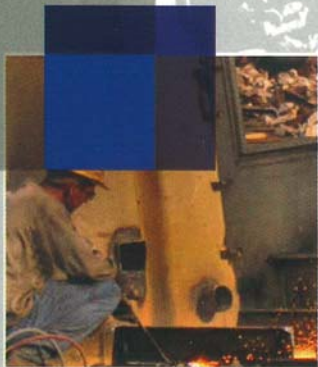




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Labour
Office
Geneva



Safety and health in shipbreaking

Guidelines for Asian countries and Turkey

Safety and health in shipbreaking
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International Labour Organization

Safety and health in shipbreaking Guidelines for Asian countries and Turkey

International Labour Office Geneva

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ILO

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Preface

These International Labour Organization (ILO) guidelines are the first of their kind to provide assistance to ensure safe work in shipbreaking within the framework of the ILO's Decent Work Agenda. In so doing they provide advice on the transformation of a mainly informal economy activity into a more formal organized one.

The guidelines are designed to assist shipbreakers and competent authorities alike to implement the relevant provisions of ILO standards, codes of practice and other guidelines on occupational safety and health and working conditions, and the provisions of instruments of other relevant international organizations, aiming at progressive improvement. The practical recommendations in these guidelines are for use by all those who are responsible for occupational safety and health in shipbreaking operations. The guidelines are not legally binding, nor are they intended to replace national laws, regulations or accepted standards. They provide guidance to those engaged in the framing of relevant provisions and the setting up of effective national systems, procedures and enterprise regulations, where they do not exist.

These ILO guidelines were adopted unanimously by the Interregional Tripartite Meeting of Experts on Safety and Health in Shipbreaking for Selected Asian Countries and Turkey, held in Bangkok, Thailand, from 7 to 14 October 2003. The spirit of cooperation among all participants paved the way for developing consensus on a comprehensive and practical set of guidelines which, if widely used, will benefit all who work in the shipbreaking industry. The Governing Body of the ILO approved the publication of the guidelines at its 289th Session (March 2004).

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The practical use of these guidelines will largely depend on local circumstances, the availability of financial resources, scale of operations and technical possibilities. Technical cooperation will be important in promoting the use of the guidelines. The subsequent development of supporting materials will allow specific technical tasks to be addressed to meet the requirements of its provisions. The guidelines contain elements from the ILO *Guidelines on occupational safety and health management systems, ILO-OSH 2001*, in the hope that they will serve as a practical tool for competent national authorities and shipbreaking facilities to achieve continual improvements in occupational safety and health performance.

These guidelines are issued in concert with other international instruments, including those of the International Maritime Organization (IMO), the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention, 1972, and Protocol, 1996), and the International Chamber of Shipping (ICS) Industry Code of Practice on Ship Recycling.

Participants at the Meeting

The following countries were represented by tripartite delegations: Bangladesh, China, India, Pakistan and Turkey. The Meeting was composed of five experts from the above countries appointed following consultations with the Governments, five experts appointed following consultations with the Employers' group and five experts appointed following consultations with the Workers' group of the Governing Body. Technical specialists from major shipowning countries and observers from international agencies also attended.

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Glossary

In these guidelines, the following terms have the meanings hereby assigned to them:

Active monitoring: The ongoing activities which check that hazard and risk preventive and protective measures, as well as the arrangements to implement the OSH management system, conform to defined criteria.

Audit: A systematic, independent and documented process for obtaining evidence and evaluating it objectively to determine the extent to which defined criteria are fulfilled. Audits should be conducted by competent persons internal or external to the facility who are independent of the activity being audited.

Competent authority: A minister, government department or other public authority with the power to issue regulations, orders or other instructions having the force of law. Under national laws or regulations, competent authorities may be appointed with responsibilities for specific activities, such as for the implementation of national policy and procedures for the protection of shipbreaking workers.

Competent person: A person with suitable training, and sufficient knowledge, experience and skill, for the performance of the specific work, in good safety conditions. The competent authority may define appropriate criteria for the designation of such persons and may determine the duties to be assigned to them.

Continual improvement: Iterative process of enhancing the OSH management system to achieve improvements in overall OSH performance.

Contractor: A person or an enterprise providing services to an employer at the facility in accordance with agreed specifications, terms and conditions. For the purpose of these guidelines, contractors include subcontractors and labour supply agents.

Employer: Any physical or legal person that employs one or more workers.

Facility: A location at which the dismantling or scrapping of a ship at a beach, pier, dry dock, or dismantling slip is carried out by a company, operation, firm, undertaking, establishment, enterprise, institution or association, whether incorporated or not, public or private, that has its own functions and administration.

General arrangement (GA) plan: A drawing supplied to the ship and owners by the builders showing the general arrangement of decks, fire-fighting equipment, position of cargo-handling equipment, location of holds, tank disposition, hydrostatic information, accommodation, etc.

Green passport: The concept of a “green passport” for ships has been developed by the IMO. This document, containing an inventory of all materials potentially hazardous to human health or the environment, used in the construction of a ship, should accompany the ship throughout its working life. Produced by the shipyard at the construction stage and passed to the purchaser of the vessel, the document should be in a format that would enable any subsequent changes in materials or equipment to be recorded. Successive owners of the ship are required to maintain the accuracy of the green passport and incorporate into it all relevant design and equipment changes, with the final owner delivering it, with

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the vessel, to the shipbreaking facility. The current owner of an existing ship would prepare a green passport for it.

Hazard: The inherent potential to cause injury or damage to people's health.

Hazard assessment: A systematic evaluation of hazards.

Hazardous ambient factor: Any factor in the workplace which may in some or all normal conditions adversely affect the safety and health of the worker or other person.

ILO-OSH 2001: ILO Guidelines on occupational safety and health management systems (Geneva, 2001).

Incident: An unsafe occurrence arising out of or in the course of work where no personal injury is caused.

Labour inspectorate: The body established according to national laws and regulations to secure the enforcement of the legal provisions relating to the conditions of work and the protection of workers while engaged in their work.

Labour supply agent: Supplier or provider of workers.

London Convention, 1972, and Protocol, 1996: Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972.

Occupational health services: Services entrusted with essentially preventive functions and responsible for advising the employer, the workers and their representatives in the facilities on:

- (a) the requirements for establishing and maintaining a safe and healthy working environment which will facilitate optimal physical and mental health in relation to work;
- (b) the adaptation of work to the capabilities of workers in the light of their state of physical and mental health.

Occupational health surveillance: See *Workers' health surveillance*.

OSH: Occupational safety and health.

OSH management system: A set of interrelated or interacting elements to establish OSH policy and objectives, and to achieve those objectives.

Reactive monitoring: Checks that failures in the hazard and risk prevention and protection control measures, and the OSH management system, as demonstrated by the occurrence of injuries, ill health, diseases and incidents, are identified and acted upon.

Risk: A combination of the likelihood of an occurrence of a hazardous event and the severity of injury or damage to the health of people caused by this event.

Risk assessment: The process of evaluating the risks to safety and health arising from hazards at work.

Safety and health committee: A committee with representation of workers and employers and their respective representatives established and functioning at facility level according to national laws, regulations and practice.

Supervisor: A person responsible for the day-to-day planning, organization and control of a shipbreaking work-site.

Surveillance of the working environment: A generic term which includes the identification and evaluation of environmental factors that may affect workers' health. It covers assessments of sanitary and occupational hygiene conditions, factors in the organization of work which may pose risks to the health of workers, collective and personal protective

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equipment (PPE), exposure of workers to hazardous agents, and control systems designed to eliminate and reduce them. From the standpoint of workers' health, the surveillance of the working environment may focus on, but not be limited to, ergonomics, accident and disease prevention, occupational hygiene in the workplace, work organization, and psychosocial factors in the workplace.

Worker: Any person who performs work, either regularly or temporarily, for an employer.

Workers' health surveillance: A generic term which covers procedures and investigations to assess workers' health in order to detect and identify any abnormality. The results of surveillance should be used to protect and promote the health of the individual, collective health at the workplace, and the health of the exposed working population. Health assessment procedures may include, but are not limited to, medical examinations, biological monitoring, radiological examinations, questionnaires or a review of health records.

Workers and their representatives: Where reference is made in these guidelines to workers and their representatives, the intention is that, where representatives exist, they should be consulted as the means to achieving appropriate worker participation. In some instances it may be appropriate to involve all workers and all representatives.

Workers' representative: In accordance with the Workers' Representatives Convention, 1971 (No. 135), any person who is recognized as such by national law or practice, whether they are:

- (a) trade union representatives, namely, representatives designated or elected by trade unions or by members of such unions; or
- (b) elected representatives, namely, representatives who are freely elected by the workers of the enterprise in accordance with provisions of national laws or regulations or of collective agreements and whose functions do not include activities which are recognized as the exclusive prerogative of trade unions in the country concerned.

Workplace: Physical area where workers need to be, or to go to, on the instruction of an employer to carry out their work.

Work-related injury: Death or any personal injury resulting from an occupational accident.

Work-related injuries, ill health and diseases: Negative impacts on health arising from exposure to chemical, biological, physical, work-organizational and psychosocial factors at work.

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1. General provisions

1.1. Objectives

1.1.1. These guidelines should contribute:

- (a) to the protection of shipbreaking workers from workplace hazards and to the elimination and control of work-related injuries and diseases, ill health, and incidents;
- (b) to assisting and facilitating the improved management of occupational safety and health issues in or about the workplace.

1.1.2. These guidelines should assist in:

- (a) establishing a coherent national policy and principles on occupational safety and health and welfare of persons employed in shipbreaking facilities and on the protection of the general environment;
- (b) establishing the respective duties and responsibilities of the authorities, employers, workers and further bodies involved and make arrangements for a structured co-operation between them;
- (c) improving knowledge and competence;
- (d) promoting the implementation and integration of consistent occupational safety and health (OSH) management systems with a view to improving working conditions considerably.

1.2. Application

1.2.1. These guidelines should apply to:

- (a) all those government authorities, workers' and employers' organizations and industry associations, whether

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legislative or advisory, whose activities influence the safety, health and welfare of persons engaged in ship-breaking;

- (b) all those individuals at the level of the shipbreaking facilities, i.e. employers, persons in control of premises, and workers and contractors, as appropriate to their duties and responsibilities for safety and health;
- (c) all shipbreaking operations irrespective of the nature of facility (beach, pier, dry dock, slip or other types of dismantling locations).

2. Industry characteristics

2.1. Shipbreaking

2.1.1. Shipbreaking is the process of dismantling a vessel's structure for scrapping or disposal whether conducted at a beach, pier, dry dock or dismantling slip. It includes a wide range of activities, from removing all gear and equipment to cutting down and recycling the ship's infrastructure. Shipbreaking is a challenging process, due to the structural complexity of the ships and the many environmental, safety, and health issues involved. While ship scrapping in dry docks of industrialized countries is regulated, shipbreaking on beaches or alongside piers is less subject to control and inspection. Although these guidelines represent good practices for all, they are more particularly aimed at the step-by-step improvement of the more hazardous situation of dismantling of ships on beaches.

2.2. Shipbreaking contributes to sustainable development

2.2.1. Breaking old or redundant ships – rather than scuttling or using them as artificial reefs – enables steel (and other parts of the ship) to be recycled at a much lower cost than importing and processing iron ore. Less energy is also needed. It also provides for the timely removal of outdated tonnage from international waters. Hundreds of vessels are scrapped each year, a trend which will continue. With the phasing out of single-hull vessels there is a question of capacity, thus increasing the danger that more countries will resort to scrapping by beaching.

2.3. Problems of the industry

2.3.1. Shipbreaking is one of the most hazardous occupations

2.3.1.1. Over the last decades, shipbreaking, which is recognized as a very hazardous occupation, has been concentrated in a few developing countries (mainly in Asia) on account of low wages and a lower level of compliance with international standards on safety, health and the environment and where working and environmental conditions are relatively poor. A recent feasibility study commissioned by the European Union concluded that shipbreaking was unlikely to be carried out in Europe due to its hazardous nature, its relatively high cost and the lack of demand for scrap steel.

2.3.2. Shipbreaking is hazardous waste management

2.3.2.1 Although many of the hazardous materials used to build a ship – asbestos, polychlorinated biphenyls (PCBs), toxic paint such as tributyltin (TBT), and heavy metals – are mostly restricted or banned today, a ship built 20-30 years ago still contains these materials. It also carries hazardous and flammable chemicals used for painting, repair and maintenance, etc. Cables and electrical and other control systems contain hazardous material and emit hazardous gases if burned. The paint coat can contaminate air, soil and water when torched or scraped, and is thus hazardous for human beings and the environment. The protection and safety and health of workers handling the hazardous waste is of crucial importance.

2.3.3. Shipbreaking is not always covered by labour law and social protection

2.3.3.1. Shipbreaking is not recognized as an industry in some countries. Although facing more hazards than an aver-

age industry, shipbreaking in some countries is neither covered by the maritime legislative framework nor by normal safety and health legislation and inspection, nor by social protection. This leaves workers more vulnerable.

2.3.4. Shipbreaking locations make the enforcement of laws and regulations difficult

2.3.4.1. Shipbreaking operations are frequently carried out at sites which are difficult to reach, which are dispersed and can change location. Casual, contract or migrant workers typically undertake the work. These factors combine to make the enforcement of laws and regulations more difficult than in other industrial sectors. Many hazards may be attributed to a hostile environment rather than to inadequate requirements compounded by negligent behaviour. Other work practices are based on an opinion as to what is safe and what is not. Laws and regulations cannot be expected to cater for every variable; however, laws should provide a sound basis for safe and healthy work practices. The informal nature and – in some countries or locations – the temporary establishment of shipbreaking sites emphasize the difficulty of implementing all relevant ILO labour standards immediately.

2.3.5. Lack of an inventory of hazardous material; decontamination and gas-freeing; planning for safe demolition; and recycling and safe waste management

2.3.5.1. A ship contains hazardous material, the removal, handling and waste management of which is hazardous both for humans and nature. The demolition process consists of hazardous work tasks. Recycling requires information on the properties of the material handled. Information on hazards and safety measures from international, national and

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shipping sources are needed at the worksite level for safe performance. In the future, all ships should carry a “green passport” which would follow a ship from the day it was built (see Annex IV). At the moment, authorization for dismantling exists but in the future this should only be given to ships which are safe for breaking on arrival. This Certificate for Dismantling would include:

- (a) an updated list of hazardous substances and wastes on the ship to be dismantled provided by the shipowner in accordance with the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and the ICS Industry Code of Practice on Ship Recycling;
- (b) ensuring on the part of owners, brokers and breakers that a ship to be dismantled is decontaminated and gas free for hot work;
- (c) the relevant information (drawings, etc.) necessary for the development of a safe shipbreaking plan. Information, planning, proactive actions and safe management of the demolition process can increase safety substantially. The development of a safe shipbreaking plan is not costly, but can save lives and improve productivity;
- (d) OSH management systems covering continuous safe operations in the ship, the breaking facility and the surrounding area;
- (e) implementation in the shipbreaking industry of relevant conventions and documents on OSH, working and living conditions and the environment;
- (f) provision of appropriate housing, welfare and sanitary facilities for all workers.

2.4. Occupational hazards

2.4.1. Shipbreaking operations expose workers to a wide range of hazards or workplace activities or conditions likely to cause injuries and death, ill health, diseases and incidents. These include:

- (a) hazardous exposures generated, in particular, by asbestos, PCBs, heavy metals and hazardous material and chemicals, excess noise and fire;
- (b) hazardous working conditions (inadequate worker training and fire-protection measures, lack of or improper personal protective equipment (PPE) and lack of appropriate emergency response, rescue and first aid) and a high number of hazardous work activities.

2.4.2. A high number of hazards (as shown in table 1, overleaf, and Annex IV, as a minimum but not limited to these) are likely to cause work-related injuries and death, ill health, diseases and incidents among shipbreakers. They can be grouped as follows:

- (a) hazards with the potential of causing accidents;
- (b) hazardous substances and wastes;
- (c) physical hazards;
- (d) mechanical hazards;
- (e) biological hazards;
- (f) ergonomic and psychosocial hazards;
- (g) general concerns.

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Table 1. Common hazards that are likely to cause work-related injuries and death, ill health, diseases and incidents among shipbreakers

Frequent causes of accidents	
<ul style="list-style-type: none">• Fire and explosion: explosives, flammable materials• Falling objects• Trapping or compression• Snapping of cables, ropes, chains, slings• Heavy objects• Access in progressively dismantled vessels (floors, stairs, passageways)• Electricity (electrocution)• Poor illumination	<ul style="list-style-type: none">• Falls from height inside ship structures or on the ground• Moving objects• Wet surfaces• Sharp objects• Oxygen deficiency in confined spaces• Lack of PPE, housekeeping practices, safety signs• Shackles, hooks, chains• Cranes, winches, hoisting and hauling equipment
Hazardous substances and wastes	
<ul style="list-style-type: none">• Asbestos fibres, dusts• Heavy and toxic metals (lead, mercury, cadmium, copper, zinc, etc.)• Organometallic substances (tributyltin, etc.)• Lack of hazard communication (storage, labelling, material safety data sheets)• Batteries, fire-fighting liquids	<ul style="list-style-type: none">• PCBs and polyvinyl chloride (PVC) (combustion products)• Welding fumes• Volatile organic compounds (solvents)• Inhalation in confined and enclosed spaces• Compressed gas
Physical hazards	
<ul style="list-style-type: none">• Noise• Extreme temperatures	<ul style="list-style-type: none">• Vibration• Radiation (ultraviolet, radioactive materials)

Table 1. Common hazards that are likely to cause work-related injuries and death, ill health, diseases and incidents among shipbreakers (*concl.*)

Mechanical hazards	
<ul style="list-style-type: none"> • Trucks and transport vehicles • Scaffolding, fixed and portable ladders • Sharp-edged and other tools • Power-driven hand tools, saws, grinders and abrasive cutting wheels 	<ul style="list-style-type: none"> • Failure of machinery and equipment • Poor maintenance of machinery and equipment • Lack of safety guards in machines • Structural failure in the ship
Biological hazards	
<ul style="list-style-type: none"> • Toxic marine organisms • Risk of communicable diseases transmitted by pests, vermin, rodents, insects and other animals that may infest the ship 	<ul style="list-style-type: none"> • Animal bites • Vectors of infectious diseases (TB, malaria, dengue fever, hepatitis, respiratory infections, others)
Ergonomic and psychosocial hazards	
<ul style="list-style-type: none"> • Repetitive strain, awkward postures, repetitive and monotonous work, excessive workload • Long working hours, shift work, night work, temporary employment 	<ul style="list-style-type: none"> • Mental stress, anti-social behaviour (aggressive behaviour, alcohol and drug abuse, violence) • Poverty, low wages, under-age workers, lack of education and social environment
General concerns	
<ul style="list-style-type: none"> • Lack of safety and health training • Poor work organization • Inadequate housing and sanitation 	<ul style="list-style-type: none"> • Inadequate accident prevention and inspection • Inadequate emergency, first-aid and rescue facilities • Lack of medical facilities and social protection

PART I. NATIONAL FRAMEWORK

3. General responsibilities, duties and rights, and legal framework

3.1. Responsibilities and duties of competent authorities

3.1.1. Each government should nominate a competent authority or authorities, as appropriate, which should, in consultation with the representative organizations of employers and workers, formulate, implement and periodically review a coherent national policy and principles for safe ship-breaking. Such policy should include:

- (a) the control of the import and preparation of ships for breaking;
- (b) employment and working conditions, OSH, workers' rights and workers' welfare;
- (c) the protection of both persons and the environment in the vicinity of a shipbreaking worksite.

The policy on shipbreaking should form part of an overall policy on OSH and the working environment as required by the Occupational Safety and Health Convention, 1981 (No.155).

3.1.2. The policy should:

- (a) recognize shipbreaking as an official occupation of the national economy;
- (b) aim at preventing illness and injury to health arising from shipbreaking activities through the identification of hazards and the elimination of or exercising control over risks from all existing situations in the working environment;
- (c) be supported by specific laws and regulations and have an effective mechanism of inspection for their enforcement.

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3.1.3. In ensuring a coherent policy and measures for its implementation, the competent authority should identify all relevant stakeholders and:

- (a) establish the respective duties and responsibilities of all national/local authorities, industry stakeholders, labour inspectorates, labour supply agents, employers and workers and their organizations;
- (b) specify the particular responsibilities of shipowners, shipbrokers, owners/lessors of facilities, contractors, manufacturers, designers and suppliers of equipment and substances;
- (c) provide for arrangements appropriate to national conditions and practice to ensure the necessary coordination between the various authorities and bodies called upon;
- (d) specify the requirements regarding the participation of workers and contractors working in shipbreaking activities.

3.1.4. To give effect to the policy, the competent authority should:

- (a) establish control mechanisms for the proper import and preparation of ships for breaking;
- (b) make appropriate arrangements regarding OSH and for social security coverage in shipbreaking facilities;
- (c) establish control mechanisms for waste management and protection of the environment;
- (d) ensure, through appropriate measures such as laws, regulations and inspections, that all shipbreaking workers, irrespective of their employment status:
 - (i) benefit from both protection and regulations comparable with those of other national sectors; and
 - (ii) are subject to the same requirements for prevention;

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- (e) periodically review existing national conditions and practice for eliminating or controlling risks to health with a view to identifying major problems, proposing corrective actions, setting priorities for action, and evaluating results;
- (f) consider changes to national laws and regulations;
- (g) promote a systematic approach in respect of the assessment of hazards, risks and control measures and for appropriate occupational health surveillance;
- (h) implement and monitor systems for:
 - (i) the reporting, recording, notification, investigation and compensation of work-related injuries and diseases, ill health, and incidents (see Chapter 5); and
 - (ii) the progressive development of occupational health services for all shipbreaking workers (see Chapter 6);
- (i) ensure enforcement of national OSH laws and regulations through an adequate and appropriate system of labour inspection;
- (j) specify employment conditions (working time, breaks and leave, payment, etc.) and working arrangements;
- (k) promote the implementation and integration of OSH management systems based on the *ILO Guidelines on occupational safety and health management systems, ILO-OSH 2001*.

3.1.5. The competent authority or a body approved or recognized by it, should establish, review and update exposure limits or other exposure criteria for the evaluation and control of the working environment in accordance with national or internationally recognized technical standards.

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3.1.6. If justified on safety and health grounds, the competent authority should have the power to:

- (a) prohibit or restrict certain hazardous processes or substances; or
- (b) require advance notification and authorization before such processes or substances are used; or
- (c) place restrictions, for reasons of safety and health, on categories of workers engaged in the use of hazardous processes or substances.

3.2. Legal framework

3.2.1. National laws and regulations should:

- (a) ensure the safety and health of workers employed in shipbreaking activities; and
- (b) support the practical implementation of the obligations placed on the competent authority in paragraphs 3.1.3 to 3.1.6 above.

