SIP 006 - GUIDANCE ON BULK LIQUIDS

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HSE Health & Safety Executive

PSS Port Skills and Safety

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Contents

1. INTRODUCTION

1.1. The Health and Safety Executive provided support to Port Skills and Safety in producing this guidance, which is aimed at improvements within the Ports industry. This guidance may go further than the minimum you need to do to comply with the law with regard to health and safety.

1.2. It is for companies operating in the UK ports industry with responsibility for the safe design, construction, operation, management and maintenance of ports and terminal facilities and management of port and terminal activities. It will also be useful to employees and their representatives.

1.3. Following the guidance is not compulsory and you are free to take other action. But if you do follow the guidance you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance. If the guidance goes beyond compliance, then this will be clearly identified.

1.4. Regulations in this document are referred to by title but not year, because they are amended from time to time and the reader should always seek the current version. Acts are given a year as they tend to change less frequently. The list of references at the end of this document however does include a year that was correct at the time of publication.

1.5. Automated docking systems using hydraulics, vacuum or other methods to maintain a ship's position alongside when in port fall outside the scope of this guidance, as this is specialised equipment.

1.6. This document addresses the loading, unloading and handling of bulk liquids in ports. It includes site design, operational planning safety equipment specific to liquids, management of hoses and transfer equipment as well as controlling spills and ensuring environmental protection. This document does not cover landside storage of bulk liquids

2. REGULATORY FRAMEWORK AND GUIDANCE

2.1. The two principal relevant pieces of law are the Health and Safety at Work etc. Act (HSWA) 1974, and the Management of Health and Safety at Work Regulations (MHSWR), which set out the basic requirements to ensure, so far as is reasonably practicable, the health, safety and welfare of all involved.

2.2. Port specific, Merchant Shipping and other legislation applies and should be referred to.

2.3. Approved Code of Practice (ACOP) L148 'Safety in Docks' was introduced on 6 April 2014: http://www.hse.gov.uk/pubns/books/l148.htm

2.4. The PSS/HSE Safety in Ports guidance suite, available from the PSS website at: https://www.portskillsandsafety.co.uk/resources is an important supplement to Safety in Docks ACOP L148.

2.5. The guidance is aimed at routine operations and does not cover some of the specialised and high-risk activities associated with handling dangerous goods and hazardous cargoes, or major hazards sites which are subject to the Control of Major Accident Hazards Regulations for which specialist advice may be required.

2.6. Reference can also be made to the International Labour Organisation's (ILO) Code of Practice on Safety and Health in Ports (ILO 152): http://www.ilo.org/sector/activities/sectoral-meetings/WCMS_546257/lang--en/index.htm

3. HEALTH

3.1. The wide range of activities in ports can give rise to possible health risks such as exposure to dusty cargoes; back injuries, sprains and strains from lifting and handling, pushing and pulling; noise and vibration. There is specific legislation including the Control of Substances Hazardous to Health Regulations, the Control of Noise at Work Regulations, the Manual Handling Operations Regulations and Personal Protective Equipment at Work Regulations.

3.2. While there is reference to some specific health risks in these guidance documents, it is not possible to cover all the issues. Further information and guidance on the identification, assessment and reduction or avoidance of such risks can be found on the HSE website at:

