Appendices

Appendix 1
RESCUE

Integrated response

The potential for hazardous chemical exposures and subsequent injury to personnel exists on board ships that carry hazardous materials. While occurring infrequently, chemical incidents are capable of endangering the health of exposed individuals and emergency personnel directed to assist them. People who have been seriously injured by a hazardous material have a greater chance of recovery without complications when appropriate emergency treatment is provided by trained personnel at the scene, and when the casualty is safely transported to an area where further care can be given. This requires an integrated emergency medical response involving the ship's master and all individuals who may be called upon to rescue and provide medical assistance after an exposure incident.

Emergency response plan

A common characteristic of the successful management of chemical incidents is adequate contingency planning. Planning requires the involvement of all personnel on board the ship who might be called upon to provide emergency response and first aid to injured individuals.

Every ship carrying dangerous goods should have an emergency response plan which includes the following:

- A listing of individuals who are trained to respond to an exposure incident and administer first aid.
- Methods and procedures for response which are specific for the particular ship, including procedures and equipment for casualty decontamination.
- Location of personal protective equipment and transport equipment.
- Content and frequency of training programmes and drills.
- Location of Material Safety Data Sheets (MSDS), papers related to ship inventories and other documents that might help identify chemicals present at an incident.

Arrival at the scene

Many first responders are accustomed to immediately attending an injured casualty and may disregard the possibility of danger to themselves. Without proper protection, a rescuer entering a contaminated area risks exposure and the potential for becoming a casualty. Even though rescue of any casualty is important, it should only be attempted after it is certain that the responders, themselves, will not become injured.

Whenever a chemical is unidentified, worst-case assumptions concerning toxicity must be assumed.

Rescuers therefore must **NOT**:

- Enter a contaminated area without using a pressure-demand self-contained breathing apparatus and wearing full protective clothing;
- Enter an enclosed space unless they are trained members of a rescue team and follow correct procedures;
- Walk through any spilled materials;
- Allow unnecessary contamination of equipment;
- Attempt to recover shipping papers or manifests from contaminated area unless adequately protected;
- Become exposed while approaching a potentially contaminated area;
- Attempt rescue unless trained and equipped with appropriate personal protective equipment (PPE) and protective clothing for the situation.

Establishment of an exclusion or hot zone

The **first rescuer** at the site should establish an exclusion zone that encompasses all contaminated areas, but should not become exposed in doing so. No one should be allowed to cross into the zone without wearing a self-contained breathing apparatus and full protective clothing.

Assessment, decontamination and initial treatment of casualties

Primary goals for emergency personnel in a hazardous materials incident include termination of exposure to the casualty, removal of the casualty from danger, and casualty treatment – while not jeopardizing the safety of rescue personnel.

Termination of exposure can best be accomplished by removing the casualty from the exposure area and removing contaminates from the casualty. If the casualty is removed from the possibility of additional exposure or other dangers and the casualty is no longer contaminated, the level of protection for personnel can be downgraded to a level that will better facilitate the provision of casualty care.

The potential for additional danger to casualty and responder prohibits any medical treatment inside the exclusion zone other than basic life support. The probability of contact with hazardous substances either by subsequent release of materials still in the area, along with dangers of fire or explosion, and the restriction of movement by necessary PPE outweigh the time saved by attempting casualty care in the exclusion or hot zone.

Priority should be given to the **A**irway, **B**reathing, and **C**irculation (ABC, see **table 2**). Once life-threatening matters have been addressed, rescue personnel can then direct attention to secondary casualty assessment. It is important to remember that appropriate personal protective equipment and clothing must be worn until the threat of secondary exposure is no longer a danger. Therefore, the sooner the casualty becomes decontaminated the sooner response personnel may reduce protective measures or downgrade the level of protection.

During initial casualty stabilization, a gross decontamination should simultaneously be performed. This consists of cutting away or otherwise removing all suspected contaminated clothing, including jewellery and watches, and the brushing or wiping off any obvious contamination. Care should be taken to protect any open wounds from contamination. Every effort should be made by personnel to avoid contact with any potentially hazardous substance.

Decontamination

Decontamination includes the reduction of external contamination, containment of the contamination that is present, and prevention of the further spread of potentially dangerous substances. In other words, remove what you can and contain what you can't.