Consistent with national conditions and practice, national laws and regulations should be supplemented in practice by technical standards, codes of practice or authoritative guidance.

3.2.2. National laws and regulations should be adequate and appropriate to the specific type of shipbreaking facilities and workers' status in employment, and should:

- (a) reflect the relevant applicable provisions of documents and information made available by the ILO, the IMO and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal;

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- (b) be so constructed that they take into account technological developments, and new situations and standards;
- (c) specify that the employer of a shipbreaking facility has overall responsibility for the protection of the workers in respect of their safety and health, provides leadership for OSH activities and commits to the following key principles:
 - (i) compliance with the relevant national OSH and other work-related laws and regulations;
 - (ii) protecting the safety and health of all workers within the facility;
 - (iii) ensuring that workers and their representatives are consulted and encouraged to participate actively in OSH matters;
 - (iv) installing, maintaining and continually improving work systems and methods which are safe and without risk to health.

3.3. Duties of labour inspectorates

3.3.1. Labour inspectorates should:

- (a) periodically carry out inspections in the presence of the employers' and workers' representatives, and monitor compliance with and enforce all relevant laws and regulations at shipbreaking facilities;
- (b) advise employers and their workers on the safe performance of activities, particularly on the choice and use of safe working methods and appropriate PPE;
- (c) monitor the safety requirements and performance of comparable national or international shipbreaking

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facilities to provide feedback for further development and improvement of safety measures;

- (d) participate, in cooperation with the recognized organizations of employers and workers, in formulating and updating safety rules and measures to be adopted at national and enterprise levels.

3.3.2. Labour inspectors should:

- (a) be competent to deal with the special problems associated with shipbreaking and able to provide support and advice;
- (b) notify the findings of inspections to the concerned personnel, safety and health committees or worker representatives, for the implementation of required remedial action;
- (c) periodically determine whether an existing OSH management system or OSH elements are in place, adequate and effective.

3.3.3. The rights, procedures and responsibilities of labour inspectors should be communicated to all affected parties.

3.4. General responsibilities of employers

3.4.1. Occupational safety and health and the protection of the working and living environment should be the overall responsibility and duty of the employer of the shipbreaking facility, as prescribed by national laws and regulations. The employer should show strong leadership and commitment for OSH activities, which may be exercised through the establishment of an OSH management system specifically designed

for the shipbreaking facility (see Chapter 4 and Annex III of these guidelines).

3.4.2. Employers should:

- (a) make arrangements for the identification and periodic assessment of the hazards and risks to safety and health from hazardous ambient factors at each permanent or temporary workplace, generated by the use of different operations, tools, machines, equipment and substances;
- (b) implement appropriate preventive and protective measures required to prevent those hazards and risks, or to reduce them to the lowest reasonable and practicable level, in conformity with national laws and regulations.

3.4.3. These arrangements should:

- (a) be in conformity with the provisions of national laws and regulations and recommendations contained in these guidelines;
- (b) be specific to the facility and appropriate to its size and nature of its activities;
- (c) form the essential elements of a successful OSH management system in the shipbreaking facility.

3.4.4. Employers should comply with the safety and health measures identified or arising from:

- (a) international conventions, codes of practice or guidelines, as appropriate;
- (b) national laws and regulations, technical standards, codes of practice and authoritative guidance (see paragraphs 3.2.1 and 3.2.2 of these guidelines); and

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- (c) any voluntary programmes or agreements to which the enterprise subscribes, as prescribed, approved or recognized by the competent authority.

3.4.5. In accordance with national laws and regulations, employers should:

- (a) provide and maintain workplaces, equipment, tools and machinery safe and without risk to health, and organize work to eliminate or control hazardous ambient factors at work;
- (b) make the necessary arrangements to provide for:
 - (i) adequate and competent supervision of work and work practices;
 - (ii) the application and use of appropriate control measures and the periodic review of their effectiveness;
 - (iii) appropriate and periodic OSH education and training to workers and, where appropriate, to their representatives; and
 - (iv) regular workers' health surveillance (see Annex I), where necessary, and surveillance of the working environment (see Annex II);
- (c) set up arrangements to deal with work-related injuries and diseases, ill health and incidents which may involve hazards or risks to safety and health.

3.5. General duties of workers

3.5.1. Workers should have the duty, in accordance with their training and the instructions and means given by their employers:

- (a) to comply with prescribed safety and health measures;
- (b) to take all reasonable steps to:

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- (i) secure their personal safety and that of any other person who may be at risk as a result of their acts or omissions at work;
- (ii) take all reasonable steps to eliminate or control hazards or risks to themselves and to others, including proper care and use of PPE and protective clothing, facilities and equipment placed at their disposal for this purpose;
- (c) to report forthwith to their immediate supervisor, without detriment to themselves, any situation which they have reasonable justification to believe presents an imminent and serious danger to their life or health or that of other persons, and which they cannot properly deal with themselves;
- (d) to report to the responsible supervisor or manager any accident or injury to health which arises in the course of or in connection with work;
- (e) to cooperate with the employer and other workers to permit compliance with the duties and responsibilities placed on the employer and workers pursuant to national laws and regulations.

3.6. Rights of workers

3.6.1. In accordance with national laws and regulations, workers should have the right:

- (a) to bring to the attention of their representatives, the employer or the competent authority hazards or risks to safety and health from ambient factors at work;
- (b) to appeal (without prejudice or detriment to themselves) to the competent authority or labour inspectorates, if

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they consider that the measures taken and the means employed by the employer are inadequate for the purposes of ensuring safety and health at work, or if they believe that the employer is failing to comply with laws, regulations and codes of practice regarding safety and health;

- (c) to remove themselves from danger when they have reasonable justification to believe that there is an imminent and serious risk to their safety and health. Such workers should inform their supervisor immediately and should not be required to return to the work situation until the matter has been rectified;
- (d) to adequate medical treatment and compensation for occupational injuries and diseases, and to compensation for permanent disability or death as a consequence of such diseases or injuries;
- (e) to refrain from using equipment or a process or substance which can reasonably be expected to be hazardous, if the relevant information is not available to assess the hazards or risks to safety and health;
- (f) to refrain from operating or interfering with tools, machines and equipment that they have not been duly authorized to operate, maintain or use.

3.6.2. Workers should have the right to appropriate medical examination without cost to themselves, where they have good grounds to believe that an activity or a work situation might have caused an injury to health. This medical examination should be provided irrespective of any medical examination for detection of occupational diseases. Workers should be informed in a timely, objective and comprehensible manner of the results of the examinations.

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3.6.3. Workers should have the right to elect or appoint, as specified by national laws, regulation and practice, their representatives as a means to achieve worker participation.

3.6.4. Workers and their representatives should:

- (a) be consulted regarding any hazards or risks to safety and health at work;
- (b) inquire into and receive information from the employer regarding any hazards or risks to safety and health from hazardous ambient factors at work. This information should be provided in forms and languages easily understood by the workers;
- (c) request and be involved in the assessment of hazards and risks to safety and health from hazardous ambient factors to be conducted by the employer and by the competent authority, and in relevant control measures and investigations;
- (d) be involved in the inception, development and implementation of workers' health surveillance.

3.6.5. Workers should receive training and, where necessary, retraining in forms and languages easily understood by them and in the most effective methods available to minimize risks to safety and health.

3.7. General responsibilities of suppliers, manufacturers and designers

3.7.1. Measures should be taken, in accordance with national laws and regulations, to ensure that those who design, manufacture, import, provide or transfer machinery, equipment or substances for use in shipbreaking operations:

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- (a) satisfy themselves that the machinery, equipment or substances do not entail dangers for the safety and health of those using them correctly;
- (b) make available:
 - (i) information concerning the correct installation and use of machinery and equipment and the correct use of substances;
 - (ii) information concerning the hazards of machinery and equipment, the dangerous properties of hazardous substances and physical agents or products;
 - (iii) instructions on how known hazards are to be avoided.

3.7.2. Those responsible for the design and construction of shipbreaking facilities and workplaces should ensure, in close cooperation with specialists, that:

- (a) the levels of hazardous ambient factors from shipbreaking facilities and processes be minimized and they conform to nationally recognized standards; and
- (b) their design promote a safe and healthy working environment.

3.8. General responsibilities and rights of contractors

3.8.1. Contractors should comply with the arrangements established by the shipbreaking facility on site which should:

- (a) include OSH criteria in procedures for evaluating and selecting contractors;
- (b) establish effective ongoing communication and coordination between appropriate levels of the facility and the contractor prior to commencing work. This should

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include provisions for communicating hazards and the measures to prevent and control them;

- (c) include arrangements for reporting of work-related injuries and diseases, ill health and incidents among the contractors' workers while performing work for the facility;
- (d) provide relevant workplace safety and health hazard awareness and training to contractors or their workers prior to commencing work and as work progresses, as necessary;
- (e) regularly monitor OSH performance of contractor activities on site; and
- (f) ensure that on-site OSH procedures and arrangements are followed by the contractor(s).

3.8.2. When using contractors, the commissioning party should ensure that:

- (a) the same safety and training requirements apply to the contractors and their workers as to the workers in the establishment;
- (b) where required, only such contractors are used that have been duly registered or hold licences;
- (c) contracts specify safety and health requirements as well as sanctions and penalties in case of non-compliance. Contracts should include the right for supervisors mandated by the commissioning party to stop work whenever a risk of serious injury is apparent and to suspend operations until the necessary remedies have been put in place;
- (d) contractors who repeatedly violate their contractual obligations are excluded from future bidding.

3.9. Cooperation

3.9.1. In accordance with national laws and regulations, measures for cooperation relating to the elimination or control of risks to safety and health from hazardous ambient factors should be taken, including the following:

- (a) employers, in discharging their responsibilities, should cooperate as closely as possible with workers and/or their representatives;
- (b) workers should cooperate as closely as possible with their fellow workers and their employers in the discharge by the latter of their responsibilities and should comply with all prescribed procedures and practices;
- (c) suppliers should provide employers with such information as is available and required for the evaluation of any unusual hazards or risks to safety and health which might result from a particular hazardous ambient factor at work.

3.9.2. Whenever two or more service contractors engage in activities on the same project at one worksite, the employers should cooperate with each other, as prescribed by the national competent authority. Cooperation should include mutual information on hazards to safety and health arising from their activities, the coordination of measures for protection against these hazards and clear arrangements for supervision.

3.9.3. With a view to ensuring the elimination or control of hazards or risks to safety and health, employers, workers and their representatives should cooperate as closely as possible in the application both of the measures provided by these guidelines and of the provisions of, in particular, the

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Working Environment (Air Pollution, Noise and Vibration) Convention (No. 148) and Recommendation (No. 156), 1977; the Occupational Safety and Health Convention (No. 155) and Recommendation (No. 164), 1981; the Occupational Health Services Convention (No. 161) and Recommendation (No. 171), 1985; the Chemicals Convention (No. 170) and Recommendation (No. 177), 1990, and further relevant ILO standards as indicated in the Bibliography.

4. Occupational safety and health management

4.1. Introduction

4.1.1. The process of improving working conditions at a shipbreaking facility must be approached systematically in order to bring these up to reasonable standards. With a view to achieving acceptable environmentally sound conditions of occupational safety and health, it is necessary to invest in permanent structures for their continuous review, planning, implementation, evaluation and action. This should be done through the implementation of OSH management systems. The systems should be specific to the facilities and appropriate to their size and the nature of activities. Their design and application at national and facility levels should be guided by the *ILO Guidelines on occupational safety and health management systems, ILO-OSH 2001*. Further information is given in Annex III.

4.1.2. Typically, an OSH management system should contain the following main elements:

- (a) OSH policy;
- (b) necessary conditions for the executing organization, i.e. establishment of responsibility and accountability, competence and training, documentation, communication and information;
- (c) hazard and risk assessment, planning and implementation of OSH activities;
- (d) evaluation of OSH performance and action for improvement.

4.2. Occupational safety and health policy

4.2.1. The OSH policy for the shipbreaking facility should include, as a minimum, the following key principles and objectives to which the facility is committed:

- (a) management commitment to, and leadership of, the occupational safety, health and environmental programmes;
- (b) recognizing OSH as an integral part of the overall management structure and OSH performance as an integral part of the facility's business performance;
- (c) protecting the safety and health of all members of the facility by preventing work-related injuries and diseases, ill health and incidents;
- (d) complying with relevant OSH national laws and regulations, voluntary programmes, collective agreements on OSH and other requirements to which the facility subscribes;
- (e) ensuring that workers and their representatives are consulted and encouraged to participate actively in all elements of the OSH management system; and
- (f) continual improvement of the performance of the OSH management system.

4.3. Initial review

4.3.1. Before works begin, an initial review should be carried out by competent persons, in consultation with workers and their representatives, as appropriate. It should:

- (a) identify the necessary work procedures and the associated hazards;

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- (b) assess the risks to safety and health arising from the existing or proposed work environment or work organization;
- (c) identify the current applicable national laws and regulations, national guidelines, specific guidelines, voluntary programmes and other relevant requirements for the activities to be carried out;
- (d) determine whether planned or existing controls are adequate to eliminate hazards or control risks; and
- (e) analyse other available data, in particular data provided from workers' health surveillance (see Annex I), the surveillance of the working environment (see Annex II) and active and reactive monitoring, if available.

4.3.2. The initial review should be used in the systematic development of safety arrangements in shipbreaking and as the base for planning and practical implementation of the OSH policy. Due to the changing nature of the shipbreaking process, a review should be carried out on every ship to develop a ship-specific safe breaking plan (see section 7.2).

4.4. Hazard identification and risk assessment, and preventive and protective measures

4.4.1. For works which by their very nature expose workers to hazardous chemical, physical or biological factors, psychosocial factors and climatic conditions, arrangements should be made for the identification and periodic assessment of these hazards and risks to safety and health at each permanent or temporary workplace in both the facility and every new incoming ship, generated by the use of different operations, tools, machines, equipment and substances. This review, together with other available data, should be used for the development of a safe shipbreaking plan.

4.4.2. Employers should plan and implement appropriate preventive and protective measures required to prevent the identified hazards and assessed risks, or reduce them to the lowest reasonable and practicable level, in conformity with national laws and regulations.

4.4.3. Preventive and protective measures should be implemented in the following order of priority:

- (a) eliminate the hazard/risk;
- (b) control the hazard/risk at source, through the use of engineering controls or organizational measures;
- (c) minimize the hazard/risk by the design of safe work systems, which include administrative control measures; and
- (d) where residual hazards/risks cannot be controlled by collective measures, the employer should provide for appropriate PPE, including protective clothing, at no cost to workers, and should implement measures to ensure its use and maintenance.

4.5. Planning and implementation

4.5.1. Based on the results of the initial review, subsequent reviews or other available data, arrangements should be made for adequate and appropriate OSH planning, which should include:

- (a) a clear definition, priority setting and quantification, where appropriate, of the OSH objectives for the reduction of existing risks to as low a level as possible;
- (b) the preparation of a plan for achieving each objective, with defined responsibility and clear performance criteria indicating what is to be done by whom and when;

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- (c) the selection, planning and implementation of corresponding preventive and protective measures;
- (d) the selection of measurement criteria for confirming that the objectives are achieved;
- (e) the provision of adequate resources, including human and financial resources and technical support, as appropriate.

4.5.2. A thorough planning and implementation process should contribute to a continual improvement of the OSH performance.

4.6. Emergency preparedness

4.6.1. Emergency prevention, preparedness and response arrangements should be established and maintained. These arrangements should identify the potential for accidents and emergency situations, and address the prevention of OSH risks associated with them. Arrangements should be made according to the location and environment of the ship-breaking facility and also take into account the size and nature of activities associated with each shipbreaking operation. They should:

- (a) ensure that the necessary information, internal communication and coordination are provided to protect all people in the event of an emergency at the facility;
- (b) provide information to, and communication with, the relevant competent authorities, and the neighbourhood and emergency response services;
- (c) address first-aid and medical assistance, fire-fighting and evacuation of all people at the facility; and

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- (d) provide relevant information and training to all members of the shipbreaking facility, at all levels and according to their competence, including regular exercises in emergency prevention, preparedness and response procedures.

5. Reporting, recording and notification of work-related injuries and diseases, ill health and incidents

5.1. General provisions

5.1.1. In the establishment, review and application of systems for the reporting, recording and notification of work-related injuries and diseases, ill health and incidents (see Glossary for the assigned meanings), the competent authority should take account of the Employment Injury Benefits Convention, 1964 (No. 121), and its Schedule I, as amended in 1980, the ILO Protocol of 2002 to the Occupational Safety and Health Convention, 1981 (No. 155), the List of Occupational Diseases Recommendation, 2002 (No. 194), and the ILO code of practice *Recording and notification of occupational accidents and diseases*.

5.1.2. Reporting, recording, notification and investigation of work-related injuries and diseases, ill health and incidents are essential for reactive monitoring and should be undertaken to:

- (a) provide reliable information about occupational accidents and diseases at facility and national level;
- (b) identify major safety and health problems arising from shipbreaking activities;
- (c) define priorities of action;
- (d) evolve effective methods for dealing with occupational accidents and diseases;
- (e) monitor the effectiveness of measures taken to secure satisfactory levels of safety and health.

Reporting, recording and notification of work-related injuries

5.1.3. By national laws or regulations or any other method consistent with national conditions and practice, the competent authority should:

- (a) specify which categories or types of work-related injuries and diseases, ill health and incidents are subject to requirements for reporting, recording and notification; these should comprise, as a minimum:
 - (i) all fatal accidents;
 - (ii) occupational accidents causing loss of working time, other than insignificant loss;
 - (iii) all occupational diseases included in a national list of work-related diseases;
- (b) establish and apply uniform requirements and procedures for facility-level reporting and recording of work-related injuries and diseases, ill health, incidents and cases and suspected cases of diseases by employers and workers, physicians, health services and other bodies, as appropriate;
- (c) establish and apply uniform requirements and procedures for the notification of prescribed data, and specify, in particular:
 - (i) the respective information to be notified to the competent authority, insurance institutions, labour inspectorates, health services and other authorities and bodies directly concerned, as appropriate;
 - (ii) the timing of the notification; and
 - (iii) the prescribed standardized form of notification to be used;
- (d) make appropriate arrangements for the necessary coordination and cooperation between the various national

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authorities and bodies and when two or more enterprises engage in activities simultaneously at one workplace;

- (e) make appropriate arrangements for guidance to be provided to employers and workers to help them comply with the legal obligations;
- (f) apply these requirements and procedures to all workers in all shipbreaking activities, regardless of their status in employment.

5.1.4. For the purpose of prevention, recording, notification and, if applicable, compensation, a national list of occupational diseases should be established by the competent authority, in consultation with the most representative organizations of employers and workers, by methods appropriate to national conditions and practice, and by stages as necessary. This prescribed list of occupational diseases should:

- (a) take account of the diseases enumerated in Schedule I of the Employment Injury Benefits Convention, 1964 (No. 121), as amended in 1980; and
- (b) comprise, to the extent possible, other diseases contained in the List of Occupational Diseases Recommendation, 2002 (No. 194), or relevant updated lists.

5.1.5. In accordance with national laws or regulations, the employer should ensure that arrangements are made within the facility which are capable of satisfying the requirements to record and notify information in connection with:

- (a) the system for benefits in case of occupational injury and occupational disease; and
- (b) the system for the recording and notification of work-related injuries and diseases, ill health and incidents.

Reporting, recording and notification of work-related injuries

5.1.6. Workers and their representatives in the facility should be given appropriate information by the employer about the arrangements for:

- (a) the recording and notification of information required for benefits in the case of occupational injury and occupational disease; and
- (b) the reporting, recording and notification of work-related injuries and diseases, ill health and incidents.

5.2. Reporting at the level of the facility

5.2.1. The employer, after consultation with the workers or their representatives in the enterprise, should set up arrangements, in accordance with national laws or regulations, to enable workers to comply with the requirements to report:

- (a) forthwith to their immediate supervisor, without detriment to themselves, any situation which they have reasonable justification to believe presents an imminent and serious danger to life or health;
- (b) any occupational injury, suspected case of work-related injuries and diseases, ill health and incidents, as appropriate.

5.3. Recording at the level of the facility

5.3.1. The employer should ensure that records of work-related injuries and diseases, ill health and incidents are available and readily retrievable at all reasonable times. In cases in which more than one worker is injured in a single occupational accident, a record should be made for each of the injured workers.

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5.3.2. Workers' compensation insurance reports and accident reports to be submitted for notification should be acceptable as records if they contain all the facts required for recording or are supplemented in an appropriate manner.

5.3.3. For inspection purposes and as information for workers' representatives and health services, employers should prepare records within a period of time to be determined by the competent authority.

5.3.4. Workers in the course of performing their work should cooperate with the employer in carrying out the arrangements within the facility for recording and notification of work-related injuries and diseases, ill health and incidents.

5.3.5. The employer should give appropriate information to workers and their representatives concerning:

- (a) the arrangements for recording; and
- (b) the competent person identified by the employer to receive and record information on work-related injuries and diseases, ill health and incidents.

5.3.6. The employer should provide appropriate information to workers or their representatives on all work-related injuries and diseases, ill health and incidents in the facility as well as commuting accidents, to help workers and employers reduce the risk of exposure to similar events.

5.4. Notification of work-related injuries

5.4.1. All occupational accidents should be notified to the family of the accident victim, which should be informed as soon as possible, and, as required by national laws or regula-

Reporting, recording and notification of work-related injuries

tions, to the competent authority, the labour inspectorate, the appropriate insurance institution or any other body:

- (a) immediately after the reporting of an occupational accident causing loss of life;
- (b) within a prescribed time for other occupational accidents.

5.4.2. Notification should be made within such time as may be specified, and in prescribed specific standardized forms or formats, such as:

- (a) an accident report for the labour inspectorate;
- (b) a compensation report for the insurance institution;
- (c) a report for the statistics-producing body; or
- (d) a single form which contains all essential data for all bodies.

5.4.3. With a view to meeting the requirements of labour inspectorates, insurance institutions and the statistics-producing body, the forms prescribed in either a specific or single format should include at least the following minimum information on:

- (a) facility and employer;
- (b) injured person (name, address, sex and age; employment status; occupation);
- (c) type, nature and location of injury;
- (d) accident and its sequence (geographical location of the place of the accident; date and time; action leading to injury; type of accident).

5.4.4. National laws or regulations should provide for the specification of the relevant necessary information to be

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notified for commuting accidents and of more detailed information, if available.

5.5. Notification of occupational diseases

5.5.1. National laws or regulations should specify that notification of occupational diseases include at least the following information:

- (a) facility and employer;
- (b) person affected by the occupational disease (name; employment status; occupation at the time when the disease was diagnosed; length of service with present employer);
- (c) occupational disease (name and nature; harmful agents, processes or exposure; description of work; length of exposure; date of diagnosis).

