

ACT

ADVANCE CHEMICAL TANKER

BAB V

RESPOND TO EMERGENCIES

5.1 Chemical Tanker Emergency Procedures

EMERGENCY PROCEDURES

This chapter deals with the preparation of plans to meet any emergencies affecting chemical cargoes or cargo handling, as well as the immediate action to be taken in such an emergency. Particular attention is paid to the procedures needed in the event of a fire or an uncontrolled toxic liquid release, because these are potentially the most extreme types of emergency likely to be encountered. However, much of the guidance is applicable in other circumstances, including the control of pollution, and the chapter should be read with this in mind. Rescue from enclosed spaces is covered in Chapter 3, while additional information on fire fighting will be found in Appendix H.

This chapter gives general guidance on procedures for the most readily foreseeable emergencies in which chemicals are involved.

It is impossible to predict the nature of every potential emergency that may occur on a chemical tanker. Standard emergency procedures should therefore be developed and kept available for immediate implementation, so that basic action can be taken quickly and decisions on how to tackle any additional problems can be made in an orderly manner. The ship's emergency contingency plan should align with a broader plan held by the company management. The procedures developed should anticipate and cover the types of emergency which might be encountered in the particular activities and trade of the tanker or at terminals regularly visited.

The person who discovers an emergency situation should raise the alarm to alert the emergency organisation. Those on the scene should attempt immediate measures to control the incident until the emergency organisation takes effect.

Personnel on a chemical tanker must be prepared to tackle cargo-related emergencies, such as chemical fires, chemical reactions, toxic vapour release, leaks and spills, both at sea and in port. Personnel that will be directly involved in such emergencies must be familiar with emergency procedures and contingency plans.

Drills and exercises should vary, so that the crew members become familiar with equipment throughout the ship, and the master and other officers can consider what they would do in the event of various types of emergency. In each emergency, the first stages of the contingency plan should be:

- Raising the alarm.
- Locating and assessing the emergency and the dangers involved, and identifying actions already taken.
- Organizing man power and equipment.
- Arranging contingency evacuation for non-essential personnel.
- Notifying proper authorities.
- Notifying the ship operator's office in accordance with the company's contingency plan.

The contingency plan, which should include emergency evacuation procedures, has to be as effective in port as at sea and therefore all procedures and arrangements have to be developed with this in mind.

The master should take advantage of any opportunity for a combined emergency exercise with shore personnel at a terminal.

EMERGENCIES

Chemical fires

Fire fighting cannot be successful unless all equipment is operational, and all personnel are trained in its use. Fires involving chemicals pose specific hazards which are addressed in Appendix H. There is no such thing as a minor fire involving chemical cargoes.

The ship's general alarm should be raised and, if along side, the terminal must be notified with regards to the chemicals involved. The terminal control room should be requested to summon any outside assistance such as the civil fire brigade, rescue launches, medical aid and ambulances, police, harbour authority and pilots.

Any cargo handling, ballasting, tank cleaning or bunkering operations should be stopped immediately and all valves closed. Any craft alongside should be released. Decks, bulkheads and other structures in the vicinity of the fire, and adjacent tanks which contain flammable cargoes or are not gas free, should be cooled with water.

If at sea, the tanker should be manoeuvred so as to restrict the spread of the fire and allow it to be attacked from a windward direction.

It is anticipated that each ship or company will have its own fire emergency plan. The following list of points should be considered for inclusion:

- Activate the alarm.

- Stop cargo operations - close valves and hatches.
- Organise fire fighting teams.
- If alongside a berth, alert terminal staff and request them to alert port authorities.
- If at anchor in port, alert the port authorities.
- If other ships or craft are alongside, alert them and instruct them to depart immediately.
- Identify the chemical or chemicals involved, and any chemicals that maybe at risk if the fire spreads.
- Select the fire fighting equipment and fire extinguishing agent to be used.
- Be alert to the fact that toxic fumes may enter the accommodation, and an evacuation of non-essential crew maybe necessary.