Table 7 (EYE EXPOSURE TO CHEMICALS) and **table 8** (SKIN EXPOSURE TO CHEMICALS) provide detailed instructions for decontamination.

With a few exceptions, intact skin is less absorptive than injured flesh, mucous membranes, or eyes. Therefore, decontamination should begin at the head of the casualty and proceed downward with initial attention to contaminated eyes and open wounds. Once wounds have been cleaned, care should be exercised so as not to recontaminate them. This can be aided by covering the wounds with a waterproof dressing. For some chemicals, such as strong alkali, it may be necessary to flush exposed eyes with water or normal saline for an extended period of time.

External decontamination should be performed using the least aggressive methods. Mechanical or chemical irritation to the skin should be limited to prevent increased permeability. Contaminated areas should be carefully cleaned under a gentle spray of water with a soft sponge and a mild soap such as dishwashing liquid. Warm water (never hot) should be used. The degree of decontamination should be completed based on the nature of the contaminant, the form of contaminant, the casualty's condition, environmental conditions, and resources available.

Responders should try to contain all runoff from decontamination procedures for proper disposal. The casualty should be isolated from the environment to prevent the spread of any remaining contaminants.

All potentially contaminated casualty clothing and belongings should be removed and placed within properly labelled bags.

Considerations for casualty treatment

A contaminated casualty is like any other casualty and may be treated as such except that responders must protect themselves and others from dangers due to contamination. Response personnel must first address life-threatening issues and then decontamination and supportive measures. The initial assessment can be accomplished simultaneously with decontamination and additional management completed as conditions allow. The chemical-specific information which is obtained from shipping papers and labels should be incorporated into the proper casualty treatment procedures.

When more than one casualty is involved, proper triage procedures should be implemented.

- If there is only one unconscious casualty (irrespective of the total number of casualties):
  1 give immediate treatment to the unconscious casualty only; and
  2 send for help.
- If there is more than one unconscious casualty:
  1 send for help; and
  2 give appropriate treatment to the worst casualty in the priority order of:
    a casualties who have stopped breathing or have no pulse (see **table 2**);
    b casualties who are unconscious (see **table 4**).
- If the casualty is unconscious or cyanotic (bluish skin) but breathing, connect to portable oxygen.

Presenting signs and symptoms can then be treated as appropriate and when conditions allow. The sooner a casualty has been decontaminated the sooner he or she can be treated like a "normal" casualty. Unless required by life-threatening conditions, preventive invasive procedures, such as intravenous injections, should be performed only in fully decontaminated areas where conditions permit. These procedures may create a direct route for introducing the hazardous material into the casualty.

Oxygen should be given using a bag valve mask with reservoir device (rebreather). The contaminated atmosphere should not mix with the oxygen if possible.

The casualty should be frequently reassessed because many hazardous materials have latent physiological effects. While some cases may require treatment with antidotes, most cases will be handled with symptomatic care.

Transport of casualty to medical area of ship

The casualty should be as clean as possible before transport, and further contact with contaminants should be avoided. Special care should be exercised in preventing contamination of stretchers and others who will subsequently come in contact with the casualty. Protective clothing should be worn by response personnel as appropriate. If decontamination cannot be performed adequately, responders should make every attempt to prevent the spread of contamination and at the very least remove casualty clothing, wrap the casualty in blankets, followed by body bags or plastic or rubber sheets to lessen the likelihood of contamination to equipment and others. Minimize contamination from shoes.

If casualties can walk, lead them out of contaminated area.

If casualties are unable to walk, remove them on backboards or stretchers. Fibreglass backboards and disposable sheeting are recommended.

If a wood backboard is used, it should be covered with disposable sheeting or it may have to be discarded afterwards. Equipment that comes in contact with the casualty should be segregated for disposal or decontamination.

If no other means of removal are available, carefully carry or drag casualties to safety.

Medical management of casualty

If the route of exposure to the casualty is known, the appropriate table should be consulted for guidance.

If the chemical has a specific treatment procedure (see **appendix 15**), the appropriate table should be consulted.

If the casualty has signs or symptoms, the appropriate table should be consulted.