6. Occupational health services

6.1. Consistent with the Occupational Health Services Convention (No. 161) and Recommendation (No. 171), 1985, the competent authority should make provision for the establishment of occupational health services:

- (a) by laws or regulations; or
- (b) by collective agreements or as otherwise agreed upon by the employers and workers concerned; or
- (c) in any other manner approved by the competent authority after consultation with the representative organizations of employers and workers concerned.

6.2. Occupational health services may be organized as a service for a single facility or as a service common to a number of facilities, as appropriate, and by:

- (a) facilities or groups of facilities concerned;
- (b) public authorities or official services;
- (c) social security institutions or any bodies authorized by the competent authority.

6.3. The employer should provide for the setting up of or access to an occupational health service whose basic function, objective and operation in the establishment should be preventive and supportive to the employer, in particular regarding:

- (a) the identification and assessment of the risks from health hazards in the workplace;
- (b) surveillance of the factors in the working environment (see Annex II) and working practices which may affect workers' health, including sanitary installations, canteens and housing where these facilities are provided by the employer;

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- (c) advice on planning and organization of work, including the design of workplaces, on the choice, maintenance and condition of machinery and other equipment and on substances used in work;
- (d) participation in the development of programmes for the improvement of working practices as well as testing and evaluation of health aspects of new equipment;
- (e) advice on occupational health, safety and hygiene and on ergonomics and personal and collective protective equipment;
- (f) surveillance of workers' health in relation to work (see Annex I);
- (g) the adaptation of work to the worker;
- (h) the contribution to measures of vocational rehabilitation;
- (i) collaboration in providing information, training and education in the fields of OSH, hygiene and ergonomics;
- (j) the organizing of first aid and emergency treatment;
- (k) participation in analysis of work-related accidents and diseases.

6.4. A multiplicity of health hazards is present in ship-breaking work and every effort should be made to promote awareness of this fact and of the need to safeguard health.

6.5. All workers should be subject to health surveillance which should be provided in line with the ILO *Technical and ethical guidelines for workers' health surveillance* and as prescribed by national laws and regulations. These guidelines require arrangements, in particular regarding the following activities (see Annex I):

- (a) organization of workers' health surveillance at different levels;
- (b) health assessments and collection, analysis and evaluation of information;
- (c) pre-assignment, regular and post-employment medical examinations;
- (d) use of the results and records of workers' health surveillance.

6.6. The surveillance of the working environment and planning of safety and health precautions should be performed in line with requirements in Annex II of these guidelines and as prescribed by national laws and regulations.

6.7. Whenever new ships or equipment are introduced and new working methods are needed, special attention should be paid to informing and training workers with respect to the implications for safety and health.

PART II. SAFE SHIPBREAKING OPERATIONS

7. Operational planning

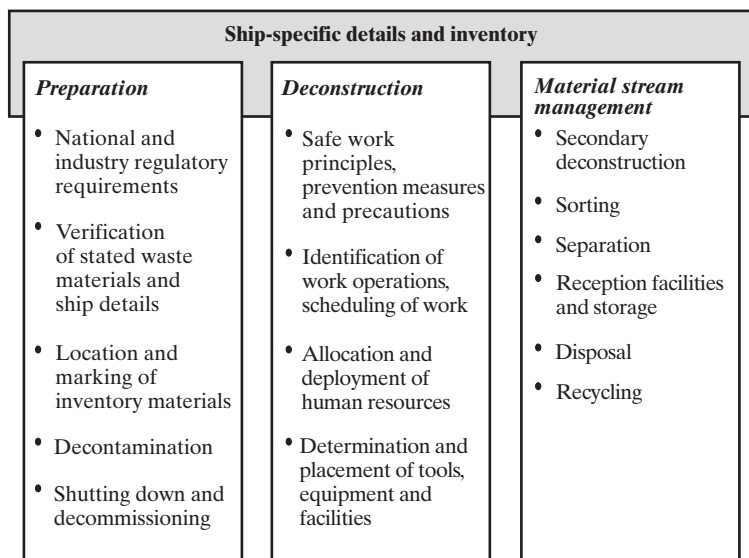
7.1. General requirements

7.1.1. The breaking of a ship can be divided into the three core phases – preparation, deconstruction and material (scrap) stream management – these may be further subdivided to identify the constituent work processes. By segmenting the shipbreaking process, individual tasks and consequently the tasks hazardous to the safety and health of workers can be more easily identified and quantified. The breaking of a ship using this approach can therefore be undertaken in a controlled and managed manner so that the safety and health of workers can be protected by eliminating or minimizing any risks involved with the work to be undertaken. An example of this type of approach is shown in the model safe shipbreaking plan (figure 1). The plan becomes ship-specific when a particular ship's details are applied to it.

7.1.2. The safe execution of each core phase is dependent on safe working practices and processes being adopted and the provision of advance information concerning the physical characteristics of the ship and the dangers presented by wastes – hazardous and otherwise – remaining on board or inherent in the vessel when presented for breaking. In this regard, an inventory of materials together with details of the ship in the form of drawings, plans, logbooks detailing tank dispositions, etc., are essential if the deconstruction is to be planned and conducted in a safe manner. The “green passport” system (see below) would provide some of the information required, but reliance solely on this information may lead to other aspects of the workplan being overlooked.

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Figure 1. Model safe shipbreaking plan



7.1.3. In all instances involving the deconstruction of ships, shipbreakers must prepare plans in advance to ensure the safety and health of workers. The three core phases approach is one of many systemized approaches which can be adopted and used to develop a safe shipbreaking plan. Indeed, a shipbreaker may choose to follow a plan that embraces the requirements of the *Guidelines on occupational safety and health management systems, ILO-OSH 2001* (see Chapter 4) or other management system that encompasses protection of the safety and health of workers. Whichever system is employed, advance information and planning is essential to safeguard the safety and health of those engaged in

the various physically demanding operations. Since ship-breaking is a complex business, it is essential that all work systems should be documented – copies of the relevant sections should be made available to the workers in a language they understand.

7.1.4. A safe shipbreaking plan should also be a means to systematically improve working conditions through the review process. The benefits of planning shipbreaking operations include reductions in work-related accidents and increased productivity by the adoption of safe work practices and the associated psychological assurances borne out of knowing control is being exercised in the workplace.

7.1.5. Shipbreakers must promote a “safety first” culture and reassure workers by providing health services, workers’ health surveillance (see Annex I), surveillance of the working environment (see Annex II) and other welfare and social security benefits.

7.1.6. All workers need to receive induction and basic safety training in safe working procedures and be issued with relevant PPE and protective clothing, when occasions demand. Trained workers with tested competence and specialized skills should be used in demanding and hazardous work.

7.1.7. Plans and actions for prevention of fires should be developed and regularly implemented. The advance of the rough demolition process should be preceded with inspections and fire prevention action. Trained fire-fighting teams should be present at all times when work is in progress.

7.1.8. Emergency procedures, escape routes and rescue plans should be developed and rehearsed for fires, explosions, releases of hazardous chemicals and suffocation.

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7.1.9. A plan on the sequence of rough demolition – safe shipbreaking plan – should be made to enable safety and prevention teams to take proactive measures to prevent exposure, accidents and emergencies. A monitoring and roaming safety inspection team(s) should be established and persons appointed to take proactive measures and intervene to avoid hazardous occurrences.

7.1.10. It should be noted that the “model safe shipbreaking plan” mentioned in paragraph 7.1.1 above, shipbreaking schedules (section 7.2) and risk assessment methods (Annex V) are provided solely for the purpose of example. They are intended to indicate that a logical and systematic approach must be applied to shipbreaking operations if work is to be carried out safely with due protection of workers from the inherent occupational hazards.

7.2. Safe shipbreaking plans and schedules

7.2.1. Model plans

7.2.1.1. Safe shipbreaking plans should be developed by competent persons that possess a thorough knowledge of safe shipbreaking practices and procedures, including precautionary and preventive measures necessary to safeguard the safety and health of workers. Model plans may be developed with input in the initial stages from managers and supervisors and then adapted for specific ships as information and details for each ship is acquired. As the plan is developed, input from specialists and contractors, according to the specific ship to be broken and who are likely to become involved in the actual operation, should be sought.

7.2.1.2. All safe shipbreaking plans should encompass, inter alia, the following principal planning activities:

- (a) determination of the necessary operational work procedures/process for the breaking as a whole and for each of the core phases;
- (b) identification of operational work procedures/processes and the attendant associated hazards and the assessment of risks for each;
- (c) selection of appropriate and adequate preventive and protective measures for each procedure/process, using information on OSH measures from international, national and ship-related sources, as appropriate; consideration of any additional requirements such as responsibility, accountability, supervision, competence and training, OSH requirements for purchasing, leasing and contracting specifications.

Safe breaking of a ship requires shipbreakers to plan their operations in advance and continually review such plans as operations are carried out and completed.

7.2.1.3. With regard to the model shown in figure 1, the first stage of developing a safe shipbreaking plan begins with obtaining ship-specific details and a materials inventory. In this respect, two documents should be obtained prior to the arrival of a vessel, viz:

- (a) Certificate for Dismantling – as described in 2.3.5 of this document; and
- (b) the “green passport” – adopted by IMO Assembly resolution No. A.962(23) – consists of an inventory of all the materials potentially hazardous to human health or the environment on board the vessel when it arrives at

the shipbreaking facility (see Annex IV and Glossary). It would be compiled during building (and maintained during the life of the ship) or following an inspection while the vessel is in service.

7.2.1.4. Whether or not a Certificate for Dismantling and/or “green passport” is available, as a minimum the shipbreaker should, in every case, before any physical breaking takes place:

- (a) obtain an updated list of hazardous substances on the ship to be dismantled provided by the shipowner in accordance with the provisions of the Basel Convention and the ICS Industry Code of Practice on Ship Recycling;
- (b) confirm that owners, brokers and breakers have ensured that a ship to be dismantled is gas free for hot work and decontaminated;
- (c) ensure that the relevant information (ship’s drawings, plans, etc.) necessary for the development of a safe ship-breaking plan is available.

The above information is crucial for the development of a safe shipbreaking plan and for breaking operations to be carried out through the observance of safe processes and procedures. Such information forms the basis of the plan, the first inclination and means of identifying which hazards are present and where, and the implementation of the primary preventive and protective measures.

7.2.1.5. To support the core phases of the ship-specific breaking plan, shipbreaking schedules should be developed, compiled from information concerning the various processes to be undertaken and according to the sequential order of the work to be carried out. To save time and ensure their completeness, the compiling of schedules should start as soon as

information on the ship becomes available, preferably before the ship is presented at the shipbreaking facility. The main elements for each core phase are presented in figure 2 below.

7.2.1.6. A shipbreaking schedule should:

- (a) be prepared for each core phase with each element identified as indicated in figure 2; and
- (b) act as a progress sheet that can be marked as the work advances.

7.2.1.7. In accordance with figure 3, shipbreaking schedules should identify, individually:

- (a) each main process (work to be carried out);
- (b) all sub-processes;
- (c) the appropriate risk assessment information (risk factors);
- (d) details of the safe work prevention measures; and
- (e) details of any special safety measures to be implemented.

Pertinent information from realized risk assessments (see an example of a model risk assessment form in Annex V) should be shown in the appropriate risk factor column in figure 3 so that schedules provide as much detail as possible, avoiding the need to resort to supplementary documentation. In the event that the risk assessment of a process requires stringent and specific safety prevention and precaution measures to be in place before starting work, the schedule should indicate the risk assessment document number (as the example shown in figure 3 – “Report No. 15”). Generic risk assessments may be used to make preliminary assessments, but these should be updated when the verification/survey of the vessel is carried out.

Figure 2. Elements for the development of shipbreaking schedules for each core phase

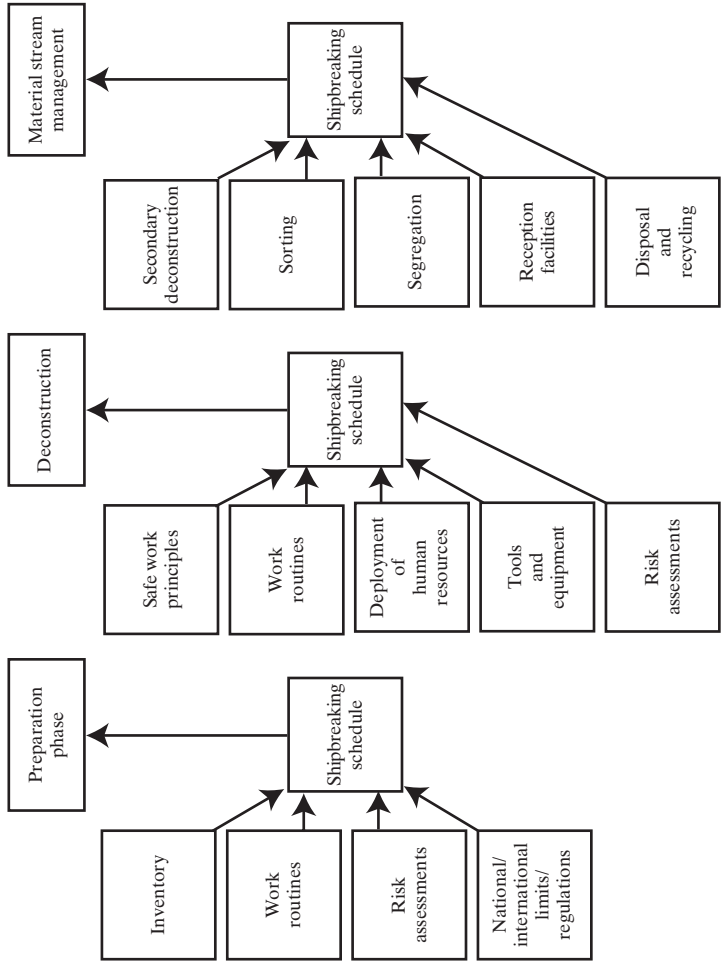


Figure 3. Model shipbreaking schedules for the three core phases

Shipbreaking schedule – Material stream management						Page No. 1
Shipbreaking schedule – Deconstruction						Page No. 1
Shipbreaking schedule – Preparation						Page No. 1
Item No.	Process	Sub-process	Risk factor	Safe work prevention measures	Special safety measures	
1	National and industry regulations	Identification of applicable regulations	Not applicable	Dependent on regulations for ship type	Not applicable	
2	Verification and survey	Confirm ship and waste materials	See individual reports	Check gas free certificates before surveying tanks. Check hazards from cargo residues	At least three persons in the verification team	
3	Location and marking of inventory materials	Marking tanks containing hazardous materials	Low	PPE to be used	Not applicable	
4	Decontamination	Gas freeing tanks	Report No. 15 RF – 20			
5	Decontamination					

7.2.2. Preparation phase

7.2.2.1. Within the preparation phase – before a vessel arrives and up to the time when deconstruction operations actually begin – the following elements should be addressed:

- (a) international, national and industry regulations and guidelines: these include the owner/vendor's compliance with IMO guidelines on ship recycling, the technical guidelines for the environmentally sound management of the full and partial dismantling of ships of the Basel Convention, ICS Industry Code of Practice on Ship Recycling, national guidelines on OSH, or any equivalent regulatory or code of practice requirements;
- (b) verification and survey: to include verification of the stated facts in the “green passport” or other inventory of materials document or arrangements to survey the ship if no inventory is provided. This includes the realization of the initial review (see also section 4.3) and the analysis of other available data, in particular that provided from workers' health surveillance, the surveillance of the working environment, active and reactive monitoring and risk assessment reviews, if available;
- (c) location and marking of inventory materials: details covering hazardous wastes should be located and, if possible, clearly and distinctly marked on the ship and identified on the safe shipbreaking schedules and any working drawings, plans, instructions to subcontractors etc., to ensure all workers are aware of the hazards posed;
- (d) decontamination: plans to arrange for and carry out any residual gas freeing, cleaning of tanks/compartments and removal of any cargo residues (chemical or otherwise posing a hazard);

- (e) shutting down and decommissioning: requirements that include the shutting down or decommissioning of hydraulic systems, boilers, fire protection systems, fuel oil and electrical systems such as generators and incinerators, freshwater systems, feed tanks and associated fittings.

7.2.2.2. Verification of the stated compliance documents should be carried out in the preparation phase to ensure there are no deficiencies in the information being provided or declared. Such verifications may involve comparing prescribed documents against what has actually been provided. Where errors, omissions or variations appear these should be carefully noted and any differences should be resolved before releasing any of the schedules to the workforce. Extra care needs to be exercised when verifying inventories that contain details of waste materials or other hazardous materials that remain on board the ship.

7.2.2.3. Every endeavour should be made to locate the waste and hazardous materials mentioned in the inventory. Such identification may be in the form of annotating the ship's general arrangement plan (GA plan – see Glossary) with details of the materials and, subsequently, physically marking the ship immediately on arrival or at handover to the breakers. All materials mentioned in the inventory must be accounted for and any errors and omissions (quantities and/or commodities) reconciled before any attempt is made to remove wastes or materials posing a hazard. An annotated and approved copy of the inventory should always be maintained with the schedule for reference in case of accidents and for counting off the materials that are eventually removed from the ship. The person who prepared and is responsible for the schedule should be indicated.

7.2.2.4. Decontamination of spaces and equipment requires the identification of the individual compartments and items of equipment together with the detailed arrangements for completing each process. The schedules and the general arrangement plan, or a copy for exclusive use with the decontamination process, should show clearly those areas, spaces and equipment requiring screening before work commences. Decontamination (removal of hazardous contaminants) includes such activities as gas freeing, cleaning, removal of chemical/cargo residues, etc.

7.2.2.5. Systems used in delivering or operating a ship awaiting delivery to breakers must be shut down and decommissioned before breaking commences. Typically, these systems will include the shutting down and decontamination of hydraulic systems, boilers, fire protection, fuel oil and electrical systems, incinerators, freshwater evaporator systems, tanks and fittings, etc. In all cases competent personnel with the requisite technical knowledge and skills to perform the task safely must carry out these operations. Ideally, these should be identified in the respective shipbreaking schedule.

7.2.2.6. Access to confined spaces, hot work, etc. should not be permitted before the identification and marking of hazardous material and chemical decontamination has taken place. Ensuring the gas-free state of tanks must be done before work commences. Removal of hazardous material should be organized to diminish exposure to workers, especially workers not directly involved in the removal process.

7.2.2.7. Hazardous work areas need to be clearly marked and access restricted. Special removal teams and other high-risk workers should be given adequate training, proper tools and equipment, technical and PPE and issued

with relevant work permits. Safe work routines should be developed and workers trained accordingly.

7.2.3. Deconstruction phase

7.2.3.1. All main deconstruction and sub-processes should be identified in the safe shipbreaking schedules. These will include, inter alia:

- (a) determination and implementation of the applicable preventive and protective measures based on safe work principles and any completed risk assessments;
- (b) development of a workplan and, on a daily basis, ensuring that it does not place workers in dangerous positions, e.g. the workplan does not allow one group of workers to work directly above others working at a lower level;
- (c) allocation of human resources throughout the site; and
- (d) determining the positions of tools and equipment to be used.

7.2.3.2. One of the first processes of the deconstruction phase concerns management, supervisor and worker responsibility to ensure that precaution and prevention measures are in place before undertaking any physical breaking. Requirements in this regard include:

- (a) ensuring safe access and egress to and from the workplace;
- (b) erection of platforms and stabilization of the actual places where people perform their tasks;
- (c) ensuring hot-work procedures and precautions to prevent fires and explosion are understood, have been implemented and are being followed;
- (d) safe atmospheres have been established so that air at the workplace is breathable; and

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- (e) fire-fighting and first-aid facilities are in place and immediately available in case of accident.

7.2.3.3. Work operations, as detailed in the safe ship-breaking schedules, should follow the convention of working – from the top of a structure to the bottom – i.e. commencing with the main deck and gradually working towards the keel. In many cases the sequence of work will be affected by other factors such as the removal of engines/generators for reuse or recycling, etc., and the cutting of apertures in side plating to allow their removal. As the schedules are assembled according to the order in which processes should be carried out, it should be possible to quantify the time and the labour required to complete the respective operation. This should enable those with responsibilities for planning the deconstruction process to take such operations into account and avoid assigning workers to dangerous positions. The addition of a column(s) in the schedules for these factors to be included is optional.

7.2.3.4. Consideration should be given to using a copy of the general arrangement plan to determine the cutting plan. Using a GA plan in this way not only gives the site manager/supervisor an overall picture of the sequence of operations, but the plan can also be used as a progress sheet – as each element is cut, the plan should be annotated with the work that has been completed. In addition to displaying the location of hazardous materials, many other operational matters can be appended to the GA plan such as:

- (a) the destination (facility zone A, B, direct to transport, etc.) of the various cut or removed items;
- (b) the location of safety measures – access and egress routes, fire-fighting equipment, first-aid facilities, etc.;

- (c) advance work preparations, precautions and safety measures to be put in place.

7.2.3.5. It is essential that those with responsibility for engaging and deploying contractors (third-party workers) make sure the work to be carried out by these persons does not conflict with the work being performed by others.

7.2.3.6. Work schedules and safety and health measures, as an integral part of the work carried out, should be reviewed daily. Progress with cutting, sorting, recycling, etc., must be viewed not only in the context of productivity but also in the context of the effectiveness and execution of safety and health provisions.

7.2.3.7. The arrangements concerning removal/storage and handling on and from the ship must be planned in advance so that the reception area(s) is well equipped and able to safely accommodate the downstream materials (see paragraph 7.2.4 below).

7.2.3.8. The protection of all workers on the site must be a paramount consideration. Time and resources devoted to installing safety and health and protection measures are known to increase productivity rather than the contrary. As mentioned in paragraph 7.2.3.1 above, no worker should be assigned to work below others, particularly where there is a danger of tools, equipment and cut sections or any other loose work item falling from the upper work location. Protection and concern for the safety and health of workers engenders a sense of confidence and well-being, allowing workers to work without fear of injury or accident.

7.2.3.9. The need to provide a safe working environment is not limited to the breaking of the ship but the principle

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must be applied across the entire workplace – beach, dry dock, pier, crane operating and storage/sorting/recycling areas. Persons assigned duties associated with the protection of the safety and health of workers should be aware of the risks and consequences of workers failing to observe the safety and health requirements.

7.2.3.10. All persons engaged in breaking operations must be familiar with their tasks and duties and the respective protective and preventive measures necessary to protect their safety and health whilst on the breaking facility.

7.2.3.11. No tools or equipment should be issued to or operated by persons who are unfamiliar with its operation and who are not competent to use such tools or equipment. A register should be established that records the competencies of individuals.

7.2.3.12. Only serviceable tools and equipment should be issued and used. Tools and equipment should be fitted with safety devices to prevent inappropriate use and malfunction (see Chapter 13). Persons responsible for each task in the work schedule should ensure the right tools and equipment are being used in a proper and safe manner and that defective tools are marked and removed from the workplace.