Chemical cargo spills

The biggest risk of a cargo spill is during cargo handling operations, either because of equipment failure or improper handling procedures. Cargo spills are therefore most likely to happen in port. In the event of a spill, the following actions should be taken immediately:

- Activate the alarm.
- Stop all cargo operations and close valves and hatches.
- If along side a berth, notify the terminal staff of the chemicals involved and possible risk posed to personnel.
- Notify local port authorities, usually through the terminal staff.
- Prohibit smoking and use of naked lights throughout the ship.
- Clear all non-essential personnel from the area.
- Close all accommodation access doors, and stop all non-closed circuit ventilation.
- Arrange for main engines and steering gear to be brought to stand-by.

The primary factor affecting response will of course be the chemical or chemicals involved, but the action to be taken depends on the circumstances of the spillage, as well as its size and location. If there is a possibility of cargo or cargo vapour entering any accommodation or engine room air intake, appropriate preventive steps must be taken quickly. As a general rule, there should be a full initial response to any spill, the emergency party wearing the appropriate protective clothing and breathing apparatus.

Safety of personnel and the ship should take priority over environmental care. If it is possible and safe to do so, the released liquid should be pumped or washed into a slop tank or other containment, or collected for safe disposal using absorbent material. However, if it is not safe or if there is any doubt, the spillage

should be washed overboard with very large amounts of water. If at sea, the tanker should be manoeuvred so as to disperse the vapour away from the ship's accommodation.

For small, localised and contained spills, it may not be necessary to implement all the action points in the ship's contingency plan. However, the master must always keep in mind the local circumstances, the nature of the chemical involved, and the potential harm to personnel, ship's structure and the environment, in most cases it is better to overreact than to delay action.

The general advice for a corrosive cargo spillage on deck is to wash the spilled liquid overboard with large quantities of water from as far away as practicable. A fog nozzle should be used and not a direct jet of water. The emergency team should wear appropriate protection, approach the spill from upwind and direct the spray of water to the edge of the spill, gradually working towards the centre. The use of water on a fuming acid and other strong acids will initially cause a vigorous reaction that will cause increased fuming. However, this will be temporary while the spillage will be dealt with rapidly. If at sea, the ship should be turned off wind.

Deck valve and deck pipeline leakage

If leakage develops from a deck pipeline, deck valve, cargo hose or metal arm, operations through that connection should be stopped and the situation treated as an emergency until the cause has been identified and the defect remedied. Permanent means for the retention of any slight leakage at ship and shore connections should have been provided. Operations should not be restarted until the fault has been rectified and all hazards from the released cargo eliminated.

If a pipeline, hose or arm bursts, or if there is an overflow, all cargo and bunker operations should be stopped immediately and the situation treated as a cargo spill.

Tank leakage within the ship

Leakage from a cargo tank into void or ballast spaces may cause damage to materials or equipment, and may create an explosive atmosphere and a potential personnel risk. The actions to be taken may differ depending on the product involved and other circumstances such as the weather, but should as a minimum include the following:

- Identify the products involved and the risks associated with them.
- Clear the area of all non-essential personnel.
- Identify the location of the leak.
- Transfer the product in the leaking tank to an empty tank, if at all possible.
- Consider notifying port and local authorities, and ship's operators.
- Commence remedial measures.

Spills in confined spaces such as pumprooms should, where practicable, be first contained and then treated and collected for safe disposal. Spills may be contained with dry sand, earth or proprietary chemicals. Acid residues can be

neutralised with sodium carbonate (soda ash) or special chemicals. Untreated acid spillage must be prevented from entering mild steel areas of the ship as rapid corrosion can follow: in extreme cases the consequent hull corrosion has caused the ship to sink.

Leakages from one cargo tank to another, or multiple leakages where there is a risk of mixing incompatible chemicals, should always be treated carefully. Where time allows, expert advice should be sought as to the possible risks involved.

A non-cargo space that has had a chemical leaking into it should be treated as a cargo space, and the same precautions taken. It should be cleaned and gas freed before any attempt is made for repairs. Remedial measures should be decided upon after consultation with the operator.

EMERGENCY DISCHARGE OR JETTISON OF CARGO

The jettison of cargo is an extreme measure, justified only in emergency as a means of saving life at sea or where the integrity of the ship is at risk. A decision to jettison cargo should not be taken until every alternative option has been considered in the light of available information on stability and reserve buoyancy.