3.2.1. Ports web pages:
http://www.hse.gov.uk/ports/index.htm

3.2.2. Control of Substances Hazardous to Health:
http://www.hse.gov.uk/coshh/index.htm

3.2.3. HSE Whole Body Vibration in Ports Information Paper
http://www.hse.gov.uk/vibration/wbv/ports.pdf

3.2.4. Musculoskeletal disorders (MSDs)
http://www.hse.gov.uk/msd/index.htm

3.2.5. Noise at Work
http://www.hse.gov.uk/noise/

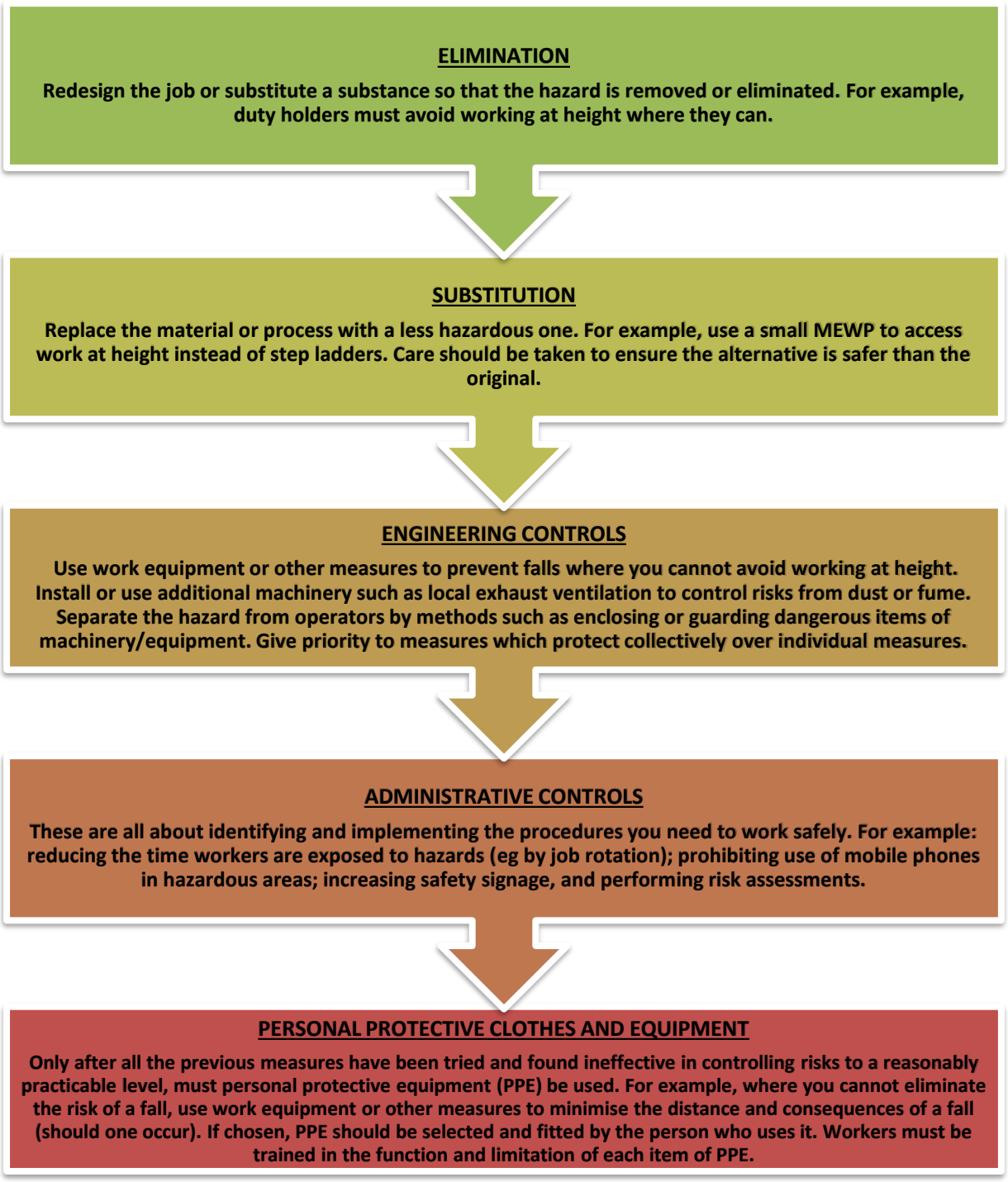
3.2.6. Personal Protective Equipment
http://www.hse.gov.uk/toolbox/ppe.htm

3.2.7. Vibration at Work
http://www.hse.gov.uk/vibration/

4. RISK ASSESSMENT

4.1. Risk Assessments must be undertaken in accordance with the Management of Health and Safety at Work Regulations. The risk assessment must consider the risks, not only to permanent employees but also to others including non-permanent employees (NPE's), ship's crew, passengers and visitors that may be affected by the activity. The appropriate control measures must be introduced and should consider collective measures ahead of personal or individual measures.

4.2. Risks should be reduced to as low as is reasonably practicable by taking preventative measures in order of priority below. The diagram below sets out an ideal order to follow when planning to reduce risk.