7.2.4. Material stream management phase

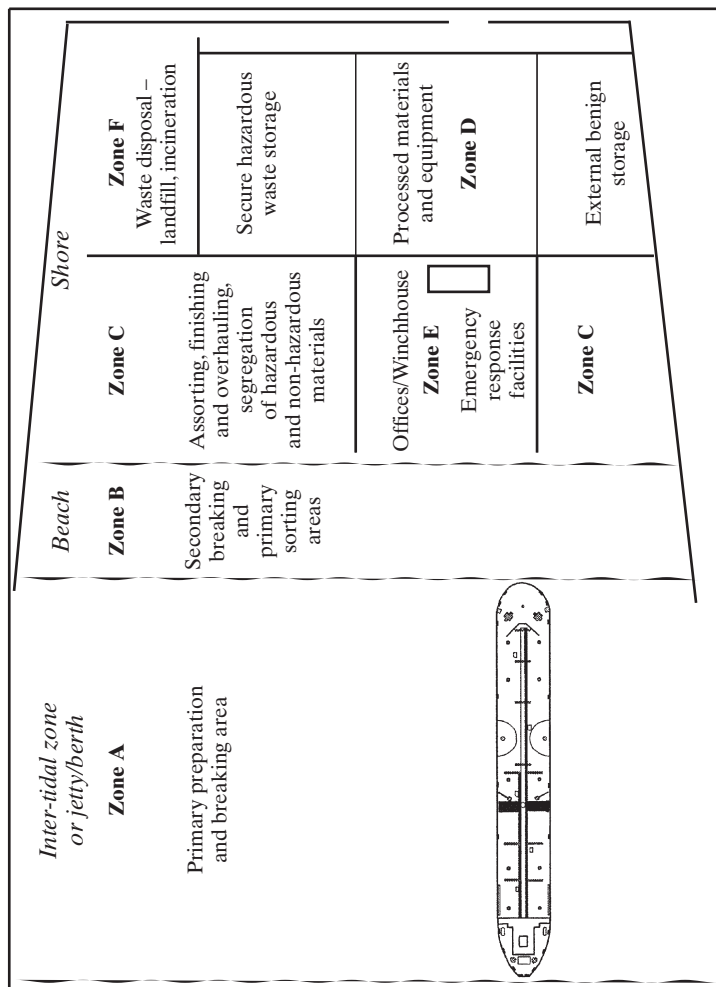
7.2.4.1. This final core phase applies to the management of materials that arise from the primary activity of ship deconstruction. Such materials may be termed waste or scrap or, in the case they have a secondary use, materials to be recovered, reused or recycled. The following are indicative activities normally carried out in this phase of the safe shipbreaking plan:

- (a) secondary deconstruction: the breaking down of large items once removed from the main ship structure, i.e. the cutting down of large sections for further processing and disposal;
- (b) sorting: identifying similar metals or components into groups of the same, i.e. valves, pipes, dissimilar metals (brass from steel), etc.;
- (c) separation: the disengaging of one element from another, e.g. copper wire from cables, asbestos from pipes, paint removal, etc.;
- (d) reception facilities: to include suitable provisions to receive liquids/solids, hazardous substances and other inventory materials;
- (e) disposal: the appropriate means and arrangements to safely dispose of materials that cannot be recovered, recycled or passed on to another user for reuse, i.e. incineration and landfill;
- (f) recycling: materials and machinery that may or may not require additional processing before it is sold or put to another purpose including reuse.

7.2.4.2. The breaking area should be zoned to ensure each type of downstream material is positioned and handled so as not to pose a hazard or threat to the safety and health of workers on the site, adjacent work areas or residents of a danger zone(s) outside the facility boundaries. Figure 4 shows how a site may be subdivided to prevent and reduce the risk of accidents from materials being handled, processed and stored.

7.2.4.3. Within each zone particular hazards occur according to the activities being carried out and these must be

Figure 4. The zoning of the shipbreaking area



identified if counter measures in the form of precautions and prevention measures are to be introduced (see table 1). It is important to note that determination of zones and activities carried out in each will differ according to site geography, environment, and type of breaking being carried out and the wastes handled.

7.2.4.4. The following is an explanation of the zones shown in figure 4 and the typical hazards encountered:

- **Zone A:** is the intertidal area where preparations for and actual deconstruction of the ship and removal of the material take place. The equivalent, where ships are broken while still afloat, would be the final resting place alongside a jetty or between buoys in a harbour. The processes carried out include decommissioning activities, the removal of oils and other liquid and gaseous wastes, removal of asbestos, dismantling of reusable machinery and equipment, cutting of large segments of the ship's structure, etc. Hazards encountered in this zone cover:
 - dangers to breathing from cutting operations vapours and working in confined spaces;
 - risk of fire and explosion;
 - risks posed by falling objects;
 - falls, trips and slips;
 - asbestos removal;
 - exposure to hazardous liquids and gases (oil and cleaning compounds, redundant gases – Freon, CO₂, PCBs, etc.);
 - drowning (for floating or partially floating structures).

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- **Zone B:** consists of the secondary deconstruction and sorting area. Processes carried out are likely to include cutting of large sections, containing residual liquids and waste materials, sorting of components and lifting smaller sections to transport. Hazards encountered in this zone include:
 - risk of fire and explosion;
 - the presence of hazardous vapours;
 - exposure to handling hazardous liquids;
 - falls, trips and slips;
 - handling of asbestos.
- **Zone C:** is also a deconstruction zone where further dis-assembly, sorting, overhauling (refurbishing for reuse) and segregation of hazardous and non-hazardous materials take place. Very dangerous materials such as asbestos should be processed within a separate and tightly controlled facility within the zone. Within Zone C hazards likely to be confronted include:
 - vapours (from cutting, stripping, dismantling operations);
 - trips and slips;
 - manual lifting and handling of heavy objects;
 - handling of asbestos;
 - other physical hazards affecting the ears, eyes and other body senses (dust, noise, vibrations, etc.).
- **Zone D:** is a primary material management zone used for storage of processed materials and wastes. To minimize and reduce the effects of the hazards present, the zone should be further subdivided to segregate hazardous wastes, benign materials and processed materials

and equipment. Typically, hazards in this zone would include:

- trips and slips;
 - manual lifting and handling of heavy objects;
 - handling of hazardous materials (liquids and recovered gases);
 - other physical hazards affecting the eyes, ears and other body senses (dust, noise, vibrations, etc.);
 - risk of fires and explosions (storage of oils and other gas-generating substances).
- **Zone E:** consists of a zone devoted to administrative and emergency response activities. Hazards in this zone are minimal except where a winch or other lifting/hauling device is located. The area should be kept clear of any deconstruction processes and materials that could affect the provision or impede the provision of emergency services.
 - **Zone F:** separated from all other activities processes in this zone, the area should be confined to disposing of waste materials through incineration, direct landfill or arranging for wastes to be transported to other land-side disposal facilities. Hazards present in this zone include:
 - hazardous materials (solids, liquids, PCBs, etc.);
 - vapours (escaping or being vented);
 - risk of explosion;
 - handling hazardous substances.

7.2.4.5. While awaiting deconstruction, ships on occasion illegally dispose of waste and toxic materials into the sea.

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In the case of beaching a ship, waste disposal into the sea is intended to lighten the ship in order to minimize its draft so that it may be beached as near as possible to the deconstruction facility. Such jettisoning practices create unseen dangers by contamination of beaches and possible effect on bathers, poisoning of fish stocks and the subsequent problems on an unsuspecting public through the consumption of contaminated fish. The zoning of a site should therefore take into account the management of all the materials derived from the deconstruction processes to encourage the cessation of jettisoning activities.

7.2.4.6. Risk assessment should not be confined to physical practices but also to areas where breaking processes or storage operations are conducted. The above example of zoning a site clearly shows that hazards in one process can affect other processes, particularly when they are conducted in close proximity of one another and where a community is located close to the site.

7.3. Hazard identification and risk assessment

7.3.1. Hazards are present in virtually all work processes and practices. Many hazards can be identified through knowledge of the processes and skills gained by experience. However, a considerable number of hazards are not so self-evident and these require a detailed analysis of the process to reveal or identify them and their potential to cause injuries. Notwithstanding the mere perceived nature of a hazard, each process should be examined in detail to quantify its possible effect on the safety and health of workers.

7.3.2. Risk is generally accepted as being a function of hazard in that it gives the term “hazard” a dimension. When a

hazard is identified it must be put into perspective and quantified since some hazards present no concerns for the safety and health of workers whereas others possess varying injurious effects ranging from slight to fatal. Risk of damage to workers in the workplace can be assessed using a number of techniques, providing they include criteria that relate to the potential damage caused to humans.

7.3.3. Risk is also affected by the frequency of carrying out a hazardous task. Generally and for a variety of reasons including fatigue and poor health, risk may increase through the repetition of the task as indicated in figure 5.

7.3.4. Risk assessments should be carried out by employers or by persons acting on their behalf that are competent and have the necessary information, instruction and training, in consultation with workers and their representatives. Where the outcome of the assessment indicates a potential injury or risk to safety and health, the results should be recorded and made available for inspection by the competent authority, and to workers exposed to the hazardous ambient factors and the workers' representatives.

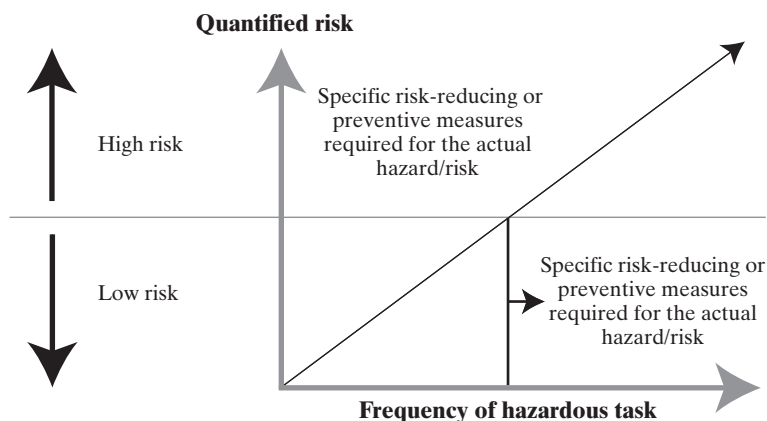
7.3.5. If a new source of hazard is introduced, an assessment should be made before workers are exposed to the hazard. The assessment should gather information on the hazardous ambient factors present at the workplace, the degree of exposure and risk, appropriate control measures, health surveillance and training. Reviews should be carried out as detailed below.

7.3.6. In accordance with national laws and regulations, employers should:

- (a) make arrangements for the identification and periodic assessment of hazards and risks to safety and health from

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Figure 5. Relationship between quantified risk and the frequency of the task performed



hazardous ambient factors at each permanent or temporary workplace, generated by different operations, tools, machines, equipment and substances;

- (b) implement appropriate preventive and protective measures required to prevent those hazards and risks, or to reduce them to the lowest reasonable and practicable level, in conformity with national laws and regulations.

7.3.7. The mandatory development of emergency situation plans should ensure that employers possess the capacity to deal with developing situations, for example plans and contingency arrangements in case of fire, explosion and pollution incidents (see Chapter 16).

7.3.8. A safe shipbreaking plan should be used to identify hazards relevant to the ship as well as to the processes that

have to be undertaken. The obtaining of an inventory of hazardous materials on board enables the shipbreaker to identify and make provisions for numerous hazards according to the declared materials. In addition, specific hazards can be identified together with the risks posed by using appropriate and suitable risk assessment techniques (see Annex V for examples of models of individual and process risk assessment tools).

7.3.9. Process (group) hazards in the deconstruction phase can easily be identified and analysed, for example the hazards associated with providing safe access to and from the area of work. The same applies to activities identified in the third phase where the sorting and storage of waste present a number of process hazards as well as individual hazards that require the imposition of preventive measures.

7.3.10. Whether or not an OSH management system or equivalent systemized safety control system exists or is to be implemented, employers should endeavour to:

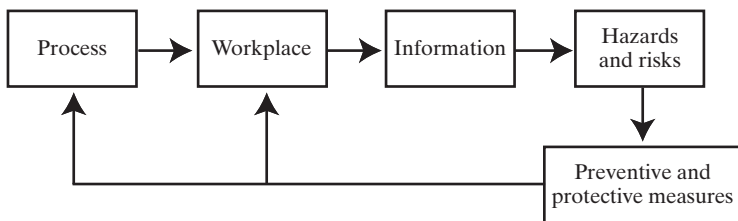
- (a) establish measurable safety and health objectives;
- (b) plan, develop and implement processes to reach these objectives;
- (c) evaluate the organization's safety and health performance; and
- (d) aim at continual improvement of the set objectives which may include OSH requirements for purchasing, leasing and contracting specifications.

7.3.11. The first stage of any assessment should include a review of the workplace by location or process (see figure 6) in order to identify:

- (a) which hazardous ambient factors are present or likely to occur and in which activity and place (a list of common

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Figure 6. Model for assessment of the workplace



hazards that are likely to cause work-related injuries and diseases, ill health and incidents among shipbreakers is presented in table 1);

- (b) what activities are likely to expose workers and others to the hazardous ambient factors identified, including work organization, maintenance, cleaning and emergency procedures.

7.3.12. The second stage of assessment should consist of collecting information to assess the magnitude and significance of the hazardous ambient factors, its relevance to the work organization and the practicability of various methods of control. The information, including exposure levels, should include that provided by suppliers together with any other information in the public domain. Exposure levels should be compared with those set or standards prescribed by the competent authority. Where no such limits or standards exist, other national or internationally recognized standards should be used for comparison. In either case, due account should be taken as to the basis on which those limits have been set.

7.3.13. The third stage of an assessment should establish whether hazards or risks to safety and health could be elim-

inated. If they cannot be eliminated, the employer should plan how they can be reduced to the lowest practicable level, or to a level which, in the light of currently available national and international knowledge and data, would not lead to injury if exposure continued for a working lifetime.

7.3.14. As part of an assessment, the employer should:

- (a) determine what instructions, training and information need to be given to the workers and, where appropriate, to their representatives, and others likely to be exposed to the hazardous ambient factors;
- (b) determine what measures are needed to ensure that the information is kept up to date;
- (c) plan for the necessary training to be given to new or transferred workers;
- (d) ensure that a programme for review of the assessment, including future monitoring of exposure levels, is established.

7.3.15. The record of assessment should be retained for a period of time as may be specified by the competent authority or until a specified time after such hazardous ambient factors or work processes have ceased. Even when the latter occurs, or where the assessment indicates no risk, it may be advisable to make and keep a record to review in the event an accident does occur.

7.3.16. The frequency and type of future monitoring of exposure levels will depend on the exposure found in relation to recognized exposure limits. If the exposure level is very much lower than the limit and there is no change in the process or other reason for this low level, then repeat measurement may only be needed occasionally. If the exposure level

is relatively high, then measurement may be needed several times between assessment reviews, to ensure that these levels have not been altered by some unidentified factor.

7.3.17. Hazard mapping, i.e. the clear and understandable presentation of the location of identified hazards and risks and the resulting protective and preventive requirements in ship's drawings, plans, maps or other suitable means, should be used as appropriate information for all persons working in shipbreaking facilities.

7.4. Review of risk assessments

7.4.1. The identification of hazards and assessment of risks in each phase of the shipbreaking plan is not a one-off exercise. Indeed, reviews of the protective and preventive measures implemented should be carried out regularly, if not daily. Further, reported incidents or the occurrence of accidents should serve as feedback into the review process to indicate the success or failure of the safety and health protection measures taken or proposed.

7.4.2. Assessments should also be reviewed whenever there has been a significant change in the work to which it relates or when there is reason to suspect that it is no longer valid. The review should be incorporated in a management system of accountability to ensure that control action which was shown to be necessary by the initial (or subsequent) assessments and reviews have in fact been carried out. Reviews of an assessment should be recorded on the documented record indicating changes or even cancellation of the assessment.

7.4.3. Reasons indicating that an assessment may no longer be valid might include:

- (a) complaints by workers of adverse health effects and detection of health impairment;
- (b) an accident, dangerous occurrence or incident leading to exposure to hazardous ambient factors or risks which is different from that quantified in the initial assessment;
- (c) subsequent measurement of exposure levels;
- (d) availability of updated information on the hazards or risks of hazardous ambient factors;
- (e) modification of the facility, including control measures, changes in the process or methods of work and in the volume or rate of production which lead to a change in the hazardous ambient factors present.

7.4.4. The review should reconsider all parts of the initial (or subsequent) assessment and in particular whether it is now:

- (a) practicable to eliminate any hazardous ambient factors;
- (b) possible to control at source and minimize hazards or risks which had previously required PPE.

7.4.5. The review should also consider the results of the programme for monitoring exposure levels and whether:

- (a) exposure levels previously considered to be acceptable should now be regarded as too high in the light of available and updated information on the hazards and risks of hazardous ambient factors;
- (b) any control action needs to be taken;
- (c) the frequency and type of monitoring decided in the review is still appropriate.

7.5. Response to hazards and risks – Preventive and protective measures

7.5.1. Preventive and collective or individual protective measures can be applied across a number of activities. In identifying individual or specific risks that may be either simple or complex (a combination of hazards), each should be examined to ensure no aspect is overlooked.

7.5.2. Acceptable levels of risks prescribed by competent authorities or by industrial standards should be the first points of reference. Where the facility determines there is an element of risk and there is no reference standard or levels, the employer should assess the levels of risks and deal with them in the following order of priority:

- (a) reduce or eliminate the hazard/risk;
- (b) control the hazard/risk at source, through the use of engineering controls or organizational measures;
- (c) minimize the hazard/risk by the design of safe work systems, which include administrative control measures; and
- (d) where residual hazards/risks cannot be controlled by collective measures, the employer should provide for appropriate PPE, including protective clothing, at no cost to the worker, and should implement measures to ensure its use and maintenance.

During the process of assessing the levels of risks, the employer should consult the competent authorities.

8. General preventive and protective measures

8.1. General provisions

8.1.1. All appropriate precautions should be taken:

- (a) to ensure that all workplaces are safe and without risk to the safety and health of workers;
- (b) to protect persons present at or in the vicinity of a deconstruction facility from all risks which may arise from the site or associated shipbreaking operations.

8.2. Means of access and egress

8.2.1. Adequate and safe means of access and egress should be provided for all workplaces during all shipbreaking operations. These means should be maintained in a safe condition.

8.2.2. Means of access to vessels should be:

- (a) where practical, the ship's accommodation ladder, a gangway or a similar appliance; or
- (b) in other cases, ladders, stairs, or, if necessary, rope step-ladders or similar appliances.

8.2.3. Means of access should be:

- (a) kept free from obstructions; if they pass under workplaces they should be protected against falling objects;
- (b) as far as practicable, so installed that no loads pass over them. In any event, loads should not be passed over the means of access while workers are on it.

8.2.4. Hatches, openings or any other means of access to holds, ships' decks or between decks should be provided with safety barriers. If it is not practicable to provide fixed

hold ladders, portable metal ladders (or appropriate wooden ones) should be provided. Rope ladders should be used only as supplementary means of access to holds. All ladders should be secured before being used.

8.3. Means of escape in case of fire or other dangers

8.3.1. Means of escape should be kept clear at all times. Escape routes should be frequently inspected and continuously modified on the ship according to the breaking progress. Where appropriate, suitable visual signs should be provided to indicate clearly the direction of escape in case of fire.

8.3.2. Means of escape should be:

- (a) provided on the ship and from the ship during all breaking operations;
- (b) clearly marked; during night work this should be done with emergency lighting;
- (c) shown on plans which should be posted at the access to and inside of the ship and landside facilities as appropriate.

8.4. Roadways, quays, yards and other places

8.4.1. Roadways, quays, yards, etc., where persons or vehicles move or are stationed should be so constructed and maintained as to be safe for the traffic that they have to carry.

8.4.2. Yards and other places that are surrounded by fencing should have separate gates for pedestrians and vehicles.

8.4.3. Dangerous crossings where transport of heavy objects is carried out should be protected by automatic signals or gates whenever possible, or be guarded by watchmen.

8.5. Housekeeping

8.5.1. A suitable housekeeping programme should be established and continuously implemented on each ship-breaking facility and ship which should include provisions for:

- (a) the proper storage of materials and equipment;
- (b) the removal, at appropriate intervals, of scrap, waste and debris.

8.5.2. Loose materials which are not required for immediate use should not be placed or allowed to accumulate on the site so as to dangerously obstruct means of access to and egress from workplaces and passageways.

8.5.3. Workplaces and passageways that are slippery owing to oil or other causes should be cleaned up or strewn with sand, sawdust, ash or the like.

8.5.4. Tools, bolts, nuts and other objects should not be left lying about where they could create a tripping hazard.

8.5.5. Scrap, waste, rubbish and dirt should not be allowed to accumulate at workplaces or in passageways.

8.5.6. Rubbish, dirt and refuse should not be thrown overboard but removed in an environmentally sustainable manner.

8.6. Scaffolds and ladders

8.6.1. Where work cannot safely be done on or from the ground or from part of a ship or other permanent structure, a safe and suitable scaffold, or other equally safe and suitable provision, should be provided and maintained.

8.6.2. The competent authority should establish and enforce laws, regulations or standards covering detailed technical provisions for the design, construction, erection, use, maintenance, dismantling and inspection of the different kinds of scaffolds and ladders used.

8.6.3. Scaffolds should be provided with safe means of access, such as gangways, stairways or ladders. Ladders should be secured against inadvertent movement.

8.6.4. Every scaffold and part thereof should be:

- (a) designed so as to prevent hazards for workers and collapse or accidental displacement when properly used;
- (b) designed so that guard rails and other protective devices, platforms, putlogs, rakers, transoms, ladders, stairs or ramps, as appropriate, can be easily put together;
- (c) of suitable and sound material and of adequate size and strength for the purpose for which it is to be used and maintained in a proper condition.

8.7. Precautions against the fall of persons and materials

8.7.1. All openings through which workers are liable to fall should be kept effectively covered or fenced and clearly indicated in the most appropriate manner.

8.7.2. Adequate precautions should be taken, such as the provision of fencing, lookouts or barriers to protect any

person who might be injured by the fall of materials, or tools or equipment being raised or lowered.

8.7.3. As far as practicable and in accordance with national laws and regulations, guard rails and toe boards should be provided to protect workers from falling from elevated workplaces. Wherever the guard rails and toe boards cannot be provided:

- (a) adequate safety nets or safety sheets should be erected and maintained; or
- (b) adequate safety harnesses should be provided and used.

8.7.4. Where necessary to prevent danger, guys, stays or supports should be used or other effective precautions should be taken to prevent the collapse of structures or parts of structures that are being dismantled or demolished.

8.7.5. Waste materials or objects should not be thrown down from heights. If material and objects cannot be safely lowered from heights, adequate precautions such as the provision of fencing or barriers should be taken. Loose articles should not be left lying about in places where they could fall on persons underneath. Workers employed at elevated workplaces should be provided with containers for screws, bolts, nuts and the like.