If it is necessary to jettison cargo there will be a possibility of releasing large amounts of flammable or toxic vapours. The following precautions are recommended:

- Engine room personnel should be alerted: depending on the circumstances prevailing at the time, consideration should be given to changing over engine room sea water intakes from high to low level.
- Discharge should take place through a sea valve and where possible on the side opposite to the engine room intakes.
- AH non-essential inlets should be closed.
- If discharge must be from the deck level, flexible hoses should be rigged to extend below the water surface.
- All safety precautions relating to the presence of flammable or toxic gas in the vicinity of the deck must be observed.
- A radio warning should be broadcast for the information of ships nearby.

NOTIFICATION OF SPILLAGE IN TO THE SEA

Any incident, accidental or deliberate and whether at sea or in port, that causes or will probably cause a release of oil into the sea should be reported to the proper authorities. Each ship will have its own Shipboard Oil Pollution Emergency Plan (SOPEP), which will give advice.

From 2003, the same reporting requirements will apply to actual or probable releases of noxious liquid substances, and in the case of ships certified to carry such cargoes the SOPEP will become a Shipboard Marine Pollution Emergency Plan (SMPEP), covering spillage of noxious liquids.

PERSONNEL EXPOSURE

Unplanned exposure of personnel to toxic or corrosive fumes or liquid should always be treated as an emergency. Section A.3 and B.3 give an outline indication of appropriate care. In more serious cases, the rescue team should be mobilised and the rescue plan implemented. First aid should be administered as indicated in the product material data sheet. General advice is given in the Emergency Schedules (EmS) and the Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG).

The master must evaluate the seriousness of the exposure and, if in doubt, seek medical attention and advice.

ACTION BY SHIPS WHEN AN EMERGENCY OCCURS AT OTHER BERTHS NEARBY

On hearing the terminal alarm being sounded, or on being otherwise advised of an emergency at the terminal, a ship which is not involved in the emergency should be prepared for the situation to worsen. It may become necessary to shut down all cargo, bunkering and ballasting operations, withdraw personnel from the open deck, bring fire fighting capability to a state of readiness, and make engines, steering gear and unmooring equipment ready for immediate use. Contingency evacuation should be considered.

EMERGENCY REMOVAL OF A TANKER A BERTH

If an emergency that cannot be controlled occurs on a chemical tanker at a terminal, it may be necessary to consider removal from the berth. Planning for such an eventuality will require consultation between a representative of the port authority or harbourmaster, the responsible terminal official, the master of the tanker and the senior local authority fire officer. The plan should avoid hasty action which might increase rather than reduce the danger to personnel, the tanker, the terminal, other ships berthed nearby and adjacent installations. By the time it is necessary to remove a tanker which is on fire, the circumstances may be such that the ship's crew is unable to assist.

The decision whether to remove a tanker under controlled conditions or to retain it at the berth should, in the first instance, be based on the safety of life

Action in case of grounding

1. On hearing the emergency alarm, I will go to the emergency station in proper rig
2. Head count and report to master
3. Inform master about any missing person/casualty
4. Follow ship's emergency procedure manual for grounding.
5. Command team : Master.
6. Emergency team : C/O.
7. Back-up team: 2/O
8. Roving team: C/E
9. E/R team / 2 E
10. Detail crew to close all water tight doors, porthole, ventilators flap and all other water tight openings to gain reserve buoyancy.
11. Ensure back-up team prepares lifeboat.
12. Detail crew to take sounding of all tanks and bilges, especially near grounded areas.
13. Sound around the ship to find possible point of grounding
14. Myself with damage control party move to area of impact to assess damage
15. Visually inspect compartment where possible.
16. Estimate the size of the damage, its location, relative position to the water line, area of the vessel.
17. Keep master updating all the situation and findings.
18. Calculate the stability of the vessel.
19. Determine possibility of refloating the ship and take appropriate actions.
20. Ask bridge about height of tide and time of rise and fall.
21. Possibility of reducing draught of ship.
22. De-ballasting.
23. Jettisoning cargo.
24. Deal additional hazards like fire, pollution.
25. If it's possible to refloat the vessel, have an exact assessment of damage.
26. Determine the possibility of proceeding to voyage or deviating to port of refuge

5.2. Action to be Taken Following Collision, Grounding or Spillage

PROCEDURE

Management

- Purpose Definitions
- Roles and Responsibilities
- Procedure and guidelines
 1. Identification of Potential Chemical Spills

2. Risk Assessments
3. Risk Control
4. Preparation for Chemical Spills
5. Spill Management Requirements
6. Cleaning up a Chemical Spill

6.1 High risk Spill

6.2 Low Risk Spills

- Debriefing
- Training and awareness
- Documents/Forms Legislation References

Purpose

This procedure outlines the requirements for the management of chemical spills in the workplace to minimise effects to health and safety from exposure to chemical spills and reduce the impact on the environment. The procedure applies to all University staff students and contractors in all areas of all University where chemical substances are transported, purchased, stored handled, or used, including vehicles of visitors or suppliers who bring substances into the University that are potentially hazardous.