Reference: HSE Leadership and Worker Involvement Toolkit. Available at
http://www.hse.gov.uk/construction/lwit/assets/downloads/hierarchy-risk-controls.pdf

4.3. Risk assessments must be reviewed regularly and immediately after any incident or when there are significant changes to the operation. Most accidents and near misses can be avoided if the risks from the work are suitably and sufficiently assessed and appropriate control methods are adopted.

4.4. The risk assessment should record the significant hazards and the risks of the operation together with the relevant control measures. In port operations risk assessments should consider changes such as tidal changes, weather, trim, list, load/cargo and vessel dynamics.

4.5. Planning and work execution is discussed in HS(G) 177, Managing Health and Safety in Dockwork: http://www.hse.gov.uk/pubns/books/hsg177.htm

4.6. The Health and Safety at Work Act 1974 applies on board a ship when shore based workers are engaged in cargo handling or other tasks on board. Cargo handling may include, but is not limited to, loading, unloading, stowing, unstowing, pouring, trimming, classifying, sizing, stacking, unstacking as well as composing and decomposing unit loads; and also, services in relation to cargo or goods such as tallying, weighing, measuring, cubing, checking, receiving, guarding, delivering, sampling and sealing, lashing and unlashing.

4.7. The Health and Safety at Work Act 1974 also applies to the Master and ship's crew when working with shore-based personnel on board ship.

4.8. Cooperation and coordination between shipside and landside employers is required. Employers must therefore carry out risk assessments and develop safe systems of work (in consultation with the workers involved) that all parties agree to, so that the respective employers can co-operate effectively with each other.

4.9. A signed agreement or an agreed and recorded system of work with the master of each vessel is recommended - this is not a legal requirement but may help to ensure effective co-ordination with other parties.

4.10. The regulations made under the Health and Safety at Work Act 1974; such as The Management of Health and Safety at Work Regulations; The Lifting Operations and Lifting Equipment Regulations and The Provision and Use of Work Equipment Regulations, do not apply to a master or crew of a ship, or any persons employing them, in relation to safe access, plant and equipment which remain on board the ship and for any undertakings or work which are carried out on board ship solely by the master and the crew. Instead, the Merchant Shipping Act 1894 and related Merchant Shipping Regulations impose similar duties on board ship in UK territorial waters.

4.11. A ship's master has duties under the Health and Safety at Work Act 1974 in relation to the ship's crew who are put ashore to perform their own tasks (for example loading ship's stores or carrying out maintenance work on their ship). Those duties also extend to plant and equipment (for example a forklift truck) which is under the master's control that is used ashore by ship's crew, or when used by shore based workers ashore or on-board ship.

5. CONSULTATION, COOPERATION AND COORDINATION

5.1. **Consultation**: Employers have a duty to consult with their employees, or their representatives, on health and safety matters. By gaining worker involvement on health and safety through two-way communication, concerns can be raised and solved together and views and information can be sought and exchanged in a timely manner.

5.1.1. See HSE pages: Consulting and involving your workers http://www.hse.gov.uk/involvement/index.htm

5.2. **Cooperation and Coordination**: Cooperation and coordination between shipside and landside employers is required. Employers must therefore carry out risk assessments and develop safe systems of work (in consultation with the workers involved) that all parties agree to, so that the respective employers can co-operate effectively with each other.

6. VESSEL ACCESS

6.1. The requirements for safe access to and on vessels are contained within the ACOP Safety in docks (L148) and SiP014 Safe access and egress

6.2. In general access onto the vessel should be provided by the ship's accommodation ladder or by the ship's gangway. This should be properly rigged and if over water include a safety net. Safe access and egress to the ladder should be maintained shore-side throughout the working of the vessel.

6.3. The Supervisor should check that access to/from the vessel and to/from the ships hold or onto deck cargo is in good repair, correctly positioned and in working order before commencement of the operation.