8.8. Fire prevention and fire-fighting

8.8.1. All appropriate measures should be taken by the employer to:

- (a) avoid the risk of fire;
- (b) control quickly and efficiently any outbreak of fire;
- (c) bring about a quick and safe evacuation of persons.

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8.8.2. Sufficient and secure storage areas should be provided for flammable liquids and solids and gases such as liquefied petroleum gas (LPG) tanks and acetylene cylinders, paints and other such materials.

8.8.3. Smoking should be prohibited and “No smoking” notices prominently displayed in all places containing readily combustible or flammable materials.

8.8.4. In confined spaces and other places in which flammable gases, vapours or dusts can cause danger:

- (a) only suitably protected electrical installations and equipment, including portable lamps, should be used;
- (b) there should be no naked flames or similar means of ignition;
- (c) there should be notices prohibiting smoking;
- (d) oily rags, waste and clothes or other substances liable to spontaneous ignition should be removed without delay to a safe place;
- (e) adequate ventilation should be provided;
- (f) persons wearing clothes likely to cause static electricity or shoes likely to cause sparks should be excluded.

8.8.5. Combustible materials, greasy or oily waste, and scrap wood or plastics should be kept in closed metal containers in a safe place.

8.8.6. Regular inspections should be made of places where there are fire risks. These include the vicinity of heating appliances, electrical installations and conductors, stores of flammable and combustible materials, hot welding and cutting operations.

8.8.7. Welding, flame cutting and other hot work should only be done on the orders of a competent person, after ap-

appropriate precautions are taken, as required, to reduce the risk of fire and explosion.

8.8.8. In accordance with national laws and regulations, places where the danger of fire exists, should be provided with:

- (a) suitable and sufficient fire-extinguishing equipment, which should be readily available, and easily visible and accessible;
- (b) an adequate water supply at ample pressure.

8.8.9. Fire-extinguishing equipment should be selected and provided in accordance with the provisions of international and national laws and regulations, the results of the initial hazard identification and risk and assessment and based on the processes identified in the safe shipbreaking plan. Equipment deployed should be suitable for and consistent with the following demands and applications:

- (a) the restricted access, egress and confined spaces inside the ship;
- (b) the quantity and characteristics of hazardous, flammable and explosive substances handled in shipbreaking operations;
- (c) site transport and storage facilities;
- (d) first-stage fire-fighting purposes (hand-held or trolley-mounted portable fire-fighting extinguishers).

The extinguishing medium should be selected according to identified hazards and risks and control measures.

8.8.10. Fire-extinguishing equipment should be properly maintained in full working order and inspected at suitable intervals by a competent person. Access to fire-extinguishing

equipment such as hydrants, portable extinguishers and connections for hoses should be kept clear at all times.

8.8.11. Suitable training, instruction and information should be given to all supervisors and a sufficient number of workers about the hazards of fires, the appropriate precautions to be taken and the use of fire-extinguishing equipment, so that adequate trained personnel is readily available during all working periods. The training, instruction and information provided should include, in particular:

- (a) the circumstances in which workers should not attempt to deal with a fire themselves but should evacuate the area and call in firefighters;
- (b) when and where to raise the alarm;
- (c) action to be taken in the event of fire, including the use of means of escape;
- (d) the correct use of fire-fighting and fire-protection equipment, for workers expected to use it;
- (e) the toxic nature of the fumes given off and first-aid measures;
- (f) the proper use of appropriate PPE;
- (g) evacuation plans and procedures.

8.8.12. Sufficient, suitable and effective means (sight and sound signals) to give warning in case of fire should be installed. There should be an effective evacuation plan so that all persons are evacuated speedily without panic.

8.8.13. Notices should be posted at conspicuous places, indicating, if applicable:

- (a) the nearest fire alarm;
- (b) the telephone number and address of the nearest emergency services;

- (c) the nearest first-aid post.

8.9. Dangerous atmospheres and confined spaces

8.9.1. Where workers are required to enter any area in which a toxic or harmful substance may be present, or may have been present, or in which there may be an oxygen deficiency or a flammable atmosphere, adequate measures should be taken to guard against danger.

8.9.2. The measures to be taken regarding dangerous atmospheres should be prescribed by the competent authority in conformity with the IMO recommendations for entry into enclosed spaces aboard ships (appendix to Annex I of IMO resolution A.962(23)) and should include prior permission from a competent person, or in conformity with any other system by which entry into any area in which a dangerous atmosphere may be present can be made only after completing specified procedures.

8.9.3. Inside a confined space or area, no naked light or flame or hot work should be permitted unless it has been made completely free of the flammable atmosphere, tested and found safe by a competent person. Only non-sparking tools, flameproof hand lamps protected with guards, and safety torches should be used inside such confined space or area for initial inspection, cleaning or other work required to be done for making the area safe.

8.9.4. While a worker is in a confined space:

- (a) adequate facilities and equipment including breathing apparatus, first-aid kit, resuscitation apparatus and oxygen should be readily available for rescue purposes;
- (b) a fully trained attendant(s) should be stationed at or near the opening;

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- (c) suitable means of communication should be maintained between the worker and the attendant(s).

8.10. Signs, notices and colour codes

8.10.1. Signs and symbols are a very effective method for warning against hazards and for presenting information in a non-linguistic form. Safety signs and notices should conform in shape and colour to the requirements of the competent authority.

8.10.2. The contents of portable fire extinguishers should be indicated by a colour code in compliance with the requirements of the competent authority. Each fire extinguisher should have a label affixed to it providing instructions for its use.

8.10.3. Various standards exist for the colour coding of electrical wiring cores and care should always be taken to ensure that personnel are aware of the meaning of the core colours on board each ship. If a replacement is required, it should be in accordance with the coding system.

8.10.4. Gas cylinders should be clearly marked with the name and symbol of the gas and the body should be coloured according to its contents. A colour coding card should be provided.

8.11. Prevention of unauthorized entry

8.11.1. Visitors should not be allowed access to ship-breaking facilities or ships, as appropriate, unless accompanied by or authorized by a competent person and provided with the appropriate protective equipment.

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8.11.2. Appropriate arrangements concerning access by workers' representatives should be established in accordance with the provisions of national laws and regulations or of collective agreements.

9. Management of hazardous substances

9.1. General provisions

9.1.1. As a basis for eliminating or controlling exposure to hazardous substances (including dusts, fumes and gases), the provisions of the ILO code of practice *Ambient factors in the workplace* should be consulted. Where the workers are exposed to hazardous chemicals, the provisions of the ILO code of practice *Safety in the use of chemicals at work* should apply.

9.1.2. The competent authority should ensure that criteria are established on measures which provide for safety and health, in particular:

- (a) in the handling, storage and transport of hazardous substances;
- (b) in the disposal and treatment of hazardous chemicals and hazardous waste products, consistent with national or international regulations.

9.1.3. The employer should ensure that each ship or other object for deconstruction is in a safe condition for breaking, has the necessary certifications and licences, and satisfies the conditions for breaking according to national and international standards, such as:

- (a) hazardous substances, not necessary for ship safety on the last journey, have been removed and recycled in an environmentally sustainable manner;
- (b) the ship and its tanks are gas free.

9.1.4. The employer should require or prepare, if not already available, an inventory list of hazardous substances on the ship to be dismantled. This inventory should be used

especially for identifying hazardous substances (wastes) present that are included in the IMO inventory of potentially hazardous materials on board ships (see Annex IV), and their locations and quantities, if applicable.

9.1.5. As prescribed by national laws and regulations, employers should ensure that workers are not exposed to hazardous substances to an extent that exceeds exposure limits or other exposure criteria for the evaluation and control of the working environment. They should identify whether hazardous substances are present in the workplace and monitor and record the exposure of workers to ensure their safety and health. Based on the monitoring data, employers should assess the exposure of workers to hazardous substances.

9.1.6. Employers should ensure that all chemicals handled, stored and transported or otherwise used are marked, giving their relevant characteristics and instructions on their use, in accordance with the provisions of:

- (a) the ILO code of practice *Safety in the use of chemicals at work*;
- (b) the chemical safety data sheets provided by the supplier.

9.1.7. Chemicals which have not been marked or were not provided with chemical safety data sheets should not be handled and stored until similar relevant information has been obtained by the employer and has been made available to workers and their representatives.

9.2. Assessment

9.2.1. Based on the inventory of hazardous substances (see paragraph 9.1.4) and in line with the provisions of

section 7.3 of these guidelines, at the first stage of the assessment the workplace should be inspected and information obtained on:

- (a) hazardous substances that are present or likely to occur, along with other hazardous ambient factors;
- (b) hazardous activities and processes that take place.

9.2.2. In the case of identified chemicals, the employer should obtain information on the intrinsic hazards of the substances or products according to the physical states (e.g. solid, liquid, gas) in which they occur from suppliers and from the inventory of hazardous substances, if available. Where this is not practicable, employers should obtain information provided by other bodies such as the International Agency for Research on Cancer (IARC), the World Health Organization (WHO), the International Programme on Chemical Safety (IPCS), the European Communities and other competent international and national institutions.

9.2.3. Where the expected risk is from exposure to mineral or synthetic fibres, mineral dusts and vegetable dusts, employers should consider, in particular, the provisions in the Asbestos Convention (No. 162) and Recommendation (No. 172), 1986; the ILO codes of practice *Occupational exposure to airborne substances harmful to health*, *Safety in the use of asbestos* and *Safety in the use of synthetic vitreous fibre insulation wools* (glass wool, rock wool, slag wool), and the ILO guide on *Dust control in the working environment* (silicosis).

9.2.4. When obtaining information for assessment, employers should take account of specific work situations where workers are likely to be exposed, for example, to:

- (a) hazardous fumes as by-products (e.g. welding);
- (b) hazardous substances and oxygen deficiency in confined spaces;
- (c) prolonged periods (such as during overtime) with the risk of accumulation of higher doses;
- (d) higher concentrations due to fluctuations in ambient conditions (e.g. hot environments where vapour pressures of hazardous substances may be elevated);
- (e) absorption through multiple routes (inhalation, ingestion, absorption through the skin);
- (f) hazardous substances that may be present even in concentrations below exposure limits while performing arduous tasks.

9.2.5. In the situations listed in paragraph 9.2.4 above, the exposure limits specified by the competent authority for normal work situations would often be invalid. Employers should accordingly obtain practical information from the competent authority, international organizations and institutions (ILO, WHO, IPCS) or other bodies.

9.2.6. As the second stage of the assessment, the employer should use the information obtained to assess the risk to health resulting from exposure, especially from the effects of chemical mixtures, and should also take account of:

- (a) routes of entry (skin, inhalation, ingestion);
- (b) the risk of penetration through damaged skin or seepage through PPE;
- (c) the risk of ingestion (due to personal hygiene levels and cultural variations);
- (d) levels of airborne concentrations of hazardous substances;

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- (e) the rate at which work is performed (e.g. arduous tasks);
- (f) the length of exposure (e.g. higher exposures resulting from prolonged overtime);
- (g) the influence of other ambient factors (e.g. heat) in enhancing the risk of exposure.

9.2.7. During the third stage of the assessment, the need for a programme for the measurement of airborne contaminants (monitoring) should be determined. Such a programme is required to:

- (a) determine the extent of exposure of workers; and
- (b) check the effectiveness of engineering control measures.

9.3. Monitoring for chemical hazards in the workplace

9.3.1. General principles

9.3.1.1. Measurements of airborne contaminants (monitoring) in the workplace are necessary if other techniques do not suffice to provide a valid estimate of the risk of exposure and to assess the existing control measures. They should be undertaken in accordance with Chapter 12 of the ILO code of practice *Safety in the use of chemicals at work*.

9.3.1.2. Techniques for this risk assessment may include the following:

- (a) information on the intrinsic health and physical hazards, obtained from the ship's inventory of hazardous substances and chemical safety data sheets which correspond to the requirements established in Chapter 5 of the ILO code of practice *Safety in the use of chemicals at work*, in particular the International Chemical Safety Cards provided by IPCS (see section 9.5 and Bibliography);

- (b) estimation of exposure based on the method of work and work pattern;
- (c) experience of exposure in the workplace or that of other users; and
- (d) simple qualitative tests such as the use of smoke tubes or pellets to determine ventilation characteristics, and of the dust lamp for illuminating dust emissions.

9.3.2. Measuring methods

9.3.2.1. Sampling equipment should be compatible with the analytical methods available and should have been validated over a suitable range of concentrations above and below the exposure limits or other exposure criteria in accordance with published national or international standards, where they exist.

9.3.2.2. Static monitoring should be used to determine the distribution of an airborne chemical throughout the general atmosphere of the working area and to identify problems and priorities.

9.3.2.3. Personal monitoring should be used to evaluate the risk of exposure to the individual worker. Air samples should be collected in the worker's breathing zone by means of personal samplers. Sampling should be carried out while the work activity is in operation.

9.3.2.4. Where concentrations vary from one work operation or phase to another, personal sampling should be done in such a manner that the average, and in any case the maximum, level of exposure of each individual worker can be determined.

9.3.2.5. Personal sampling should measure exposure, or allow assessment of exposure, throughout the work shift.

The exposure should be compared to occupational exposure limit values, which are usually quoted for an eight-hour period or, for short-term limits, 15 minutes. The measurement may be continuous over the whole shift or intermittent, so long as this allows a valid calculation of the average exposure and where necessary is supplemented by short-term sampling during periods of peak emission.

9.3.2.6. Exposure profiles of particular jobs or occupational categories (such as gas cutters, removers of asbestos, PCB, paint, etc.) should be constructed from the air-sampling data of different operations and from the workers' exposure time in these jobs.

9.3.3. Monitoring strategy

9.3.3.1. A systematic measurement programme should evaluate whether the exposure of workers to certain hazardous chemicals prescribed by the competent authority or determined by the initial assessment is being kept under control.

9.3.3.2. The aims of this programme should be to:

- (a) ensure that the health of the workers is efficiently protected;
- (b) ensure that the preventive actions which have been taken are still effective;
- (c) ensure that the levels, as measured previously, remain unchanged or fall;
- (d) ensure that any changes made in recycling processes or work practices will not lead to an excessive exposure to hazardous chemicals;
- (e) promote the implementation of more efficient preventive measures.

9.3.3.3. The monitoring of airborne contaminants should be performed with adequate equipment and only by competent persons.

9.3.3.4. The employer should:

- (a) arrange for regular inspection, maintenance and proper calibration of monitoring equipment;
- (b) review the assessment as specified in section 7.4 of these guidelines.

9.3.4. Record keeping

9.3.4.1. Employers should keep dated records of measurements of airborne contaminants:

- (a) by technique and type (e.g. static, personal), including data on plant location, work area, work processes, nature of hazardous substances, names and lists of exposed workers and control measures in place;
- (b) for a period of time as determined by the competent authority.

9.3.4.2. The workers and their representatives, and the competent authority, should have access to these records.

9.3.4.3. Besides the numerical results of measurements, the monitoring data should include, for example:

- (a) the marking of the hazardous chemical;
- (b) the location, nature, dimensions and other distinctive features of the workplace, and the names and job titles of the workers involved;
- (c) the source or sources of airborne emissions, their location and the type of work and operations being performed during sampling;

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- (d) relevant information on the work process, engineering and personal protection means, and weather conditions with respect to the emissions;
- (e) the sampling instrument used, its accessories and the method of analysis;
- (f) the date and exact time of sampling;
- (g) the duration of the workers' exposure, the use or non-use of respiratory protection and other comments relating to the exposure evaluation;
- (h) the names of the persons responsible for the sampling and for the analytical determinations.

9.3.5. Interpretation and application of monitoring data

9.3.5.1. The risk of exposure should be assessed on the basis of the numerical results obtained, supported and interpreted in the light of other information such as length of exposure, work procedures and patterns, measurements of air circulation and other particular circumstances of work during measurement.

9.3.5.2. In the event that monitoring discloses levels which are in excess of the exposure limits, employers should inform the workers and their representatives, in a manner which is easily understood by the workers, of the risk and of the action to be taken to reduce this as part of the prevention and control action programme.

9.4. Control measures

9.4.1. Appropriate preventive and protective measures should be taken against the following most common hazards:

- (a) asbestos removal and disposal;

- (b) PCB;
- (c) bilge and ballast water removal;
- (d) oil and fuel removal;
- (e) paint removal and disposal;
- (f) metal cutting and metal disposal;
- (g) removal and disposal of miscellaneous ship machinery.

9.4.2. In accordance with the provisions of sections 6.5 to 6.9 of the ILO code of practice *Safety in the use of chemicals at work*, specific control measures should be carried out for:

- (a) chemicals hazardous to health;
- (b) flammable, dangerously reactive or explosive chemicals;
- (c) the storage of hazardous chemicals;
- (d) the transport of chemicals; and
- (e) the disposal and treatment of chemicals;

9.4.3. For any situation or operation involving a risk of occupational exposure to airborne asbestos dust in the demolition of structures containing asbestos materials and in the handling, transportation and storage of asbestos or asbestos-containing materials, the provisions of the ILO code of practice *Safety in the use of asbestos* should apply.

9.5. Chemical safety data sheets

9.5.1. Chemical safety data sheets (also called “material safety data sheets” or “safety data sheets” in some countries) should be obtained and made available for each of the hazardous substances identified.

9.5.2. In accordance with the requirements of Chapter 5 of the ILO code of practice *Safety in the use of chemicals at*

work, chemical safety data sheets for hazardous chemicals should be provided by the supplier and give information about the identity of the chemical, its supplier, classification, hazards, safety precautions and the relevant emergency procedures. The International Chemical Safety Cards of the IPCS, available on the Internet (see Bibliography), should serve as the international model and reference.

9.6. Health surveillance

9.6.1. The provisions of Annex I of these guidelines concerning workers' health surveillance, the use of its results and record keeping, should apply.

9.6.2. Exposure to the following types of hazardous substances may require appropriate health surveillance:

- (a) substances (dusts, fibres, solids, liquids, fumes, gases) that have a recognized systemic toxicity (i.e. an insidious poisonous effect);
- (b) substances known to cause chronic effects;
- (c) substances known to be sensitizers, irritants or allergens;
- (d) substances that are known or suspected carcinogens, teratogens, mutagens or harmful to reproductive health;
- (e) other substances likely to have adverse health effects under particular work conditions or in case of fluctuations in ambient conditions.

9.6.3. In the case of exposure of workers to specific hazards, health surveillance should include biological monitoring for the early detection of the effects on health when:

- (a) a valid and generally accepted reference method exists;

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- (b) it may be used to identify workers who need detailed medical examination (subject to the individual worker's consent);
- (c) it may be necessary to detect exposure levels and early biological effects and responses.

10. Measures against physical hazards

10.1. General provisions

10.1.1. For eliminating or controlling exposure to physical hazards, the provisions of the ILO code of practice *Ambient factors in the workplace* should be consulted.

10.2. Noise

10.2.1. Employers should:

- (a) develop a monitoring programme to identify areas of high noise exposure and the workers affected;
- (b) provide affected workers or their representatives with opportunities to observe noise exposure monitoring;
- (c) where feasible, arrange the workplace layout to minimize noise exposure to the workers;
- (d) consider whether the noisy processes could be carried out in another way without generating noise; or
- (e) consider replacing its noisy parts with quieter alternatives.

10.2.2. If the elimination of noisy processes and equipment as a whole is impracticable, their individual sources should be identified and an attempt be made to control the noise at source.

10.2.3. If prevention and control at source does not reduce exposure sufficiently, the enclosure of the noise source should be considered. In designing enclosures, acoustical and production factors should be taken into consideration.

10.2.4. Where the combination of all other practicable measures fails to reduce worker exposure sufficiently, em-

ployers should provide hearing protection devices and supervise their correct use. These devices should:

- (a) be selected in accordance with the needed reduction of the noise level;
- (b) be comfortable and practical for the working environment concerned;
- (c) take into account the individual's auditory needs (ability to hear warning signals, speech, etc.);
- (d) be used, maintained and stored properly, in accordance with the technical specifications provided by the manufacturer, and replaced when necessary.

10.2.5. Appropriate health surveillance should be conducted for all workers whose noise exposures reach a level prescribed by national laws and regulations or by national or internationally recognized standards above which health surveillance should be carried out.

10.2.6. Workers' health surveillance may include:

- (a) a pre-employment or pre-assignment medical examination including audiometric testing;
- (b) periodical medical examinations at intervals prescribed as a function of the magnitude of the exposure hazards;
- (c) medical examinations prior to resumption of work after a period of extended sickness or in case of conditions as may be specified in national legislation or internationally recognized standards;
- (d) medical examinations performed on cessation of employment to provide a general picture of the eventual effects of exposure to noise;
- (e) supplementary and special medical examinations when an abnormality is found and it requires further investigation.

10.2.7. The results of the medical examinations and of supplementary examinations and tests, such as audiometric testing, of each individual should be recorded in a confidential medical file. The worker should be informed of these results and their significance accordingly.

10.3. Vibration

10.3.1. Exposure of workers to hazardous vibration mainly comprises:

- (a) whole-body vibration when the body is supported on a surface which is vibrating, which occurs in all forms of transport and when working near vibrating industrial machinery;
- (b) hand-transmitted vibration, which enters the body through the hands and is caused by various processes in which vibrating tools or workpieces are grasped or pushed by the hands or fingers.

10.3.2. When purchasing equipment and industrial vehicles, employers should ascertain that the vibration exposure to the user is within prescribed national standards and otherwise does not pose a significant hazard or risk to the worker's safety and health.

10.3.3. Workers exposed to hand-transmitted vibration, should be examined periodically for:

- (a) hand-arm vibration syndrome (HAVS), as prescribed by national laws and regulations;
- (b) symptoms of possible neurological effects of vibration, such as numbness and elevated sensory thresholds for temperature, pain and other factors.

10.4. Optical radiation

10.4.1. Workers performing operations where they are exposed to optical radiation – ultraviolet (UV), visible light including sunlight and infrared (IR) – should be provided with adequate personal face and eye protective equipment, particularly in torch-cutting operations.

10.4.2. For the purpose of detecting pre-cancerous lesions of the skin, workers continually working under optical radiation exposure, including exposure to the sun, should be under medical surveillance.

10.5. Heat stress and wet conditions

10.5.1. Whenever workers are exposed to heat stress or wet conditions and these are such that they can lead to impairment of health or extreme discomfort, preventive measures should be taken to:

- (a) prevent heat-related illnesses;
- (b) protect workers from excessive UV radiation;
- (c) protect workers from weather/climatic conditions likely to contribute to injury or illness.

10.5.2. In accordance with international and national standards, for the prevention of heat stress employers should:

- (a) minimize exposure of workers to the sun by proper work organization and design of workplaces;
- (b) provide training, to enable workers to detect early signs of disorders;
- (c) protect workers by appropriate PPE and clothing;

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- (d) require persons continually working in the sun to undergo routine medical surveillance to detect skin lesions;
- (e) supply cooled drinking water.