The procedure provides general guidance and therefore each laboratory or other work area that use chemical substances should have specific procedures for the particular types of substances used within the workplace or brought onto the premises.

Definitions

Personal Protective Equipment (PPE) - equipment to protect a person working in a hazardous environment.

- Level A (PPE) - to be worn when the highest level of respiratory, skin, eye, and mucous membrane protection is needed. It consists of fully encasulating, chemical resistant clothing and self-contained breathing apparatus.
- Level B (PPE) - should be used when the highest level of respiratory protection is required but a lesser level of skin and eye protection is sufficient.
- Level C (PPE) - can be used when proper respiratory protection can be afforded by air: filter-equipped protective breathing devices. It provides the same level of skin protection as Level B but a lower level of respiratory protection
- Level D (PPE) - consists primarily of a standard work uniform. It provides no respiratory protection and affords only minimal skin protection.

Bund - is an embankment or wall of brick, stone, concrete, or other impervious material, which may form part of or the entire perimeter of a compound and provides a barrier to retain liquid.

The bund is designed to contain spillages and leaks from liquids used, stored processed above ground and to facilitate cleanup operations.

Chemical Spill Guides - Guides to assist in the emergency management of particular classes of spill ranging from acids to biological spill management. These guides outline the steps to take and the PPE to wear to protect both the clean up team/person and the environment.

Designated Hazardous Substances - a hazardous substances that is :

1. Listed on Australian Safety and Compensation Council list of Designated Hazardous Substances above its lowest cut-off concentration.

That is determined to be a hazardous substance by the manufacturer or importer of the substance on the basis of the Australian Safety and Compensation Council; Hazardous Substances Information System.

Hazardous substances - a that contains ingredients that may be harmful to health. This includes substances that are lethal and non-lethal, corrosive, toxic, irritant, sensitising, mutagenic, teratogenic or carcinogenic. The concentration level of each ingredient in a mixture is taken into account in determining whether the mixture as a whole is determined to be hazardous.

Danger Goods - a hazardous substance also defined by the Dangerous Substances Act, 1979 and the Australian Dangerous goods code to be dangerous. They are classified on the basis of immediate physical or chemical effects that may impact on people, property or the environment - explosive, flammable, corrosive, chemically reactive, highly combustible, acutely toxic, radioactive or infectious.

Material Safety Data Sheet - information sheets that provide technical information in relation to substances. These sheets are obtained directly from the manufacturer or through the University Chem Watch MSDS database. Be aware of the possible differences between the manufacturer's and generic MSDS's.

Risk - a the probability (likelihood) of harm or damage occurring from exposure to a hazard, and the likely consequences of that harm or damage.

Self Contained Breathing Apparatus (SCBA) - An atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

Roles and Responsibilities

Line Managers are responsible for ensuring that:

This procedure is implemented within their area of responsibility

- All necessary equipment is available and maintained in the case of a chemical spill and they are clearly labelled and signed
- Risk assessments are carried out to identify risk control measures to protect the health and safety of people and potential harm to the environment
- Procedures are written following the identification of specific risks relevant to local areas
- All staff receive appropriate training to deal with chemical spills where identified as necessary
- All supervisory staff are aware of their legal obligations and UniSA standards regarding environmental pollution from chemical spills
- All staff that use, store or manage chemical substances as a minimum requirement complete the online learning programs in environmental awareness and chemical spill management
- Appropriate personnel are informed of any chemical spills and external providers contracted to clean up where necessary.