7. HAZARDS

7.1. For the majority of installations handling bulk dangerous liquids or gases there are five main events which individually or jointly have the potential to cause significant harm or damage:

7.1.1. Fire

- ignition following a spill or release
- hazardous activities – welding , smoking etc.
- external events – non intrinsically safe equipment, impact, adjacent fires etc.falls from height

7.1.2. Explosion

- ignition following a spill or release slips, trips and falls

7.1.3. Release of a toxic substance

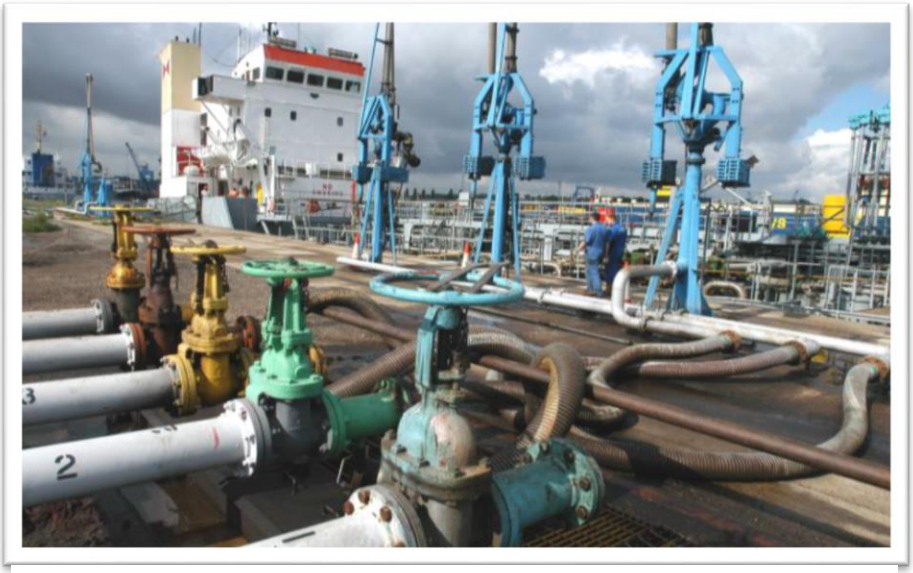
- containment failure
- impact

7.1.4. Release of an environmental pollutant

- containment failure
- impact
- human error

7.1.5. **General hazards associated with operations** such as:

- manual handling issues due to the nature of the transfer equipment used
- slips trips and falls due to the potentially congested working area



Typical illustration of slips and trips hazards on a bulk transfer jetty installation using fixed arms and flexible hoses

8. PLANNING FOR SAFE HANDLING

Photograph showing a typical view of a transfer of bulk liquids or gas using fixed arms

8.1. For details of specific measures on the safe handling of bulk liquids the latest edition of the International Safety Guide for Oil Tankers & Terminals (ISGOTT) guide should be consulted (This is only available for purchase) . Along with other documents such as The Bulk Transfer of Dangerous Liquids & Gases between Ship and Shore HSG 186 published by the HSE, The Safe Handling of Dangerous Bulk liquids and Gases at the Ship/Shore Interface published by ICHCA (This is only available for purchase) in addition where appropriate to the other publications listed at the end of this guidance

8.2. A ship/shore checklist must be completed jointly by the terminal representative and a responsible ships officer. The checklist should list all requirements and physical checks required to ensure the discharge / loading procedure commences at a safe state

8.3. All items lying within the responsibility of the ship should be personally checked by the ships Master or representative and similarly all items within the terminals responsibility should be checked by a representative of the terminal. In carrying out these checks both representatives should carry out physical checks and for example sight records where appropriate to assure themselves of safe operation on both sides. A recommended ship/shore checklist can be found in chapter 26 of the International Safety Guide for Oil Tankers and Terminals (ISGOTT) and guidance on completion of the checklist.

8.4. Specific more detailed checklists exist and should be used for vessels carrying liquid gas and chemical cargoes.

8.5. Ships carrying hazardous and polluting cargo must remain able at all times to move under their own power. Tank cleaning, Gas freeing and any work that may involve additional risk such as hot work cannot be undertaken without the permission of the Port Authority and or Terminal Operator and then only when appropriate controls are in place.

9. LIFTING AND SLINGING OPERATIONS - GENERAL

9.1. All lifting operations in ports are subject to specific legislation including: The Lifting Operations & Lifting Equipment Regulations (LOLER), The Provision & Use of Work Equipment Regulations (PUWER), The Merchant Shipping and Fishing Vessel (Lifting Operations & Lifting Equipment) Regulations (MSLOLER), and The Merchant Shipping & Fishing Vessels (Provision and Use of Work Equipment) Regulations (MSPUWER).

