENTS

The following actions are required to return any tank into its operational mode:

- a. The earthing and bonding systems have been reinstated.
- b. All electrical cables have been reconnected and tested.
- c. All instruments have been reinstated and tested.
- d. All debris and equipment has been removed from inside the tank and the tank roof and bund.
- e. The automatic vents are in position and set.
- f. The roof drains and sumps are clear of debris.
- g. Any relief valves have been tested and reinstalled.
- h. All apertures have been gasketted and bolted closed.
- i. All pipework has been re-connected.
- j. All drain valves are closed.
- k. The cathodic protection systems have been re-connected.

Annex A Tank Cleaning Certificate

A suggested certificate indicating that cleaning has been satisfactorily completed is on the following page.

Client:

Address:

TANK CLEANING CERTIFICATE

I/We being the person(s) responsible (as indicated by my/our signature(s) below) for the cleaning of the tanks listed below CERTIFY that the said work for which I/we have been responsible is to the best of my/our knowledge and belief in accordance with DEO(W) Functional Standard Specification 031 'Internal Cleaning of Fuel Tanks'.

TANK No.	TANK PRODUCT	TANK COATED/UNCOATED

Number of continuation sheets

For the Cleaning:

Name (In Block Letters):

Position:

For and on behalf of:

Address:

Signature:

Date:

Annex B Precautions Specific to Product Groups

B.1 Unleaded Petrol, Naphtha, Kerosene, Jet Fuels and Diesel (None of which contain Hydrogen Sulphide)

- a. Possibility of corrosion of the tank surfaces leading to element instability and risk of falling objects.
- b. Biological processes in water layers may leave slimy and slippery conditions on the tank bottom.
- c. Additives such as fuel systems icing inhibitor, benzene or methanol may be concentrated to hazardous levels in the tank bottoms.
- d. Particular attention should be paid to gas-freeing.

B.2 Unleaded Petrol, Naphtha, Kerosene, Jet Fuels and Diesel (All containing Hydrogen Sulphide)

- a. Possibility of corrosion of the tank surfaces leading to element instability and risk of falling objects.
- b. Biological processes in water layers may leave slimy and slippery conditions on the tank bottom.
- c. Additives such as fuel systems icing inhibitor, benzene or methanol may be concentrated to hazardous levels in the tank bottoms.
- d. Particular attention should be paid to gas-freeing.
- e. The presence of Hydrogen Sulphide may cause pyrophoric deposits for which water flooding of the tank bottom is recommended.

B.3 Leaded Petrol

- a. Leaded petrol contains tetraethyl lead (TEL) or tetramethyl lead (TML) which are very toxic in both solid and vapour form. The symptoms of lead alkyl poisoning (which may be from a single severe exposure or a cumulative effect) vary from sleep disturbance through intense anxiety to coma and death. Personnel entering tanks should be afforded high levels of protection and their clothing decontaminated after use.
- b. Tanks which have contained, but no longer contain, leaded substances may still be toxic many years later. Lead-in-air tests are required to prove residual levels and hence whether special precautions are required.

B.4 Aromatic Lube Oil Distillates, Solvents and White Spirits

- a. Possibility of corrosion of the tank surfaces leading to element instability and risk of falling objects.
- b. Biological processes in water layers may leave slimy and slippery conditions on the tank bottom.
- c. Additives such as fuel systems icing inhibitor, benzene or methanol may be concentrated to hazardous levels in the tank bottoms.
- d. Particular attention should be paid to gas-freeing.
- e. The presence of Hydrogen Sulphide may cause pyrophoric deposits for which water flooding of the tank bottom is recommended.
- f. Aromatic constituents are toxic, particularly benzene, exposure to which leads to bone and marrow abnormalities and can result in leukaemia.


B.5 Residual Fuel Oils

- a. These may contain a variety of substances including hydrogen sulphide and aromatics. It is therefore important in such circumstances to obtain the tank's storage history.
- b. Heavy sludges may form on the tank bottoms and highly viscous residues on the walls.
- c. Residual fuel oil is stored at elevated temperatures (above 100°C) and consequently the tank exterior is normally insulated. Under normal operating conditions the insulation may become impregnated with hydrocarbons which reduces the normal oil auto-ignition temperature and hence constitutes a cleaning hazard. Depending on the degree of oil spillage into the insulation around manhole areas consideration should be given for temporary local insulation removal.

B.6 Lubricating Oils

- a. The type of additives must be verified to determine the level of toxicity.
- b. By definition these substances will leave slippery residues on the walls and bottom.

Annex C Change Suggestion Form

	Defence Estate Organisation (Works) Airfields and Bulk Fuels Group Blakemore Drive SUTTON COLDFIELD B75 7RL	Internal Cleaning of Fuel Tanks Change Suggestion Form	
Originator:		Date:	
		Ref:	
Change Suggestion			
Section:		Page:	
Change Detail: <p style="text-align: right;">Continuation Sheet included ? Y <input type="checkbox"/> N <input type="checkbox"/></p>			
Reason: <p style="text-align: right;">Continuation Sheet included ? Y <input type="checkbox"/> N <input type="checkbox"/></p>			
DEO (W) Review			
Action:		Ref:	
		Action Date:	
		Approved:	
		Actioned:	

**The Stationery
Office**

Published by the Stationery Office and available from:

The Publications Centre

(mail, telephone and fax orders only)
PO Box 276, London SW8 5DT
General enquiries 0171 873 0011
Telephone orders 0171 873 9090
Fax orders 0171 873 8200

The Stationery Office Bookshops

49 High Holburn, London WC1V 6HB
(counter services and fax orders only)
Fax 0171 831 1326
68-69 Bull Street, Birmingham B4 6AD
0121 236 9696 Fax 0121 236 9699
33 Wine Street, Bristol BS1 2BQ
0117 9264306 Fax 0117 9294515
9-21 Princess Street, Manchester M60 8AS
0161 834 7201 Fax 0161 833 0634
16 Arthur Street, Belfast BT1 4GD
01232 238451 Fax 01232 235401
The Stationery Office Oriel Bookshop
The Friary, Cardiff CF1 4AA
01222 395548 Fax 01222 384347
71 Lothian Road, Edinburgh EH3 9AZ
(Counter service only)

Customers in Scotland may
mail, telephone or fax their orders to:
Scottish Publications Sales
South Gyle Crescent, Edinburgh EH12 9EB
0131 479 3141 Fax 0131 479 3142

Accredited Agents

(see yellow pages)

and through good booksellers

£12.50

ISBN 0-11-390257-3



9 780113 902576 >