Supervisors are responsible for ensuring that:

This procedure is implemented within their area(s) of responsibility

- Information is provided to all relevant staff and students to safely clean up spilled chemical substances. This should include emergency services contact details, building evacuation team contacts, and other staff as appropriate, location of equipment and materials such as self contained breathing apparatus or respirator locations
- Appropriate equipment is cleaned, stored and maintained by qualified persons
- Chemical Spill Management Facilities Inspections are carried out as per Workplace Inspection procedure at least quarterly
- All new area staff are inducted in environmental awareness and chemical spill management

Staff are responsible for ensuring that:

- They do not place themselves or others at risk of injury
- They place personal safety first - keep clear of a spill unless trained in spill control and clean up.

- Immediately reporting of chemical spill to their supervisor only trained and competent staff attempt to clean up a chemical substance spill.
- They know where MSDS's are kept, or how they can be accessed.
- Online learning modules in environmental awareness and chemical spill management are completed
- Written procedures provided for spill control are followed spill control equipment is used in the proper manner equipment is stored and maintained as appropriate.

Procedure Guidelines

1. Identification of Potential Chemical Spills

The hazard management process requires the identification of reasonably foreseeable hazards. Once a potential chemical spill hazard has been identified a risk assessment must be completed OHSW2 - Risk Assessment Worksheet. The risk assessment is to identify risk control measures to reduce the risk and harm to people and the environment

2. Risk Assessment

When a potential hazard of a chemical spill has been identified the relevant line manager will ensure that a risk assessment using form OHSW59 - Risk Assessment - Chemical Spill and Environmental Risk Worksheet or similar is completed.

The risk assessment is to include the following factors:

- The nature of the spilled chemical (high/low hazard material)
- The quantity spilled (large/small amounts)
- The location of the spill (difficult access, public site/bunded area)

When evaluating risks associated with chemical spills, the following points need to be considered is special training required to handle the situation?

- Is special equipment required to clean up the spill? (ie. Self Contained Breathing Apparatus (SCBA), Personal Protective Equipment (PPE) etc)
- Are special procedures required to clean up the spill? e.g. pumps, hoses etc Where the response is HIGH to any of the above factors then the spill must be considered as HIGH RISK.

All HIGH RISK spills should be managed by the Campus Facilities Manager. Low Risk spills may be handled by area workers under the direct supervision of the relevant laboratory technician.

3. Risk Control

Measures to eliminate or control the potential risk shall be developed in the following order of controls, known as the hierarchy of controls (see also Form OHSW59 - Risk Assessment - Chemical Spill and Environmental Risk Worksheet)

1. Elimination - complete removal of the hazard or risk of exposure
2. Substitution - replacing the substance or work process with a less hazardous means
3. Isolation - through distance or enclosure.
4. Engineering - includes redesigning the work area, fixing rollover bund guard(s) or maintenance
5. Administrative - includes standard operating procedure, supervision, training, rotation and signage
6. Personal protective equipment - includes protective clothing, safety shoes, goggles, safety glasses and gloves.

The completed risk assessment form OHSW59 or similar is to be forwarded to the relevant Line Manager and laboratory supervisor as soon as practical after completion. The Line Manager is to ensure that the recommended control measures are implemented where appropriate.

4. Preparation for Chemical Spills

Staff that use or manage chemical substances must have an understanding of their Material Safety Data Sheet including the special requirements for spill control such as the type of fire extinguisher required, incompatible substances, and reactivity with substances such as water or air.

Where a substance is unknown, or is an experimental substance that does not have an MSDS always treat as HIGH RISK.

Wherever practicable, the storage and use of the chemicals in an area which can contain or restrict the flow from a spill site. On benches, this can be assisted by a raised lip at the front of the bench, or by the use of spill trays.

Spill Kits

- Spill kits should be available for use where assessed as required. The contents of the spill kit should be relevant to the area and the potential spill, this may include such things as:
 - An amount of vermiculite sufficient to deal with a spillage of the largest container of non corrosive liquids used in the immediate area is to be available.
 - A similar amount of Sodium Hydrogen Carbonate is to be available for spills of corrosive liquids.
 - A couple of bags of kitty litter, saw dust or sand to absorb spilt liquids.
 - Brooms, dustpans and a square mouth shovel to sweep up the absorbent material

- Absorbent pillows or booms to contain larger liquid spills and prevent spills entering drains
- Heavy duty plastic bags or plastic drums (with a lid) to contain hazardous material prior to disposal.
- Appropriate personal protective clothing (such as chemical resistant gloves, safety glasses)
- A wheelie bin to contain all the above equipment and store hazardous material prior to disposal

Ensure that the spill kit is clearly labelled and located in an easily accessible position for all staff. Ensure that all staff are aware of and can access the Chemical spill management and chemical spill guidelines, and know how to use the spill kit in case of an emergency.