9.2. So as not to cause confusion with the different terms used to describe lifting equipment, LOLER clearly uses the following definitions:

9.2.1. "**lifting equipment**" means work equipment for lifting or lowering loads and includes its attachments used for anchoring, fixing or supporting it

9.2.2. "**accessory for lifting**" means work equipment for attaching loads to machinery for lifting

9.3. In the port industry accessories for lifting are sometimes referred to as 'lifting accessories'

9.4. The Regulations aim to reduce risks to people's health and safety from lifting equipment provided for use at work. Generally, the Regulations require that lifting equipment provided for use at work is:

9.4.1. strong and stable enough for the particular use and marked to indicate safe working loads

9.4.2. positioned and installed to minimise any risks

9.4.3. used safely, i.e. the work is planned, organised and performed by competent people

9.4.4. subject to ongoing thorough examination and, where appropriate, inspection by competent people

9.5. Equipment and accessories that are exposed to conditions that can cause deterioration and that could lead to dangerous situations must:

9.5.1. be thoroughly examined

9.5.2. in the case of lifting equipment for lifting persons, or an accessory for lifting, at least every 6 months [note: this also applies to ship's lifting equipment]

9.5.3. in the case of other lifting equipment, at least every 12 months

9.5.4. in either case, in accordance with an examination scheme; and each time that exceptional circumstances which are liable to jeopardise the safety of the lifting equipment have occurred

9.5.5. if appropriate for the purpose, be inspected by a competent person at suitable intervals between thorough examinations

9.6. It is essential to identify that all lifting equipment and lifting accessories are within the correct inspection (thorough examination) period. One way of doing this is by using a system of colour coding.

9.7. All equipment should be checked by a competent person before use. If there is any doubt as to the suitability of lifting equipment and lifting accessories, they must be removed from use.

9.8. The term 'load' within LOLER includes lifting a person. Equipment used for lifting people must be designed for such use and checked prior to lifting any personnel. If using ship's equipment for lifting people, the certification and condition of the equipment must be checked by a competent person prior to use as is the case with landside equipment.

9.9. Always have lifting equipment thoroughly examined following 'exceptional circumstances', e.g. if it is damaged or fails, is out of use for long periods, or if there is a major change in how it is used which is likely to affect its integrity.

9.10. The frequency of inspection might need to be increased for other reasons for example environmental factors, high frequency of use, etc. This should be identified as part of the risk assessment.

9.11. Hired equipment should be received with all maintenance and inspection records up-to-date. Where the length of hire extends past the inspection date, the individual responsible for the hiring should be responsible for ensuring inspections are completed and recorded.

9.12. Further general advice and guidance can be found on the HSE and MCA web pages – see Lifting equipment at work - A brief guide to the law http://www.hse.gov.uk/pubns/indg290.pdf and the references at the end of this document.

10. SITE DESIGN

10.1. Oil, petrochemical and gas terminal sites will also be required to be assessed and where appropriate, zoned as required by the Dangerous Substances and Explosive Atmosphere Regulations 2002.

10.2. Equipment such as electrical systems, cranes, vehicles, pumps, portable equipment etc. will all need to be designed and approved to work in the environment concerned

10.3. Security at petrochemical transfer sites must be considered. Suitable access control for vehicles and pedestrians is vital and in many cases will have to be restricted. The provisions of the International Ship and Port Facilities Security Code must be taken into consideration.

10.4. Means of access must be suitable and consideration to means of access for emergency services must be taken into account. Means of escape must also be considered as well as the possibility of providing safe refuges where appropriate.

10.5. Consideration must also be given to how mooring operations can be safely undertaken. Where provided equipment such as capstans must be suitable for use in the area. Access to mooring stations/dolphins etc. must be suitable. If mooring boats are to be used suitable ladders and mooring provision for mooring boats should be provided.

11. SAFETY EQUIPMENT

11.1. Levels and type of equipment will be determined by risk assessment and industry good practice. All equipment will need to be capable of being safely used in the hazardous environments involved.

12. HOSE MANAGEMENT

12.1. Portable hoses, fixed loading arms and any other device connecting to ships manifolds must be fit for purposes, inspected at appropriate intervals and safe for use in the hazardous environment.

12.2. Care should be taken on terminals to ensure that flexible hoses are not left as trip hazards to personnel including ship's crew, agents, mooring gangs and pilots etc.

13. TRANSFER EQUIPMENT & OPERATIONS

13.1. Equipment such as pumps, vapour return units, line pigging units etc. must all be fit for purpose and suitable for use in the intended environment.