10.6. Lighting

10.6.1. Where natural lighting is not adequate to ensure safe working conditions, and at night, adequate and suitable artificial lighting, including portable lighting where appropriate, should be provided at every workplace and any other place on the shipbreaking facilities or ship, where a worker may have to pass.

10.6.2. Electric lighting should comply with the relevant requirements, particularly in respect of prevention of sparks and sources of ignition and minimum lighting levels. Only persons authorized to do so should switch off or displace lamps in the general lighting system. Matches and open-flame lamps should not be used for lighting on board the ship.

10.6.3. If the lighting in a ship is provided solely by sources outside the ship, adequate emergency lighting should be available on board during the whole breaking operation.

10.6.4. Artificial lighting should not, as far as practicable, produce glare or disturbing shadows.

10.6.5. Where necessary to prevent danger from electric shock, wiring, lamps and electric machinery should be protected by suitable guards against accidental breakage.

10.6.6. The cables of portable electrical lighting equipment should be of adequate size and characteristics for the power requirements and of adequate mechanical strength to withstand severe conditions in shipbreaking operations.

10.7. Electricity

10.7.1. All electrical equipment and installations should be installed and maintained by a competent person, and so used as to guard against danger.

10.7.2. Before shipbreaking is commenced and during the progress thereof, adequate steps should be taken to ascertain the presence of and to guard against danger to workers from any live electrical cable or apparatus which is under, over or on the site.

10.7.3. The laying and maintenance of electrical cables and apparatus on shipbreaking sites should be governed by national laws and regulations.

10.7.4. All parts of electrical installations should be of adequate size and characteristics for the power requirements and work they may be called upon to do and in particular they should:

- (a) be of adequate mechanical strength to withstand working conditions in shipbreaking operations;
- (b) not be liable to damage by water, dust or electrical, thermal or chemical action to which they may be subjected.

10.7.5. All parts of electrical installations should be so constructed, installed, maintained and regularly examined as to prevent danger of electric shock, fire and external explosion.

10.7.6. Suitable warnings should be displayed at all places where contact with or proximity to electrical equipment can cause danger.

10.7.7. Persons having to operate electrical equipment should be fully instructed as to any possible dangers of the equipment concerned.

11. Measures against biological hazards

11.1. National laws and regulations should ensure that risks such as those of infection, allergy or poisoning due to biological agents are prevented or kept to a minimum when the work activities comply with relevant national or other recognized safety and health standards.

11.2. In areas where biological agents pose a hazard (sludge evacuation, bilge- and sediment-clearing operations, etc.), preventive measures should be taken which consider the mode of transmission, in particular:

- (a) the provision of sanitation and information for workers;
- (b) action against vectors, such as rats and insects;
- (c) chemical prophylaxis and immunization;
- (d) the provision of first aid, antidotes and other emergency procedures in case of contact with poisonous animals, insects or plants, and suitable preventive and curative medicine, mainly in rural areas;
- (e) the supply of adequate protective equipment and clothing and other appropriate precautions.

12. Ergonomic and psychosocial hazards

12.1. Measures should be taken to ensure the appropriate selection or adaptation of tools, machines and equipment, including PPE, taking into account local conditions in user countries and, in particular, ergonomic implications and the effect of climate.

12.2. The competent authority, after consulting the representative organizations of employers and workers concerned, should establish safety and health requirements for the handling and transport of materials, particularly on manual handling. Such requirements should be based on risk assessment, technical standards and medical opinion, taking account of all the relevant conditions under which the work is performed, in accordance with national law and practice.

12.3. Workers should not be required or permitted to engage in the manual handling or transport of a load which by reason of its weight, size, shape and nature is likely to jeopardize their safety or health. Where appropriate, mechanization of work processes should be introduced progressively to replace manual lifting and handling.

12.4. Adequate and appropriate welfare facilities should be provided (see Chapter 18 of these guidelines) with the view to avoiding physical and psychological discomfort caused, in particular, by a crowded, unsafe, unhealthy and unstable living environment and a lack of privacy.

13. Safety requirements for tools, machines and equipment

13.1. General requirements

13.1.1. In accordance with the provisions of the Guarding of Machinery Convention (No. 119) and Recommendation (No. 118), 1963, all tools, machines and equipment used in shipbreaking, including hand tools, both manual and power-driven, should:

- (a) comply with safety and health requirements as prescribed in international or national standards and recommendations, wherever these are available;
- (b) be of good design and construction, taking into account, as far as possible, safety and health and ergonomic principles;
- (c) be maintained in good working order;
- (d) be used only for work for which they have been designed, unless a use outside the initial design purpose has been assessed by a competent person who has concluded that such use is safe;
- (e) be used or operated only by workers who have been authorized and given appropriate training;
- (f) be provided with protective guards, shields, or other devices as required by national laws or regulations.

13.1.2. Employers, manufacturers or agents should provide comprehensive and clear instructions and information on all aspects of operator/user maintenance and the safe use of tools, machines and equipment. These should include any requirements for PPE as well as the need for training.

Safety requirements for tools, machines and equipment

13.1.3. No worker using tools, machines and equipment should make inoperative the guards provided, nor should such guards be made inoperative on any machinery to be used by any worker.

13.1.4. Equipment should be so designed as to allow easy and safe maintenance and minor repair at the worksite. Workers who operate equipment should be trained to do day-to-day maintenance and minor repairs on machines and tools. Where this cannot be ensured, a competent person should be in easy reach of the worksite.

13.1.5. Machines and equipment should be so constructed and installed as to avoid hazardous points between moving and stationary parts or objects. If this is not the case, all dangerous moving parts, such as reciprocating components, revolving shafts, gearing or belt drives should be enclosed or adequately guarded in accordance with national laws and regulations.

13.1.6. Workers operating tools, machines and equipment should be provided with appropriate PPE.

13.2. Hand tools

13.2.1. Hand tools and implements should be tempered, dressed and repaired by competent persons. Heads of hammers and other shock tools should be dressed or ground to a suitable radius on the edge as soon as they begin to mushroom or crack. The cutting edges of cutting tools should be kept sharp.

13.2.2. When not in use and while being carried or transported, sharp tools should be kept in sheaths, shields, chests or other suitable containers.

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13.2.3. Only non-sparking tools should be used near or in the presence of flammable or explosive dusts or vapours.

13.2.4. Employers should not issue or permit the use of unsafe tools.

13.3. Electrical tools

13.3.1. Portable electrical tools should preferably be used, as far as possible, on reduced voltage to avoid the risk of a lethal shock.

13.3.2. All electrical tools should:

- (a) be earthed, unless they are “all-insulated” or “double-insulated” tools which do not require an earth; earthing should be incorporated in metallic cases, and as a safeguard against damaged cables where wires enter the tool;
- (b) receive inspection and maintenance on a regular basis by a competent electrician, and complete records kept.

13.4. Flame-cutting and other hot work

13.4.1. Workers should be:

- (a) competent and familiar with the equipment to be used, which should be inspected by a competent person before use;
- (b) given careful instructions if special precautions need to be taken.

13.4.2. Harmful fumes may be produced and oxygen depleted during operations. Special care should be taken during operations in enclosed places and confined spaces.

13.4.3. Clean and approved PPE should be worn by the worker and other persons involved in the work process. The worker should normally wear:

- (a) a welding helmet and suitable eye shield;
- (b) leather working gloves;
- (c) a leather apron when appropriate; and
- (d) other appropriate PPE.

13.4.4. Before any operation begins, inspections and tests should be carried out by a competent person to ensure that there are no combustible solids, liquids or gases at or in any compartments adjacent to the work area which might be ignited by heat or sparks from the work.

13.4.5. All surfaces upon which hot work is to be conducted should be free of oil, grease or any flammable or combustible material.

13.4.6. All openings through which sparks might fall should be closed where practical.

13.4.7. Cargo tanks, fuel tanks, cargo holds or other tanks or spaces (including cargo pumps and pipelines) that have contained flammable substances should be certified by a competent person as being free of flammable gases before any work commences.

13.4.8. All operations should be properly supervised and a fire watch maintained, both in the operational area and all adjacent areas, including spaces on the other side of affected bulkheads. Because of the possibility of delayed fires the fire watch should be maintained for a suitable period of time after the work has been completed.

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13.4.9. An adequate quantity of appropriate fire extinguishers should be kept at hand.

13.5. Gas cylinders

13.5.1. Cylinders for compressed or liquefied gases should be:

- (a) properly constructed with sound material;
- (b) fitted with appropriate safety devices in accordance with national laws or regulations;
- (c) inspected and tested by a competent person as prescribed; and
- (d) stored, transported, handled and used in conformity with the prescribed safety measures.

13.5.2. Cylinders should be properly secured and kept upright but must be capable of quick release. Oxygen and fuel gas cylinders (such as acetylene) should be kept in suitable, separate, well-ventilated compartments that are not subject to extremes of temperature. The space should have no electrical fittings or other sources of ignition. “No smoking” signs should be displayed at the entrance and within the space. Prohibition of smoking should be enforced.

13.6. Power generators

13.6.1. Power generators should:

- (a) meet national laws and regulations for safe and reliable operation;
- (b) be rated to meet the maximum anticipated load;
- (c) be located in enclosed and properly ventilated areas;
- (d) be provided with an overriding power switch to avoid accidental remote starting during maintenance, and with necessary silencers and exhaust piping.

13.6.2. When located near workers' accommodation, power generators should be housed in a concrete room or properly insulated area in accordance with national laws and regulations to minimize noise disturbance.

13.7. Lifting appliances and gear

13.7.1. Employers should have a well-planned safety programme to ensure that all the lifting appliances and lifting gear are selected, installed, examined, tested, maintained, operated and dismantled:

- (a) with a view to preventing the occurrence of any accident;
- (b) in accordance with the requirements laid down in national laws, regulations and standards.

13.7.2. Every lifting appliance, including its constituent elements, attachments, anchorages and supports, should be of good design and construction, sound material and adequate strength for the purpose for which it is used.

13.7.3. Every lifting appliance and every item of lifting gear should be accompanied at the time of purchase with instructions for use and with a test certificate from a competent person and a guarantee of conformity with national laws and regulations concerning:

- (a) the maximum safe working load;
- (b) safe working loads at different radii if the lifting appliance has a variable radius;
- (c) the conditions of use under which the maximum or variable safe working loads can be lifted or lowered.

13.7.4. Every lifting appliance and every item of lifting gear having a single safe working load should be clearly

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marked at a conspicuous place with the maximum safe working load in accordance with national laws and regulations.

13.7.5. Every lifting appliance having a variable safe working load should be fitted with a load indicator or other effective means to indicate clearly to the driver each maximum safe working load and the conditions under which it is applicable.

13.7.6. All lifting appliances should be adequately and securely supported; the weight-bearing characteristics of the ground on which the lifting appliance is to operate should be surveyed in advance of use.

13.7.7. Lifting appliances should be installed by competent persons so that:

- (a) they cannot be displaced by the load, vibration or other influences;
- (b) the operator is not exposed to danger from loads, ropes or drums;
- (c) the operator can either see over the zone of operations or communicate with all loading and unloading points by signals or other adequate means.

13.7.8. A safe distance, as prescribed by national laws or regulations, should be provided between moving parts or loads of lifting appliances and:

- (a) fixed objects in the surrounding environment; and
- (b) electrical conductors.

13.7.9. No structural alterations or repairs should be made to any part of a lifting appliance which may affect the safety of the appliance without the permission and supervision of the competent person.

13.7.10. In accordance with the Occupational Safety and Health (Dock Work) Convention, 1979 (No. 152), and as prescribed by national laws or regulations, every lifting appliance and every item of loose gear should be examined and tested by a competent person:

- (a) before being used for the first time;
- (b) after erection on a site;
- (c) subsequently at prescribed intervals;
- (d) after any substantial alteration or repair to load-bearing parts.

13.7.11. A register of the lifting appliances and items of loose gear should be kept in a form prescribed by the competent authority, account being taken of the model recommended by the ILO.

13.7.12. No lifting appliance should be operated by a worker who:

- (a) is below 18 years of age;
- (b) is not medically fit;
- (c) has not received appropriate training in accordance with national laws and regulations and is not properly qualified.

13.7.13. A lifting appliance or item of lifting gear should not be loaded beyond its safe working load or loads, except for testing purposes as specified by and under the direction of a competent person.

13.7.14. No person should be raised, lowered or carried by a lifting appliance unless it is constructed, installed and used for that purpose in accordance with national laws and regulations, except in an emergency situation:

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- (a) in which serious personal injury or fatality may occur;
- (b) for which the lifting appliance can safely be used.

13.8. Lifting ropes

13.8.1. Lifting ropes should be installed, maintained and inspected in accordance with manufacturers' instructions and national laws or regulations.

13.8.2. Only ropes with a known and adequate safe working capacity should be used as lifting ropes.

13.8.3. Where multiple independent ropes are used, for the purpose of stability, to lift a work platform, each rope should be capable of carrying the load independently.

13.9. Transport facilities

13.9.1. Transport facilities for materials and persons should comply with national or international safety regulations and good practice as regards design, construction and operation.

13.9.2. Except in cases of emergency, the transport of persons on vehicles or equipment not designed and approved for this purpose should be prohibited. A notice to this effect should be prominently displayed.

14. Competence and training

14.1. General

14.1.1. The necessary OSH competence requirements should be defined by the employer based on the provisions of the national laws or regulations or, in the absence thereof, in consultation with workers' representatives. Appropriate training arrangements should be established and maintained to ensure that all persons are competent to perform the safety and health aspects of their present or planned duties and responsibilities.

14.1.2. The employer should have, or should have access to, sufficient OSH competence to identify and eliminate or control work-related hazards and risks, and to implement the OSH management system. Specific training needs can be identified from the initial and ongoing hazard identification and risk assessment process.

14.1.3. Training programmes should:

- (a) cover all members of the establishment, as appropriate;
- (b) be conducted by competent persons;
- (c) provide effective and timely initial and refresher training at appropriate intervals;
- (d) include participants' evaluation of their comprehension and retention of the training;
- (e) be reviewed periodically by the safety and health committee, where it exists, and modified as necessary;
- (f) be documented.

14.1.4. The form and the content of training should be devised and implemented in consultation with workers or

their representatives. Training should be in accordance with the identified needs and may include:

- (a) pertinent aspects of OSH legislation, such as the rights, responsibilities and duties of competent authorities, employers, contractors and workers;
- (b) the nature and degree of hazards or risks to safety and health which may occur, including any factors which may influence that risk, such as appropriate hygiene practices;
- (c) the correct and effective use of prevention, control and protection measures, especially engineering controls, and the worker's own responsibility for using such measures properly;
- (d) operating procedures while working in confined spaces;
- (e) correct methods for the handling of substances, the operation of processes and equipment, and for storage, transport and waste disposal;
- (f) assessments, reviews and exposure measurements, and the rights and duties of workers in this regard;
- (g) the role of health surveillance, the rights and duties of workers in this regard, and access to information;
- (h) instructions on PPE as may be necessary, their significance, correct use and limitations, and in particular on factors which may show inadequacy or malfunction of the equipment, and the measures which may be required for the workers to protect themselves;
- (i) hazard warning signs and symbols for hazardous ambient factors which may occur;
- (j) emergency measures, fire-fighting and fire prevention, and first aid;

- (k) appropriate hygiene practices to prevent, for example, the transmission of hazardous substances to the home or family environment;
- (l) cleaning, maintenance, storage and waste disposal, to the extent that these may cause exposure for the workers concerned;
- (m) procedures to be followed in an emergency.

14.1.5. Training should be provided to all participants at no cost and should take place during working hours. If this is not possible, the timing and other arrangements should be agreed upon between the employer and workers' representatives.

14.1.6. Employers should ensure that training and information requirements and procedures are kept under review, as part of the assessment review and documentation.

14.2. Qualification of managers and supervisors

14.2.1. Managers and supervisors should be in possession of an appropriate qualification and training, or have gained sufficient knowledge, skills and experience to qualify on the basis of competence, to ensure that they are able to:

- (a) plan and organize safe shipbreaking operations, including identification of hazards, assessments of risks and the implementation of preventive measures;
- (b) establish, implement and maintain an OSH management system;
- (c) monitor the status of safety and health in those operations for which they are responsible;
- (d) take remedial action in the event of non-compliance with requirements.

14.3. Qualification, training and skills testing for workers

14.3.1. Workers should be assigned and only perform work for which they have the required level of skills, knowledge and training.

14.3.2. Employers should ensure that all workers, including contractors and their workers, and casual workers, day labour and migrant workers, are:

- (a) sufficiently educated and trained in the tasks they are assigned to and possess the relevant skills certificates;
- (b) suitably instructed in the hazards connected with their work and environment, as well as trained in the precautions necessary to avoid accidents and injuries to health;
- (c) made aware of the relevant laws, regulations, requirements, codes of practice, instructions and advice relating to prevention of accidents and diseases;
- (d) informed of their individual and collective responsibility for safety and health;
- (e) sufficiently instructed in the correct use and effects of PPE and its appropriate care, and have training made available to them, as appropriate.

14.3.3. The required level of skill and knowledge should be defined and objectively assessed through skills testing leading to certification by an authorized body recognized by the competent authority. This procedure may be integrated with formal training or conducted at the worksite.

14.3.4. Prior to initial assignment to a specific task all workers should undergo appropriate training. This training should have clearly defined learning objectives, be structured and be conducted by a qualified instructor. It should include:

- (a) information about the purpose of the task and the methods and techniques to be used;
- (b) information about safety and health hazards;
- (c) use and maintenance of tools and machines;
- (d) selection and use of any PPE; and
- (e) assessment of performance for effectiveness and safety.

14.3.5. Training outcomes should be tested to make sure that workers are able to cope with the assigned task and acquire sufficient skill to perform it without endangering themselves, others and the working environment. Test results should be recorded, certified and notified to the client.

14.4. Qualifications of contractors and other third parties

14.4.1. Contracts for services should contain standard clauses requiring contractors to employ only workers who possess relevant skills, and to comply with national and establishment safety standards.

14.4.2. Registration systems for contractors should be established which make good safety performance a prerequisite for registration. Contractors' associations with voluntary membership can be an effective means of promoting safety and health among contractors.

15. Personal protective equipment and protective clothing

15.1. General provisions

15.1.1. In accordance with paragraph 4.4.3, only where adequate protection against exposure to hazardous ambient factors by the elimination of hazards/risks, their control at source, minimization by the design of safe work systems and collective measures cannot be ensured and all other measures are either impracticable or could not secure safe and healthy working conditions, suitable PPE and protective clothing should be provided and maintained by the employer.

15.1.2. PPE and protective clothing should comply with standards set by the competent authority, or recognized by national or international bodies, taking ergonomic principles into account, and be provided, as prescribed by national laws and regulations:

- (a) without cost to the workers;
- (b) having regard to the type of work and risks;
- (c) in consultation with workers and their representatives.

15.1.3. A competent person having a full understanding of the nature of the hazard and the type, range and performance of the protection required should:

- (a) select suitable items of PPE and protective clothing;
- (b) arrange that PPE and protective clothing are properly stored, maintained, cleaned, examined, replaced and, if necessary for health reasons, disinfected or sterilized at suitable intervals, in accordance with standards or guidance set or recognized by the competent authority.

Personal protective equipment and protective clothing

15.1.4. Employers should provide the workers with the appropriate instructions and means to enable them to use, maintain and store PPE and protective clothing properly.

15.1.5. Workers should be required to:

- (a) make proper use of and to take good care of PPE and protective clothing provided for their use;
- (b) use the provided PPE and protective clothing throughout the time they are exposed to the risk that requires its use.

15.1.6. PPE, which may be contaminated by materials hazardous to health, should not be laundered, cleaned or kept at workers' homes. Accommodation for clothing should be provided when protective clothing is required to be used or when there is a risk of the contamination of outdoor clothing by hazardous materials. Changing facilities should be so situated and designed to prevent the spread of contamination from protective clothing to personal clothing and from one facility to another.

15.1.7. In providing PPE and protective clothing, employers should take into account that:

- (a) proper maintenance and use of PPE, including appropriate behaviour of the user, are essential for providing the protection for which it is designed;
- (b) PPE itself may produce uncomfortable, unhealthy or unsafe working conditions;
- (c) only the user is protected, while others coming into the environment continue to be exposed;
- (d) PPE can provide a false sense of security, in particular when it is not properly used or has lost its effectiveness as a result of improper storage or maintenance;
- (e) PPE may introduce additional hazards to the workforce.

15.2. Head protection

15.2.1. Safety helmets or hard hats to protect the head from injury due to falling or flying objects, or due to striking against objects or structures, should be worn by all persons, at all times while in the shipbreaking facility. It may be necessary to carry different types of helmets for particular activities.

15.2.2. In general, the shell of a helmet should be of one-piece construction, with an adjustable cradle inside to support the helmet on the wearer's head and, where appropriate, a chinstrap to prevent the helmet from falling off. The cradle and chinstrap should be properly adjusted to ensure a snug fit as soon as the helmet is put on.

15.3. Face and eye protection

15.3.1. Clear or coloured goggles, a screen, a face shield or other suitable device should be worn when there is likely exposure to eye or face injury from airborne dust or flying particles, dangerous substances, harmful heat, light or other radiation, and in particular during welding, flame cutting, rock drilling, concrete mixing or other hazardous work.

15.3.2. Face and eye protectors are available in a wide variety of designs. Careful consideration should be given to the characteristics of the respective hazard to ensure the selection of the appropriate protector. Ordinary prescription (corrective) goggles, unless manufactured to a safety standard, do not afford protection. Certain box-type goggles are designed so that they can be worn over ordinary spectacles.

15.4. Hand and foot protection

15.4.1. Protective gloves or gauntlets, appropriate barrier creams and suitable protective clothing to protect hands or the whole body, as required, should be worn when exposed to heat radiation or while handling hot, hazardous or other substances which might cause injury to the skin.

15.4.2. Gloves should give protection from the particular hazard of the work being carried out and must be appropriate to that type of work. For example, leather gloves are generally better for handling rough or sharp objects, heat-resistant gloves for handling hot objects, and rubber, synthetic or PVC gloves for handling acids, alkalis, various types of oils, solvents and chemicals.

15.4.3. Footwear of an appropriate type should be employed in workplaces where there is the likelihood of exposure to adverse conditions or of injury from falling or crushing objects, hot or hazardous substances, sharp edged tools or nails and slippery wet surfaces.

15.4.4. Appropriate safety footwear, such as shoes and boots, should have firm, slip-resistant soles and reinforced toecaps. Sandals and similar footwear should not be worn when working.

15.5. Respiratory protective equipment

15.5.1. Respiratory protective equipment, suitable for the particular environment, should be used when workers cannot be protected against airborne dust, fumes, vapours or gases by ventilation or other means.