Spill kits should be restocked following use and the contents should be checked on a monthly basis.

5. Spill Management Requirement

The following are the minimum mandatory chemical spill facility requirements

Loading Areas Bays

- Permanently Installed Secure Roll Over Bunds
- Adequate supply of emergency drain covers
- 240 Litre Chemical spill Station (wheelie bin variety)
- Chemical Storage Areas
- All areas where chemicals are stored shall have access to a Spill Kit (within 50 metres) of the storage area
- Chemical Storage Cabinets
- Trays should be provided that are compatible with the contents, and which will contain the contents of the two largest glass containers, or the largest metal or plastic container.
- Chemical Waste Storage Areas
- Adequate supply of emergency drain covers
- 240 Litre Chemical Spill Station (wheelie bin variety)
- Adequate ventilation

6. Cleaning up a Chemical Spill

In the event of a chemical spill the following immediate actions are required to be taken. Chemical Spill guides have been prepared to assist line managers in the clean-up of particular spills, forms OHSW60 - Chemical Spill

Guides and OHSW58 - Chemical Spill Incident and Risk Assessment Response Checklist Record should always be used in these circumstances.

Immediate Actions (details repeated in OHSW58)

- Clear the affected area.
- Check for any persons involved.
- Personnel contaminated with chemicals must be decontaminated for at least 15 minutes (emergency shower) and taken for medical examination
- Administer first aid
- Isolate the spill (if safe to do so)
- Contact the Campus Facilities Manager for high risk spills (see section 6.1)
- Contact the Laboratory Technician for low risk spills (see section 6.2)
- Gather any information possible, ie identify the material and quantity, gather relevant MSDS and assess any immediate risks.

The primary concern is to protect health and safety no action should be taken during an emergency response that directly or indirectly puts human health and safety at risk.

Circumstances Requiring Evacuation

- Uncontrolled open flame
- Uncontrolled compressed gas release
- Any situation which poses imminent threat to human health or safety

When an evacuation alarm sounds, all persons should immediately exit the building and report to their assigned assembly area. Attempting to control potential sources of ignition should only occur if it can be accomplished without personal risk.

High Risk Spills

1. Contact the Campus Facilities Manager (88888) who will then inform security to inform them of the situation
2. The Campus Facilities Manager (88888) should then contact the Technical Supervisor and inform them of the situation
3. Contact Emergency Services by calling 000 or dialing (0) to get a line then 000 if calling from a University telephone (To be contacted in the first instance if the risk is great enough, but generally this is determined by the Chief Response Officer/Emergency Response Team).
4. Determine who will take responsibility for controlling the chemical spill situation, ie. Campus Facilities Manager, Fire Brigade etc.

5. Ensure appropriate University personnel are advised of the situation including the relevant Line Manager.
6. Follow any advice or information provided by the Campus Facilities Manager or Emergency Services.
7. The Campus Facilities Manager should determine the chemical(s) involved, how much has been spilt and the location of the spill
8. The spill may be cleaned up by appropriate personnel trained in chemical spill clean up. If there are no appropriately trained personnel external contractors will be engaged to perform this function (contact OHSW&IM Services to obtain contact details for appropriate contractors).

Minimal requirements for staff to clean up high risk spills

- Specific training - Any training for this must be endorsed by OHSW&IM Services
- Self Contained Breathing Apparatus (SCBA) or respiratory protection appropriate to situation
- Hard hat with face shield
- Chemical resistant coveralls
- Triple gloves
- Chemical resistant boots

Note : Area workers are not to attempt to clean up HIGH RISK spills unless they have had specific training in HIGH RISK spill clean up. Specific personnel with training or external contractors will manage the spills.