13.2. Liquid and gas transfer operations should be carried out in accordance with industry standard practice and in accordance with the guidance produced by the HSE in HSG 186 the Bulk Transfer of Dangerous Liquids and Gases Between Ship and Shore. Also the guidance provided in the International Safety Guide for Oil Tankers and Terminals and the ICHCA International Ltd document The Safe Handling of Dangerous Bulk Liquids and Gases at the Ship/Shore Interface. Whilst these documents provide detailed guidance on safe transfer of liquid bulks, they may also be other relevant documents. The terminal operators and Ships Master are responsible for the safe operation of the transfer of any product and should ensure that any such transfer is undertaken in a safe manner.

14. MAINTENANCE

14.1. Maintenance operations should be undertaken in a safe manner. It may be necessary for a permit to work system to be used to adequately control the hazards associated with this type of environment.

14.2. Maintenance activities need to be carefully planned to ensure they are carried out in a safe manner. It may be necessary to gas free lines, tanks and other equipment prior to work commencing.

14.3. Any maintenance required to be undertaken on board ship requiring hot works or disabling of a vessels means of propulsion will only be allowed following approval from the Harbour Master

15. SPILLS

15.1. Lack of containment for bulk liquid products can cause significant hazards and or major damage to the environment. Extreme care must be taken at all times during transfer operations to ensure that a lack of containment does not occur.

15.2. Vapour containment during loading operations is vital to prevent explosive atmospheres developing. Vapour return systems of high velocity valves should be used to ensure rapid dispersal or removal of toxic or flammable vapours occur.

16. ZONING

16.1. Where liquid bulks being transferred are classified as hazardous. Assessments required by the Dangerous Substances and Explosive Atmosphere Regulations 2002 should be undertaken. Such assessments may lead to areas of the site being zoned.

17. INFORMATION, INSTRUCTION, TRAINING AND SUPERVISION

17.1. All persons engaged in work must be trained and assessed as competent for the role that they are required to perform by a competent person. These persons must have their fitness for work assessed against the requirements for each task being performed and consideration should be given to the requirement for a drug and alcohol monitoring system to be in place.

17.2. All persons involved in operations must be provided with adequate information, instruction, training and supervision. This is particularly important where Non-permanent employees (NPEs) are utilised who may be generally competent but have limited experience of the particular operation.

17.3. All persons involved in operations must know who is in control. This is particularly important where NPEs are working alongside permanent employees.

17.4. Supervisors should be trained, competent and experienced in the areas of work that they are supervising and/or have access to relevant competent advice and assistance.

18. RELEVANT LEGISLATION AND GUIDANCE

18.1. Relevant legislation and guidance includes the following. Please note that these are the correct versions at the time of publishing but the reader should always seek out the most current version.

18.2. The current versions of other PSS Safety in Ports Guidance documents can be found at: https://www.portskillsandsafety.co.uk/resources

Code of Safe Working Practices for Merchant Seafarers (COSWP);
https://www.gov.uk/government/publications/code-of-safe-working-practices-for-merchant-seafarers

Confined Spaces Regulations 1997
http://www.hse.gov.uk/confinedspace/

Consulting and involving your workers:
http://www.hse.gov.uk/involvement/index.htm

Control of Major Accident Hazards Regulations (COMAH) 2015
http://www.hse.gov.uk/comah/

Control of Substances Hazardous to Health Regulations (COSHH) 2002
http://www.hse.gov.uk/coshh/index.htm

Control of Vibration at Work Regulations 2005
http://www.hse.gov.uk/vibration/wbv/regulations.htm

Dangerous Goods in Harbour Areas Regulations 2016
http://www.hse.gov.uk/pubns/books/l155.htm

Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) 2002
http://www.hse.gov.uk/fireandexplosion/dsear.htm

Electricity at Work Regulations 1989 and guidance on electrical safety
http://www.hse.gov.uk/electricity/index.htm

Health and Safety (Safety Signs and Signals) Regulations 1996;
http://www.hse.gov.uk/pubns/books/l64.htm

Health and Safety at Work etc. Act (HSWA) 1974
http://www.hse.gov.uk/legislation/hswa.htm

HSE Whole Body Vibration in Ports Information Paper
http://www.hse.gov.uk/vibration/wbv/ports.pdf