15.5.2. Appropriate respiratory protective equipment should be provided for work in conditions where there is a

risk of oxygen deficiency or exposure to poisonous, dangerous or irritating fumes, dust or gases. The selection of correct equipment is essential. Since there is a wide variety of equipment available for shipboard use, advice should be sought on the appropriate equipment for use on particular ships and for particular purposes. Workers should be trained in the use and care of equipment. The face-piece incorporated in respirators and breathing apparatus must be fitted correctly to prevent leakage. Beards and whiskers are likely to interfere with the face seal, as may the wearing of goggles, unless adequately designed for the purpose.

15.6. Hearing protection

15.6.1. Workers who by the nature of their duties are exposed to high levels of noise should be provided with and should wear ear protectors. Various types of hearing protectors are available, including ear plugs and ear muffs (the latter providing the most effective protection), each of which may be of different design standards. Protectors should be of a type recommended as suitable for the particular circumstances and climatic conditions. Hearing protectors should be made available at the entrance to the noisy space.

15.7. Protectors against radioactive contamination

15.7.1. Respirators, overalls, head coverings, gloves, tight-fitting boiler suits, impermeable footwear and aprons appropriate to the risks of radioactive contamination should be worn in areas where unsealed radioactive sources are prepared or used.

15.8. Protection from falls

15.8.1. Safety harnesses with independently secured lifelines should be worn where protection against falls cannot be provided by other appropriate means; and life vests and life preservers where there is a danger of falling into water.

15.9. Clothing

15.9.1. The clothing supplied should meet the following requirements:

- (a) waterproof clothing and head coverings when working in adverse weather conditions;
- (b) distinguishing clothing or reflective devices or otherwise conspicuously visible material when there is regular exposure to danger from moving vehicles.

16. Contingency and emergency preparedness

16.1. General

16.1.1. Emergency planning, prevention, preparedness and response arrangements for every type of ship, all ship-breaking operations and related handling of hazardous chemicals should be established and maintained in cooperation with external emergency services and other bodies where applicable. These arrangements should identify the potential for accidents and emergency situations, and address the prevention of OSH risks associated with them.

16.1.2. The emergency plans should be made in accordance with relevant international instruments and national laws and regulations, and considering the size and nature of activity at the shipbreaking facility.

16.1.3. The emergency response plan should be developed locally for each shipbreaking facility and should be comprehensive enough to deal with all types of emergencies. The plan should include, at a minimum, the following:

- (a) emergency escape routes and procedures;
- (b) procedures to be followed by workers who remain to perform critical operations before they evacuate;
- (c) the evacuation of the worksite, especially from inside the ship's hull and surrounding area, premises or establishment;
- (d) procedures to account for all workers after the emergency evacuation is complete;
- (e) rescue and medical duties for workers who are to perform them;
- (f) the means for reporting fire and other emergencies;

- (g) the provision of relevant information and training to all personnel of the facility, at all levels, including regular exercises in emergency prevention, preparedness and response procedures.

16.1.4. A chain of command should be established to minimize confusion and ensure that workers have no doubt about who has the authority to make decisions. Responsible individuals should be selected to coordinate the work of the emergency response teams. The responsibilities of the coordinator(s) should include:

- (a) assessing the situation and determining whether an emergency exists that requires activating the emergency procedures;
- (b) acting to minimize the event, e.g. controlling the fire, controlling leaks and spills, emergency shutdown, and action specifically prohibited if persons are put at risk;
- (c) directing all efforts in the area, including evacuating personnel and minimizing the loss of property;
- (d) ensuring that emergency response services, such as medical aid and fire response are summoned when necessary;
- (e) providing information to, and communication with, the relevant competent authorities and the neighbourhood and emergency response services;
- (f) directing the shutdown of shipbreaking operations when necessary.

16.1.5. The necessary and most recent information, as well as internal communication and coordination, should be provided to protect all persons in the event of an emergency at the worksite. Alarms should be capable of being seen and heard by everyone.

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16.1.6. Emergency response teams should be capable of, among other things:

- (a) fire-fighting;
- (b) first aid;
- (c) resuscitation;
- (d) shutdown procedures;
- (e) evacuation procedures;
- (f) chemical spill procedures;
- (g) use of self-contained breathing apparatus and other PPE; and
- (h) search and rescue.

16.1.7. In the absence of formal medical facilities at the shipbreaking site, the following should be considered:

- (a) eye washes, showers or suitable equipment for quick drenching or flushing should be provided in the area for immediate use, where the eyes or body of any worker may be exposed to injurious corrosive materials;
- (b) emergency telephone numbers, or other contact information should be posted in conspicuous places.

16.1.8. Notwithstanding anything contained in paragraphs 16.1.3 to 16.1.7, emergency procedures, first aid and fire-fighting for the handling, storage and transport of chemicals, disposal and treatment of waste chemicals, the release of chemicals resulting from work activities, and the breaking of equipment and containers for chemicals at shipbreaking facilities should be established and based on the provisions of Chapter 14 of the ILO code of practice *Safety in the use of chemicals at work*. Where in a shipbreaking facility hazardous chemicals are stored or processed in such a form and

such a quantity that they possess the potential to cause a major accident, the provisions for emergency planning in Chapters 8 and 9 of the ILO code of practice *Prevention of major industrial accidents* should apply.

16.2. First aid

16.2.1. The employer should be responsible for ensuring that first aid, including the provision of trained personnel, is available. Arrangements should be made for ensuring the safe transport of persons for medical attention.

16.2.2. The manner in which first-aid facilities and personnel are to be provided should be prescribed by national laws or regulations, and drawn up after consulting the competent health authority and the most representative organizations of employers and workers concerned.

16.2.3. A sufficient number of workers for every shift should be trained in basic first aid. This training should include the treatment of open wounds, and resuscitation. In areas where the work involves the risk of intoxication by chemicals, fumes or smoke, insect bites or other specific hazards, first-aid training should be extended accordingly in consultation with an appropriately qualified person or organization.

16.2.4. First-aid training should be repeated at regular intervals to ensure that knowledge and skills do not become outdated or forgotten.

16.2.5. Where the work involves risk of drowning, asphyxiation or electric shock, first-aid personnel should be proficient in the use of resuscitation and other life-saving techniques and in rescue procedures.

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16.2.6. Suitable rescue and resuscitation equipment, as required, including stretchers, should be kept readily available at the shipbreaking facility or ship, as appropriate. All workers should be informed of the location of this equipment and the procedure for obtaining stocks.

16.2.7. First-aid kits or boxes, as appropriate, containing prescribed items, should be provided at and be readily accessible from all workplaces, including isolated locations, from lifting appliances, boats, transport and floating equipment, and for maintenance crews, and be protected against contamination by dust, moisture, etc. These containers should be clearly marked and contain nothing other than first-aid equipment.

16.2.8. First-aid kits and boxes should contain simple and clear instructions to be followed, be kept under the charge of a responsible person qualified to give first aid and be regularly inspected and kept properly stocked.

16.2.9. If a minimum number of workers as prescribed is employed in any shift, at least one suitably equipped first-aid room or station under the charge of qualified first-aid personnel or a nurse should be provided at a readily accessible place for treatment of minor injuries and as a rest place for seriously sick or injured workers.

16.3. Rescue

16.3.1. Provision should be made for the quick evacuation of a person in the event of an injury or illness which requires medical assistance.

16.3.2. Transport or a means of communication should be available at the worksite to contact rescue services in case

of an emergency. The functioning of the communication arrangements should be checked periodically.

16.3.3. All workers should be informed on the procedures to be followed in case of emergency. Information should also be given on the worksite and on the location of meeting points for evacuation.

16.3.4. At worksites a place should be provided where an ill or injured person might rest in comfort until the evacuation is under way.

16.3.5. Vehicles for transportation to a point where an ambulance can be met should always be available.

16.3.6. Where professional help is not available within a reasonable distance, particularly in remote areas, consideration should be given to the creation of the necessary dispensing and health-care facilities.

17. Special protection

17.1. Employment and social insurance

17.1.1. Employers should, as prescribed by national laws and regulations or in accordance with national conditions and practice:

- (a) ensure that every worker has an employment contract and is covered by a scheme for workers' compensation and social protection;
- (b) provide coverage, such as benefits in case of injury, sickness, temporary and permanent disability through workers' compensation in the event of occupational accidents and diseases, and compensation for survivors in the event of work-related death, to all workers in ship-breaking, irrespective of their employment status.

17.2. Working hours

17.2.1. Any OSH scheme should provide for reasonable working hours which should not exceed the number prescribed by national laws and regulations or approved by labour inspectorates or in collective agreements, where applicable. The Reduction of Hours of Work Recommendation, 1962 (No. 116), should be considered a guide for working-time arrangements.

17.2.2. Working hours should be arranged so as to provide adequate periods of rest which, as prescribed by national laws and regulations or approved by labour inspectorates or collective agreements, where applicable, should include:

- (a) short breaks during working hours, especially when the work is strenuous, dangerous or monotonous, to enable workers to recover their vigilance and physical fitness;
- (b) sufficient breaks for meals;
- (c) daily or nightly rest;
- (d) weekly rest.

17.3. Night work

17.3.1. In view of the hazardous nature of shipbreaking, night work should be discouraged. If, however, night work is contemplated it should be organized in accordance with the Night Work Convention (No. 171) and Recommendation (No. 178), 1990, whose provisions may be implemented by national laws and regulations, collective agreements or in any other manner appropriate to national conditions and practice.

17.3.2. Specific measures required by the nature of night work should be applied progressively. Such measures should comprise:

- (a) health assessments to reduce or avoid health problems associated with night work;
- (b) compensation in the form of working time, pay or similar benefits and appropriate social services, in accordance with the provisions of the Night Work Recommendation, 1990 (No. 178).

17.3.3. The employer should take the necessary measures to maintain during night work the same level of protection against occupational hazards as by day, in particular avoiding, as far as possible, the isolation of workers.

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17.3.4. Where shift work and night work are required, lighting and other safety and health conditions should be managed to ensure that shift risks do not exceed those in daytime operations.

17.4. Child labour

17.4.1. The Worst Forms of Child Labour Convention, 1999 (No. 182), should apply to all persons under the age of 18 and to work which, by its nature or the circumstances in which it is carried out, is likely to harm the health, safety or morals of children. The types of this hazardous work should all be determined by national laws or regulations or by the competent authority, after consultation with the organizations of employers and workers concerned.

17.5. Alcohol- and drug-related problems

17.5.1. As the consumption of alcohol or drugs can have a negative impact on safety in the workplace, national policy and laws and regulations with respect to the prevention, reduction and management of alcohol- and drug-related problems in the workplace should be determined after consultation with the most representative employers' and workers' organizations and other experts. The ILO code of practice *Management of alcohol- and drug-related issues in the workplace* provides relevant guidance.

17.6. HIV/AIDS

17.6.1. HIV/AIDS and its impact strike hardest at vulnerable groups, including women and children, thereby increasing existing gender inequalities and exacerbating the

problem of child labour. The ILO code of practice *HIV/AIDS and the world of work* should be instrumental in helping to prevent the spread of the epidemic, mitigate its impact on workers and their families and provide social protection to help cope with the disease.

18. Welfare

18.1. General provisions

18.1.1. At or within reasonable access of every ship-breaking location or premises, the following facilities should be provided, kept clean and maintained:

- (a) sanitary and washing facilities or showers;
- (b) facilities for changing and for the storage and drying of clothing;
- (c) accommodation for taking meals and for taking shelter during interruption of work due to adverse weather conditions.

18.1.2. The scale of the above facilities, and their construction and installation should comply with the requirements of the competent authority.

18.2. Drinking water

18.2.1. An adequate supply of wholesome drinking water should be provided at or within reasonable access of every shipbreaking facility.

18.2.2. Transport tanks, storage tanks and dispensing containers should be designed, used, cleaned and disinfected at suitable intervals in a manner approved by the competent authority.

18.2.3. Water that is unfit to drink should be conspicuously indicated by notices prohibiting workers from drinking it.

18.3. Sanitary and washing facilities

18.3.1. Sanitary and washing facilities should be provided by the employer to enable workers to meet a standard

of personal hygiene consistent with the adequate control of exposure and the need to avoid the spread of materials hazardous to health.

18.3.2. Sanitary and washing facilities should be conveniently accessible but situated so that they are not themselves exposed to contamination from the workplace. The type of facilities should be related to the nature and degree of exposure. Where workers are exposed to skin contamination by poisonous, infectious or irritating substances, or oil, grease or dust, there should be a sufficient number of appropriate sanitary and washing facilities or showers.

18.4. Cloakrooms

18.4.1. Cloakrooms should be provided for workers at easily accessible places:

- (a) with suitable facilities for drying wet clothes and not be used for any other purpose; and
- (b) for hanging clothing including, where necessary to avoid contamination, suitable lockers separating working from street clothes.

18.4.2. Suitable arrangements should be made for disinfecting cloakrooms and lockers in conformity with the requirements of the competent authority.

18.5. Shelters and facilities for food and drink

18.5.1. Shelters should be made available, at or within easy access of the worksite, for protection from inclement weather and for providing facilities for washing, taking meals and for drying and storing clothing.

18.5.2. In appropriate cases, adequate facilities for heating, warming, obtaining or preparing food and drink at or near a shipbreaking facility should be provided.

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18.5.3. In order to reduce the risk of ingesting materials hazardous to health, employers should prohibit eating, chewing, drinking or smoking in work areas in which adequate control of exposure can only be achieved by workers wearing PPE to prevent exposure to materials hazardous to health and in any other area where such materials are likely to be present.

18.5.4. Where it is necessary to prohibit eating or drinking, suitable facilities should be set aside for these activities to be carried out in an uncontaminated area, which should be conveniently accessible from the work area.

18.6. Living accommodation (housing)

18.6.1. Suitable living accommodation should be made available for the workers at shipbreaking facilities which are remote from their homes, where adequate transportation between the facility and their homes or other suitable living accommodation is not available.

18.6.2. The competent authority, if appropriate, should identify the agency or agencies responsible for providing such living accommodation and should specify the minimum standards for housing, including its construction material, minimum size and layout of accommodation, cooking, washing, storage, water supply and sanitary facilities.

Bibliography

The International Labour Conference has adopted a large number of international labour Conventions and accompanying Recommendations directly concerned with OSH issues, as well as elaborated many codes of practice and technical publications applicable to shipbreaking. They represent a body of definitions, principles, obligations, duties and rights, as well as technical guidance reflecting the consensual views of the ILO's tripartite constituents from its 177 member States¹ on most aspects of OSH.

1. Relevant ILO Conventions and Recommendations

1.1. Fundamental ILO Conventions and accompanying Recommendations

Eight Conventions were included by the International Labour Conference in the ILO Declaration on Fundamental Principles and Rights at Work. These eight Conventions cover the following four areas:

Freedom of association

- Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87)
- Right to Organise and Collective Bargaining Convention, 1949 (No. 98)

The elimination of forced labour

- Forced Labour Convention, 1930 (No. 29)
- Abolition of Forced Labour Convention, 1957 (No. 105)

¹ As of October 2003.

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The abolition of child labour

- Minimum Age Convention (No. 138) and Recommendation (No. 146), 1973
- Worst Forms of Child Labour Convention (No. 182) and Recommendation (No. 190), 1999

The elimination of discrimination

- Discrimination (Employment and Occupation) Convention (No. 111) and Recommendation (No. 111), 1958
- Equal Remuneration Convention (No. 100) and Recommendation (No. 90), 1951

1.2. Conventions and Recommendations on occupational safety and health and working conditions

- Radiation Protection Convention (No. 115) and Recommendation (No. 114), 1960
- Reduction of Hours of Work Recommendation, 1962 (No. 116)
- Guarding of Machinery Convention (No. 119) and Recommendation (No. 118), 1963
- Employment Injury Benefit Convention (No. 121) and Recommendation (No. 121), 1964
- Maximum Weight Convention (No. 127) and Recommendation (No. 128), 1967
- Workers' Representatives Convention, 1971 (No. 135)
- Benzene Convention (No. 136) and Recommendation (No. 144), 1971
- Occupational Cancer Convention (No. 139) and Recommendation (No. 147), 1974
- Working Environment (Air Pollution, Noise and Vibration) Convention (No. 148) and Recommendation (No. 156), 1977
- Occupational Safety and Health (Dock Work) Convention (No. 152) and Recommendation (No. 160), 1979

- Occupational Safety and Health Convention (No. 155) and Recommendation (No. 164), 1981
 - Protocol of 2002 (recording and notification of occupational accidents and diseases) to the Occupational Safety and Health Convention, 1981 (No. 155)
 - Occupational Health Services Convention (No. 161) and Recommendation (No. 171), 1985
 - Asbestos Convention (No. 162) and Recommendation (No. 172), 1986
 - Chemicals Convention (No. 170) and Recommendation (No. 177), 1990
 - Night Work Convention (No. 171) and Recommendation (No. 178), 1990
 - Prevention of Major Industrial Accidents Convention (No. 174) and Recommendation (No. 181), 1993
 - Maternity Protection Convention (No. 183) and Recommendation (No. 191), 2000
 - List of Occupational Diseases Recommendation, 2002 (No. 194)
- 2. Selected ILO codes of practice with provisions which are relevant and applicable to shipbreaking activities**
- *Safety and health in shipbuilding and ship repairing*, 1974
 - *Protection of workers against noise and vibration in the working environment*, 1977
 - *Occupational safety and health in the iron and steel industry*, 1983
 - *Safety in the use of asbestos*, 1984
 - *Safety, health and working conditions in the transfer of technology to developing countries*, 1988
 - *Prevention of major industrial accidents*, 1991
 - *Safety in the use of chemicals at work*, 1993

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- *Accident prevention on board ship at sea and in port* (2nd edition), 1996
- *Management of alcohol- and drug-related issues in the workplace*, 1996
- *Recording and notification of occupational accidents and diseases*, 1996
- *Protection of workers' personal data*, 1997
- *Safety and health in dock work*, 1997
- *Ambient factors in the workplace*, 2001
- *Safety in the use of synthetic vitreous fibre insulation wools (glass wool, rock wool, slag wool)*, 2001
- *HIV/AIDS and the world of work*, 2001
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3. Relevant publications

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World Health Organization (WHO). 1999. *Hazard prevention and control in the working environment: Airborne dust*, Occupational and Environmental Health Series (Geneva).

4. References to important Internet information sources on chemical safety

ILO InFocus Programme on Safety, Health and the Environment (SafeWork) www.ilo.org/safework

ILO International Occupational Safety and Health Information Centre (CIS) www.ilo.org/cis

IPCS International Chemical Safety Cards www.who.int/ipcs and at CIS web site: www.ilo.org/public/english/protection/safework/cis/products/icsc/index.htm

Inter-Organization Program for Sound Management of Chemicals (IOMC) www.who.int/iomc

Intergovernmental Forum on Chemical Safety (IFCS) www.who.int/ifcs

Committee of Experts on the Transport of Dangerous Goods (TDG) and on the Globally Harmonized System of the Classification and Labelling (GHS) www.unece.org/trans/danger

Organisation for Economic Co-operation and Development OECD www.oecd.org/ehs

Annex I

Workers' health surveillance (adapted from the ILO *Technical and ethical guidelines for workers' health surveillance*, 1998)

1. General principles

1.1. Competent authorities should ensure that laws and regulations governing workers' health surveillance are properly applied.

1.2. Workers' health surveillance should be carried out in consultation with workers and/or their representatives:

- (a) with the central purpose of primary prevention of occupational and work-related injuries and diseases;
- (b) under controlled conditions and within an organized framework, as may be prescribed by national laws and regulations and in accordance with the Occupational Health Services Convention, 1985 (No. 161), and Recommendation, 1985 (No. 171), and the ILO *Technical and ethical guidelines for workers' health surveillance*, Occupational Safety and Health Series, No. 72 (Geneva, 1998).

2. Organization

2.1. The organization of workers' health surveillance at different levels (national, industry, enterprise) should take into account:

- (a) the need for a thorough investigation of all work-related factors and the nature of occupational hazards and risks in the workplace which may affect workers' health;
- (b) the health requirements of the work and the health status of the working population;
- (c) the relevant laws and regulations and the available resources;
- (d) the awareness of workers and employers of the functions and purposes of such surveillance;
- (e) the fact that surveillance is not a substitute for monitoring and control of the working environment.

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2.2. In accordance with the needs and available resources, workers' health surveillance should be carried out at national, industry, enterprise and/or other appropriate levels. Provided that surveillance is carried out or supervised by qualified occupational health professionals, as prescribed by national laws and regulations, it can be undertaken by:

- (a) occupational health services established in a variety of settings, e.g. within one enterprise or among enterprises;
- (b) occupational health consultants;
- (c) the occupational and/or public health facilities available in the community where the enterprise is located;
- (d) social security institutions;
- (e) worker-run centres;
- (f) contracted professional institutions or other bodies authorized by the competent authority;
- (g) a combination of any of the above.

2.3. A comprehensive system of workers' health surveillance should:

- (a) include individual and collective health assessments, occupational injury and disease recording and notification, sentinel event notification, surveys, investigations and inspections;
- (b) comprise the collection of information from various sources, and the analysis and evaluation with regard to quality and intended use;
- (c) determine action and follow-up, including:
 - (i) guidance on health policies and occupational safety and health programmes;
 - (ii) early warning capabilities so that the competent authority, employers, workers and their representatives, occupational health professionals and research institutions can be alerted to existing or emerging occupational safety and health problems.

3. Assessment

3.1. Medical examinations and consultations as the most commonly used means of health assessment of individual workers, either as part of screening programmes or on an as-needed basis, should serve the following purposes:

- (a) the assessment of the health of workers in relation to hazards or risks, giving special attention to those workers having specific needs for protection in relation with their health condition;
- (b) detection of pre-clinical and clinical abnormalities at a point when intervention is beneficial to individual health;
- (c) prevention of further deterioration in workers' health;
- (d) evaluation of the effectiveness of control measures in the workplace;
- (e) reinforcement of safe methods of work and health maintenance;
- (f) assessment of fitness for a particular type of work with due regard for the adaptation of the workplace to the worker, taking into account individual susceptibility.

3.2. Pre-assignment medical examinations, where appropriate, carried out before or shortly after employment or assignment, should:

- (a) collect information which serves as a baseline for future health surveillance;
- (b) be adapted to the type of work, vocational fitness criteria and workplace hazards.

3.3. During employment, medical examinations should take place at periodic intervals, as prescribed by national laws and regulations, and be appropriate to the occupational risks of the enterprise. These examinations should also be repeated:

- (a) on resumption of work after a prolonged absence for health reasons;

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- (b) at the request of the worker, for example in the case of change of work and, in particular, change of work for health reasons.

3.4. Where persons have been exposed to hazards and, as a consequence, there is a significant risk to their health in the long term, suitable arrangements should be made for post-employment medical surveillance for the purposes of ensuring the early diagnosis and treatment of such diseases.

3.5. Biological tests and other investigations should be prescribed by national laws and regulations. They should be subject to the workers' informed consent and performed according to the highest professional standards and least possible risk. These tests and investigations should not introduce unnecessary new hazards to the workers.