Low Risk Spills

1. Have at least two trained workers to handle the spill.
2. Laboratory supervisor/technician to supervise the clean-up of the spilled, chemical substance.
3. Use the proper protective equipment.
4. Ensure fire protection is available for flammable spills.
5. Control the source.
6. Contain free liquids by damming, absorbing if appropriate.
7. Place all spill residues in an appropriate sealable container.
8. Decontaminate the affected area using an appropriate material.
9. Decontaminate the cleanup equipment
10. Analyse the area to ensure proper decontamination has taken place.
11. Examine walkways, floors, stairs equipment etc for other hazards or damage.

Cleanup

Area workers may clean up spills of low-hazardous materials eg (sodium chloride solid) under the direction of the laboratory technician.

If the laboratory technician has any doubt, the laboratory supervisor must be contacted. The minimum personal protective equipment for low risk spills shall include:

- Laboratory coat fully buttoned up or disposable overalls Rubber gloves Rubber boots and
- Goggles

Debriefing

All personnel involved in the clean up of the spilled substance should be debriefed after the spill has been resolved. All spill control supplies are to be restocked.

- All damaged or used equipment must be repaired or refilled.
- When the area is deemed clear, it can be re-opened for normal operations.

Training and Awareness

The University has developed online learning programs that deal with Environmental Awareness and Chemical Spill Management to provide staff with general information and awareness relating to the management of chemical substances. It is required that any staff member who is responsible for the use, storage or management of chemical substances complete the online learning programs.

Specific training for chemical spill management is to be coordinated at the local level and recorded on the training register.

Documents/Forms

Emergency Response Plan - Code 6: Chemical

OHSW2 - General Hazard Identification and Risk Assessment

OHSW58 - Chemical Spill - Incident and Risk Assessment Response Checklist

HSW59 - Risk Assessment - Chemical Spill and Environmental Risk Worksheet

HSW60 - Chemical Spill Guides

Guide for Storage of Hazardous Substances

Legislation

Occupational Health Safety and Welfare Act 1986

Occupational Health, Safety and Welfare Regulations, 2010

Dangerous Substances Act 1979

Environment Protection Act 1993

5.3 Medical First Aid Procedures On Board Chemical Tankers, With Reference to The Medical First Aid Guide For Use in Accident Involving Dangerous Goods (MFAG)

System. Control of leaks on the cargo deck is also addressed. Spray shields are required for cargo manifold connections, to prevent cargo spraying onto surrounding structure.

The Codes prevent any cross-contamination of the fuel oil system with a corrosive cargo, by stipulating that the two liquid handling systems are fully segregated.

A few acid cargoes are flammable but the non-flammable acids can react with metals to produce hydrogen. Therefore it is prudent to treat acid cargoes as though they were flammable liquids. A flammable atmosphere must be suspected inside the cargo system, in void Spaces around cargo tanks, in cargo pumprooms etc. Electrical equipment in such spaces must comply with flammable atmosphere requirements for hydrogen-air mixtures.

5.3.1 Basic documents

The two fundamental guides for medical first aid on board ships, which give advice on dealing with exposure to corrosive cargoes, are the International Medical Guide for Ships (IMGS) and the Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG). Both are published jointly by IMO, ILO and WHO. The IMGS gives guidance on common illnesses and is not solely concerned with chemical accidents. The MFAG is supplementary to the IMGS and contains advice for recognising and treating chemical burns, within the limits of the facilities available on board.

The general rule is that if, during the handling of chemicals, any person shows symptoms that suggest chemical burning, they should be treated in accordance with the MFAG and seen by a doctor as soon as practicable. Medical advice should be sought by radio, while still at sea. Assistance may also be available from another ship with a doctor on board.

5.3.2 Chemical burns

Specific advice for the first aid treatment of chemical burns is given in sub-section 6.7 of the MFAG. Chemical burns are very similar to fire or electrical burns but with the added risk that the chemical may be absorbed through the damaged skin and cause further damage through poisoning. Three symptoms are described to help recognise (diagnose) burns:

- Burning pain, with redness at the point of contact (though sometimes only an irritating rash).

- In severe cases, blistering, loss of skin and underlying tissue.
- Nausea, vomiting, headache, breathing difficulties and confused mental state: unconsciousness implies poisoning complications.

The basic recommendation is to check the chemical data sheet immediately and radio for medical advice.

5.3.3 First aid and further cure

MFAG Section 5 outlines immediate first aid, i.e. treatment for minor casualties, or to enable a victim to be moved so that further treatment can be administered.