International Labour Organisation's (ILO) Code of Practice on Safety and Health in Ports (ILO 152):
http://www.ilo.org/sector/activities/sectoral-meetings/WCMS_546257/lang--en/index.htm

International Maritime Dangerous Goods Code (IMDG);
http://www.imo.org/en/Publications/IMDGCode/Pages/Default.aspx

International Maritime Organisation (IMO) Publication "Safe Transport of Dangerous Cargoes and Related Activities in Port Areas"
http://imo.udhb.gov.tr/dosyam/EKLER/20138695226MSC.1-Circ.1216.pdf

International Safety Guide for Oil Tankers & Terminals (ISGOTT)
http://www.isgott.co.uk/

Lifting Equipment at Work:
http://www.hse.gov.uk/pubns/indg290.htm

Lifting Operations and Lifting Equipment Regulations (LOLER) 1998;
http://www.hse.gov.uk/work-equipment-machinery/loler.htm

Load Security HSE web page:
http://www.hse.gov.uk/logistics/load-security.htm

Maintaining portable and transportable electrical equipment HSG107
www.hse.gov.uk/pubns/priced/hsg107.pdf

Management of Health and Safety at Work Regulations 1999;
http://www.hse.gov.uk/managing/index.htm

Managing Health and Safety in Dockwork HS(G) 177
http://www.hse.gov.uk/pubns/books/hsg177.htm

Managing Health and Safety in Dockwork HS(G) 177
http://www.hse.gov.uk/pubns/books/hsg177.htm

Manual handling/ pushing and pulling
http://www.hse.gov.uk/msd/index.htm

Merchant Shipping (Hatches and Lifting Plant) Regulations 1988;
http://www.opsi.gov.uk/si/si1988/Uksi_19881639_en_1.htm

Merchant Shipping (Safety at Work) (non UK Ships) Regulations 1988;
http://www.opsi.gov.uk/si/si1988/Uksi_19882274_en_1.htm

Merchant Shipping and Fishing Vessel (Lifting Operations and Lifting Equipment) Regulations (LOLER) 2006
http://www.opsi.gov.uk/si/si2006/20062184.htm

Merchant Shipping and Fishing Vessel (Provision and Use of Work Equipment) Regulations (PUWER) 2006
https://www.gov.uk/government/publications/guidance-applying-vessel-equipment-regulations-loler-and-puwer

Musculoskeletal disorders (MSDs)
http://www.hse.gov.uk/msd/index.htm

Noise at Work
http://www.hse.gov.uk/noise/

Personal Protective Equipment
http://www.hse.gov.uk/toolbox/ppe.htm

Ports web pages
http://www.hse.gov.uk/ports/index.htm

Provision and Use of Work Equipment Regulations (PUWER) 1998;
http://www.hse.gov.uk/work-equipment-machinery/puwer.htm

Risk Management HSE web page
http://www.hse.gov.uk/risk/

Safety in Docks ACOP L148
http://www.hse.gov.uk/pubns/books/l148.htm

Society of International Gas Tankers and Terminal Operators Limited (SIGTTO) publication “LNG Operations in Port Areas” and various other SIGTTO publications (This is only available for purchase)
http://www.witherbyseamanship.com/lng-operations-in-port-areas.html

Vehicles at work HSE web page
http://www.hse.gov.uk/workplacetransport/index.htm

Vibration at Work
http://www.hse.gov.uk/vibration/

Witherby publication “Tanker Jetty Safety” (This is only available for purchase)
http://www.witherbyseamanship.com/tanker-jetty-safety.html

Witherby publications “Liquid Gases - Marine Transportation and Storage” (This is only available for purchase)
http://www.witherbyseamanship.com/liquefied-gases-marine-transportation-and-storage.html

Witherby publications “Tanker Safety Training – Liquefied Gas” (This is only available for purchase)
http://www.witherbyseamanship.com/tanker-safety-training-liquefied-gas.html

Work at Height Regulations 2005
http://www.hse.gov.uk/work-at-height/index.htm

Working at Sea - Maritime & Coastguard Agency
https://www.gov.uk/topic/working-sea

19. DOCUMENT AUTHORS

This guidance document has been produced by Port Skills and Safety with the support of the Health and Safety Executive and representatives of the UK ports industry.

20. FURTHER INFORMATION

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