The key priorities must be remembered when reacting to a casualty:

- Send for help and inform the master.
- Do not become the next victim yourself: if the response is too big for you alone, then wait for back-up.
- Remove the victim from the danger or vice versa.
- Use breathing apparatus if there is any suspicion of toxic gases or vapours in the area.

In case of contact with the skin, the victim should immediately be put under an emergency shower, to wash off the corrosive with very large quantities of water. The victim's clothing and shoes should be removed while under the shower. If even a minute quantity of acid has entered the eye, it must be irrigated immediately with plenty of water for a minimum of 15 minutes, or more if necessary. Use an effective eye irrigation fountain.

First aiders must always wash their own hands and forearms and then use sterile materials for treatment, as burns may easily develop into infections. Cotton wool or other linty materials should not be used for cleaning: burns, as they are likely to leave bits in the burn. Blisters should be left intact. Vaseline gauze dressing should be used to cover burns, however small, so that the dressing does not stick to the damaged flesh.

5.3.4 MFAG tables

First aid advice concerning groups of corrosive chemicals or single chemicals is given in a number of tables in MFAG Chapter 9. Group table 700 covers acids, including those subject to the special requirements of the 1BC Code. Table 610 applies to nitric acid in concentrations not lower than 70%, as it is likely to give off nitrogen oxides which are highly toxic to the lungs. Ammonium nitrate solutions are covered by table 235, the group table for nitrates and nitrites.

The Emergency Schedules are an appendix to the IMDG Code and provide masters with advice on the immediate action to be taken in case of accidents such as spillage or leakage of corrosive substances.

The response to a spillage will depend on where the spillage occurs, the quantity involved and if remedies other than water are available. If it is safe to do so, spillage should be collected for safe disposal but, if there is any doubt, the safety of the crew takes priority over pollution avoidance. Dispersal of corrosives should not be delayed.

CONTROL OF OPERATIONAL DISCHARGES FROM A CHEMICAL TANKER

This chapter provides background information on international regulations governing discharges from ships into the environment, and points out the importance of these regulations to chemical tanker operations. In addition to cargo handling, the chapter refers to operational procedures which must be followed in respect of tank cleaning and the handling of slops and ballast, to comply with MARPOL and the IMO Codes.

ENVIRONMENTAL RESPONSIBILITY

This guide is primarily concerned with the safety of the ship and its crew, safe handling of cargo, and safe operation in ports and terminals. However, the growing importance of environmental care demands that the crews of chemical tankers have a clear understanding of the pollution regulations. Many additional tasks undertaken during cargo handling in a chemical tanker are dictated by a need to protect against any chance of discharge of cargo into the sea. These additional tasks must be performed safely, and an understanding of their purpose is a necessary part of chemical tanker operations today.

EXISTING CONTROLS

5.3.5 International regulations

The International Convention for the Prevention of Marine Pollution from Ships 1973, as modified by the Protocol of 1978, known as MARPOL 73/78, is the principal regulation covering protection of the marine environment. MARPOL Annex I covers procedures for control of oil and oil-like substances, such as cargo or fuel, and applies to all ships including chemical tankers. MARPOL Annex II contains extensive regulations about the loading, carriage and discharge of noxious liquid cargoes, as well as the treatment of cargo residues remaining on board, washing of empty tanks and the final disposal of the contaminated washing medium.

MARPOL Annex II affects all ships carrying noxious liquid cargoes in bulk. All personnel with responsibility for cargo operations on chemical tankers should be aware of the basic requirements of MARPOL, and take care that discharges into the sea never exceed the permitted limits.

In addition to MARPOL there are two IMO Codes applicable to chemical tankers:

- Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (the BCH Code). This was first adopted by IMO in 1971 as voluntary guidelines providing advice to the industry and to authorities. Under the subsequent provisions of MARPOL Annex H, chemical tankers constructed before 1 July 1986 and engaged in international trade must comply with this Code.
- International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (the IBC Code). This was adopted by IMO in 1983. Under the provisions of SOLAS Chapter VII and MARPOL Annex II all chemical tankers constructed on or after 1 July 1986 must comply with the provisions of this Code.

Both Codes have been amended several times since their adoption, in order to keep them up to date with best practice in the industry. The IBC Code also contains the current required.