3.6. Genetic screening should be prohibited or limited to cases explicitly authorized by national legislation, in accordance with the ILO code of practice *Protection of workers' personal data*.

4. Use and records of data

4.1. Workers' personal medical data should:

- (a) be collected and stored in conformity with medical confidentiality, in accordance with the ILO code of practice *Protection of workers' personal data* (Geneva, 1997);
- (b) be used to protect the health of workers (physical, mental and social well-being) individually and collectively, in accordance with the ILO *Technical and ethical guidelines for workers' health surveillance*.

4.2. The results and records of workers' health surveillance should:

- (a) be clearly explained by professional health personnel to the workers concerned or to persons of their choice;
- (b) not be used for unwarranted discrimination, for which there should be recourse in national law and practice;

- (c) be made available, where requested by the competent authority, or to any other party agreed by both employers and workers, to prepare appropriate health statistics and epidemiological studies, provided anonymity is maintained, where this may aid in the recognition and control of occupational injuries and diseases;
- (d) be kept during the time and under conditions prescribed by national laws and regulations, with appropriate arrangements to ensure that workers' health surveillance records are securely maintained for establishments that have closed down.

Annex II

Surveillance of the working environment

(according to the Occupational Health Services Recommendation, 1985 (No. 171))

1. The surveillance of the working environment should include:

- (a) identification and evaluation of the hazards and risks which may affect the workers' safety and health;
- (b) assessment of conditions of occupational hygiene and factors in the organization of work which may give rise to hazards or risks to the safety and health of workers;
- (c) assessment of collective and PPE;
- (d) assessment where appropriate of exposure of workers to hazardous agents by valid and generally accepted monitoring methods;
- (e) assessment of control systems designed to eliminate or reduce exposure.

2. Such surveillance should be carried out in liaison with the other technical services of the undertaking and in cooperation with the workers concerned and their representatives in the undertaking and/or the safety and health committee, where they exist.

3. In accordance with national law and practice, data resulting from the surveillance of the working environment should be recorded in an appropriate manner and be available to the employer, the workers and their representatives in the undertaking concerned or the safety and health committee, where they exist.

4. These data should be used on a confidential basis and solely to provide guidance and advice on measures to improve the working environment and the safety and health of workers.

5. The competent authority should have access to these data. They may only be communicated to others with the agreement of

the employer and the workers or their representatives in the undertaking or the safety and health committee, where they exist.

6. The surveillance of the working environment should entail such visits by the personnel providing occupational health services as may be necessary to examine the factors in the working environment which may affect the workers' health, the environmental health conditions at the workplace and the working conditions.

7. Without prejudice to the responsibility of each employer for the safety and health of workers in his/her employment, and with due regard to the necessity for the workers to participate in matters of occupational safety and health, personnel providing occupational health services should have such of the following functions as are adequate and appropriate to the occupational risks of the undertaking:

- (a) carry out monitoring of workers' exposure to hazards and risks, when necessary;
- (b) advise on the possible impact on the workers' health of the use of technologies;
- (c) participate in and advise on the selection of the equipment necessary for the personal protection of the workers against occupational hazards;
- (d) collaborate in job analysis and in the study of organization and methods of work with a view to securing a better adaptation of work to the workers;
- (e) participate in the analysis of occupational accidents and occupational diseases and in accident prevention programmes;
- (f) supervise sanitary installations and other facilities for the workers, such as drinking water, canteens and living accommodation, when provided by the employer.

8. Personnel providing occupational health services should, after informing the employer, workers and their representatives, where appropriate:

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- (a) have free access to all workplaces and to the installations the undertaking provides for the workers;
- (b) have access to information concerning the processes, performance standards, products, materials and substances used or whose use is envisaged, subject to their preserving the confidentiality of any secret information they may learn which does not affect the safety and health of workers;
- (c) be able to take for the purpose of analysis samples of products, materials and substances used or handled.

9. Personnel providing occupational health services should be consulted concerning proposed modifications in the work processes or in the conditions of work liable to have an effect on the safety and health of workers.

Annex III

Establishing an OSH management system (adapted from the *ILO Guidelines on occupational safety and health management systems, ILO-OSH 2001*)

1. Introduction

1.1. The positive impact of introducing occupational safety and health (OSH) management systems at the enterprise level, both on the reduction of hazards and risks and on productivity, is now recognized internationally by governments, employers and workers. The mutual benefits that accrue from the introduction of such systems should not be ignored if progress on improving safety and health and productivity in the shipbreaking industry is to be achieved.

1.2. While systems need to be specific to a shipbreaking facility and appropriate to the size and nature of activities, many elements of the ILO-OSH 2001 guidelines are generic and assistance from other industry sectors should not be difficult to obtain when implementing such a system. The design and application of OSH management systems at national and facility levels for shipbreaking should be guided by the *ILO Guidelines on occupational safety and health management systems, ILO-OSH 2001*.

1.3. The competent authority should:

- (a) promote the implementation and integration of OSH management systems as an integral part of the overall management of shipbreaking facilities;
- (b) elaborate national guidelines on the voluntary application and systematic implementation of OSH management systems based on the *ILO Guidelines on occupational safety and health management systems, ILO-OSH 2001*, or other internationally recognized safety and health management system compatible with *ILO-OSH 2001*, taking into consideration national conditions and practice;

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- (c) encourage the elaboration by authorized institutions of specific (tailored) guidelines on OSH management systems in shipbreaking facilities;
- (d) provide support and technical guidance to labour inspectorates, OSH services and other public or private services, agencies and institutions dealing with OSH, including health-care providers;
- (e) ensure that guidance is provided to employers and workers to assist them to comply with their legal obligations under the policy;
- (f) ensure cooperation between employers whenever two or more facilities engage in activities on the same project;
- (g) recognize the need, so long as the safety and health of workers are not compromised, to protect confidential information that could potentially cause harm to an employer's business.

1.4. With a view to developing, implementing and operating OSH management systems, employers should:

- (a) set out in writing their respective OSH policy, programmes and safety and health protection arrangements as part of the general facility management policy;
- (b) define the various safety and health responsibilities, accountability and authority levels and communicate these clearly to their workers, visitors or any other persons working in the facility, as appropriate;
- (c) ensure effective arrangements for the full participation of workers and their representatives in the fulfilment of the OSH policy;
- (d) define both the necessary OSH competence requirements for all persons and the consequent individual training needs;
- (e) ensure workers have sufficient information, in a form and language that they understand, to protect their health from hazardous ambient factors;

- (f) establish and maintain appropriate documentation and communication arrangements;
- (g) identify the hazards and carry out assessments of the specific risks to safety and health of workers presented in the workplace;
- (h) establish hazard prevention and control measures including emergency prevention, preparedness and response arrangements;
- (i) establish procedures for the compliance with OSH requirements in purchasing and leasing specifications and for contractors working on the site;
- (j) develop, establish and review procedures to monitor, measure and record OSH performance, taking into consideration the results of the investigations of work-related injuries and diseases, OSH compliance audits and reviews of the OSH system by management; and
- (k) identify and implement preventive and corrective actions and opportunities for continual improvement.

2. Occupational safety and health policy

2.1. The management of safety and health should be considered as a high priority management task. Consistent with the general policy of the shipbreaking facility, the employer should set out an OSH policy, which should:

- (a) be specific to the facility and appropriate to its size and the nature of its activities;
- (b) recognize OSH as an integral part of the overall management structure and OSH performance as an integral part of the business performance of the facility.

2.2. The OSH policy should include, as a minimum, the following key principles and objectives to which the facility management is committed:

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- (a) recognizing OSH as an integral part of the overall management structure and OSH performance as an integral part of the establishment's business performance;
- (b) protecting the safety and health of all members of the establishment by preventing work-related injuries, ill health, diseases and incidents;
- (c) complying with relevant OSH national laws and regulations, voluntary programmes, collective agreements on OSH and other requirements to which the establishment subscribes or may wish to subscribe;
- (d) ensuring that workers and their representatives are consulted and encouraged to participate actively in all elements of the OSH management system; and
- (e) continual improvement of the performance of the OSH management system.

2.3. The extent and precise nature of a safety and health policy will clearly depend on the size and scope of the shipbreaking facility, but certain key components should be incorporated. These are:

- (a) the recruitment and training of personnel;
- (b) the identification of those personnel who have been assigned specific responsibilities in the area of safety and health;
- (c) the provision of equipment and substances in order to ensure a safe and healthy working environment;
- (d) arrangements for liaison with other concerned bodies, for example legislators, workers' organizations, public utilities such as water and electricity authorities, and organizations responsible for environmental conservation;
- (e) the function and constitution of the safety and health committee;
- (f) procedures for the enforcement of safety requirements adopted by the establishment whether by laws and regulations or otherwise;

- (g) procedures for the reporting of accidents, dangerous occurrences and occupational diseases;
- (h) the means by which the policy will be communicated to all those involved including the date on which the policy will be reviewed and, as necessary, revised;
- (i) emergency procedures.

3. Worker participation

3.1. Worker participation should be an essential element of the OSH management system in the facility. The employer should ensure that workers and their safety and health representatives are consulted, informed and trained on all aspects of OSH associated with their work, including emergency arrangements.

3.2. The employer should ensure, as appropriate, the establishment and efficient functioning of a safety and health committee and the recognition of workers' safety and health representatives, in accordance with national laws and practice. Safety and health committees should include workers or their representatives, employers' representatives and as far as practicable an occupational safety and health expert. Safety and health committees should meet regularly and participate in the decision-making process related to occupational safety and health-related issues.

4. Responsibility and accountability

4.1. The employer should have overall responsibility for the protection of workers' safety and health and provide leadership for OSH activities and initiatives in the facility.

4.2. The employer and senior management should allocate responsibility, accountability and authority among the personnel for the development, implementation and performance of the OSH management system and for OSH matters. These matters should constitute part of their overall responsibilities and be incorporated into job descriptions as part of management tasks.

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Measures should be taken to ensure that the personnel are competent and have the necessary authority and resources to perform their duties effectively.

4.3. Irrespective of the size and structure of the enterprise, senior managers should be appointed to develop, oversee and control safety and health standards. They should be the focal points to which problems will be addressed, including the recording and notification of occupational accidents and diseases.

4.4. Managers and supervisors should:

- (a) implement the facility's safety and health policy, including through the selection of safe equipment, work methods and work organization and the maintenance of high levels of skill;
- (b) endeavour to reduce risks and hazards to safety and health in the activities for which they are responsible to as low a level as possible;
- (c) ensure that workers and contractors receive adequate information on safety and health regulations, policies, procedures and requirements and satisfy themselves that this information is understood;
- (d) assign tasks to their subordinates in a clear and precise way. Managers and supervisors should satisfy themselves that workers understand and implement the safety and health requirements;
- (e) ensure that work is planned, organized and carried out in such a way as to minimize the risk of accidents and the exposure of workers to conditions that may lead to injury or damage to their health.

4.5. In consultation with workers, managers and supervisors should assess the need for additional instruction, training or further education of workers by monitoring compliance with safety requirements.

4.6. Supervisors should be responsible for monitoring the compliance by contractors and their workers with the requirements for occupational safety and health. In the event of non-compliance, supervisors should provide appropriate instruction and advice to contractors and their workers accordingly.

4.7. Workers should be made clearly aware of their rights and individual and collective duties for safety and health matters, as prescribed by national laws and regulation or adapted regulations of the facility.

4.8. Contractors employing workers for shipbreaking should be regarded as employers for the purposes of these guidelines and the provisions pertaining to the responsibilities and duties of employers should apply accordingly.

4.9. Contractors and labour supply agents should:

- (a) be registered or hold licences where required by national laws or regulations or subscribe to recognized voluntary schemes where they exist;
- (b) make themselves aware of and operate according to the commissioning parties' policies and strategies for the promotion of safety and health and should comply and cooperate with related measures and requirements.

4.10. Contractors should comply with national laws and regulations concerning terms of employment, workers' compensation, labour inspection and OSH.

5. Competence and training

5.1. The necessary OSH competence requirements should be defined by the employer, and appropriate training arrangements established and maintained to ensure that all persons are competent to perform their present or future safety and health duties and responsibilities.

6. Documentation

6.1. According to the size and nature of activity of the facility, OSH management system documentation should be established and maintained, and may cover:

- (a) the OSH policy and objectives of the establishment;
- (b) the allocated key OSH management responsibilities of management, supervisors, workers and contractors, for the implementation of the OSH management system;
- (c) the significant OSH hazards/risks arising from the activities of the facility, including a list of all hazardous substances in the workplace, and the arrangements for their prevention and control; and
- (d) arrangements, procedures, instructions or other internal documents concerning the safety and health of workers used within the OSH management system.

6.2. OSH records should be established, managed and maintained locally and according to the needs of the establishment. They should be identifiable and traceable, and their retention times should be specified.

6.3. OSH documentation should be available to all workers, workers' representatives, or other party having an interest in or affected by its contents.

6.4. OSH records may include:

- (a) records arising from the implementation of the OSH management system;
- (b) records of work-related injuries, ill health, diseases and incidents, and relevant costs;
- (c) records arising from the implementation of national OSH laws or regulations;
- (d) records of workers' exposures, surveillance of the working environment and workers' health; and
- (e) the results of both active and reactive monitoring.

7. Communication and information

7.1. Arrangements and procedures should be established and maintained for:

- (a) receiving, documenting and responding appropriately to internal and external communications related to OSH;
- (b) ensuring the internal communication of obligatory or other OSH information between relevant levels and functions of the enterprise in the management framework; and
- (c) ensuring that the concerns, ideas and inputs of workers and their representatives on OSH matters are received, considered and responded to.

7.2. In order to ensure the full integration of safety and health concerns into shipbreaking operations, guidelines on working practices or operations manuals should incorporate safety and health regulations and advice alongside provisions pertaining to quality, productivity, environmental and other aspects.

8. Initial review

8.1. The existing OSH arrangements in a facility should be evaluated by an initial review, as appropriate. In the case where no formal OSH arrangements exist, or if the facility is newly established, an initial review should serve as a basis for establishing an OSH management system. The review should include both shore and ship-side operations. Before conducting the review three key questions should systematically be answered:

- (a) Where are we now?
- (b) Where do we want to be?
- (c) How do we get there?

8.2. In the context of a shipbreaking facility, prior to arrival, or alternatively on the arrival of a ship for breaking, an initial review in the form of an inventory survey should be completed by competent persons. The inventory or initial review should:

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- (a) identify, quantify, locate or anticipate physical, chemical, biological and other hazards and assess risks to safety and health arising from the existing or proposed work environment and work organization; and
- (b) result in the creation of an inventory list of hazardous substances (wastes) and other substances.

8.3. Additional reviews, as appropriate, should:

- (a) identify the current applicable national laws and regulations, national guidelines, tailored guidelines, voluntary schemes and other requirements to which the establishment subscribes;
- (b) determine whether planned or existing controls are adequate to eliminate hazards or control risks; and
- (c) analyse other available data, in particular data provided from workers' health surveillance (see Annex I) and the surveillance of the working environment (see Annex II).

8.4. The employer of the shipbreaking establishment should establish and maintain procedures to identify, evaluate systematically and record the hazards and risks to safety and health that may affect, or arise from the breaking of each individual ship.

9. System planning, development and implementation

9.1. Based on the results of the initial review, hazard identification and risk assessment and other available data, e.g. the results of workers' health surveillance (see Annex I), the surveillance of the working environment (see Annex II), active and reactive monitoring, the employer should:

- (a) define OSH objectives for the reduction of such risks to as low a level as possible;
- (b) devise and implement corresponding preventive measures, based on an appropriate order of prevention; and
- (c) develop, approve and implement a "safe shipbreaking plan" for each ship before any operation starts.

These activities should include the routine application of site inspection and planning as well as of the principles of work organization.

9.2. The planning arrangements should contribute to the improved protection of safety and health at work, and should include:

- (a) a clear definition, priority setting and quantification, where appropriate, of the OSH objectives of the establishment;
- (b) the preparation of a plan for achieving each objective, with defined responsibility and clear performance criteria indicating what is to be done by whom and when and what is the predicted result;
- (c) the selection of measurement criteria (indicators) for confirming that the objectives are achieved; and
- (d) the provision for adequate resources, including human and financial resources and technical support, as appropriate.

9.3. Resource allocation should include amongst others:

- (a) facilities, tools and equipment required to meet legislative and other adopted standards;
- (b) an organized infrastructure to respond to and mitigate the effects of accident risks and health hazards;
- (c) availability of management for reviewing and auditing standards and practices;
- (d) assessment of future needs arising from new technical or legal developments.

10. Occupational safety and health objectives

10.1. Consistent with the OSH policy and based on the initial review, subsequent reviews and other available data, measurable OSH objectives should be established, which are:

- (a) specific to the facility, and appropriate to and according to its size and nature of activity;

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- (b) consistent with the relevant and applicable national laws and regulations, and the technical and business obligations of the facility with regard to OSH;
- (c) focused towards continually improving workers' OSH protection to achieve the best OSH performance;
- (d) realistic and achievable;
- (e) agreed with those who deliver them;
- (f) set against a suitable timescale;
- (g) documented, and communicated to all relevant functions and levels of the enterprise; and
- (h) periodically evaluated and if necessary updated.

11. Hazard identification and risk assessment, preventive and protective measures

11.1. Employers should make arrangements for the identification and periodic assessment of the hazards and risks to safety and health from hazardous ambient factors at each permanent or temporary workplace, generated by the use of different operations, tools, machines, equipment and substances.

11.2. The assessment should be reviewed whenever there has been a significant change in the work to which it relates or when there is reason to suspect that it is no longer valid. The review should be incorporated in a system of management accountability which ensures that control action shown to be necessary by the initial assessment is in fact taken.

11.3. For works which by their very nature expose workers to hazards arising from the use or presence of hazardous chemical, physical or biological factors, psychosocial factors and climatic conditions, appropriate preventive and protective measures should be implemented to prevent those hazards and risks, or to reduce them to the lowest reasonable and practicable level, in conformity with national laws and regulations.

11.4. The employer should take appropriate measures for the prevention and control of, and protection against, occupational hazards in the working environment.

11.5. Hazards and risks to workers' safety and health should be identified and assessed on an ongoing basis. Preventive and protective measures should be implemented in the following order of priority:

- (a) eliminate the hazard/risk;
- (b) control the hazard/risk at source, through the use of engineering controls or organizational measures;
- (c) minimize the hazard/risk by the design of safe work systems, which include administrative control measures; and
- (d) where residual hazards/risks cannot be controlled by collective measures, the employer should provide for appropriate PPE, including clothing, at no cost, and should implement measures to ensure its use and maintenance.

11.6. The impact on OSH of internal changes (such as those in staffing or due to new processes, working procedures, organizational structures or acquisitions) and of external changes (for example, as a result of amendments of national laws and regulations, organizational mergers, and developments in OSH knowledge and technology) should be evaluated and appropriate preventive steps taken prior to the introduction of changes.

11.7. A workplace hazard identification and risk assessment should be carried out before any modification or introduction of new work methods, materials, processes or machinery.

11.8. Procedures should be established and maintained to ensure that:

- (a) compliance with safety and health requirements for the establishment is identified, evaluated and incorporated into purchasing and leasing specifications;

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- (b) national laws and regulations and the OSH requirements of the establishment are identified prior to the procurement of goods and services; and
- (c) arrangements are made to achieve conformance to the requirements prior to their use.

11.9. Arrangements should be established and maintained for ensuring that the safety and health requirements of the facility, or at least the equivalent, are applied to contractors and their workers.

12. Performance monitoring and measurement

12.1. Safety and health performance should be monitored against predetermined plans and standards and shipbreaking enterprises should measure what they are doing to implement their safety and health policy and to assess how effectively they are controlling risks. Monitoring should reinforce management's commitment to safety and health objectives and help in developing and promoting a positive safety and health culture.

12.2. Monitoring should provide:

- (a) feedback on OSH performance;
- (b) information to determine whether the day-to-day arrangements for hazard and risk identification, prevention and control are in place and operating effectively; and
- (c) the basis for decisions about improvement in hazard identification and risk control, and the OSH management system.

12.3. Active monitoring should contain the elements necessary to have a proactive system and should include:

- (a) monitoring of the achievement of specific plans, established performance criteria and objectives;
- (b) the systematic inspection of work systems, premises and equipment;

- (c) surveillance of the working environment (see Annex II), including work organization;
- (d) surveillance of workers' health (see Annex I), where appropriate, through suitable medical monitoring or follow-up of workers for early detection of signs and symptoms of harm to health in order to determine the effectiveness of preventive and protective measures; and
- (e) compliance with applicable national laws and regulations, collective agreements and other commitments on OSH to which the establishment subscribes.

12.4. Reactive monitoring should include the identification, reporting and investigation of:

- (a) work-related injuries, ill health (including monitoring of aggregate sickness absence records), diseases and incidents;
- (b) other losses, such as damage to property;
- (c) deficient safety and health performance, and OSH management system failures; and
- (d) workers' rehabilitation and health-restoration programmes.

13. Investigation of work-related injuries, ill health, diseases and incidents, and their impact on safety and health performance

13.1. Shipbreaking facilities should investigate and document the origin and underlying causes of all work-related injuries, ill health, diseases and incidents to identify any failures in the OSH management system.

13.2. Such investigations should be carried out by identified competent persons (internal or external) along with the appropriate participation of workers and their representatives. All investigations should conclude with a report on the action taken to prevent a recurrence.

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13.3. The results of all investigations should be communicated to the worker(s) involved and the safety and health committee, where it exists, to make any appropriate recommendations.

13.4. The results of investigations, in addition to any recommendations from the safety and health committee, should be communicated to:

- (a) appropriate persons for corrective action, included in the management review and considered for continual improvement activities; and
- (b) the competent authority, if so required by national laws and regulations.

13.5. Corrective action resulting from investigations should be implemented, and subsequently checked in order to avoid repetition of work-related injuries, ill health, diseases and incidents which gave rise to the investigation.

13.6. Reports produced by external investigation agencies, such as inspectorates and social insurance institutions, should be acted upon in the same manner as internal investigations, taking into account issues of confidentiality.

14. Audit

14.1. Arrangements to conduct periodic audits are to be established in order to determine whether the OSH management system and its elements are in place, adequate, and effective in protecting the safety and health of workers and preventing incidents.

14.2. The audit should evaluate all elements of the facility's OSH management system or a subset of these, as appropriate. Its conclusion should determine whether the implemented OSH management system elements or subset:

- (a) are effective in meeting the OSH policy and objectives of the facility;
- (b) are effective in promoting full worker participation;

- (c) respond to the results of OSH performance evaluation and previous audits;
- (d) enable the facility to achieve compliance with relevant national laws and regulations; and
- (e) fulfil the goals for continual improvement and best OSH practice.

14.3. Consultation on selection of the auditor and all stages of the workplace audit, including analysis of results, are subject to worker participation, as appropriate.

15. Management review

15.1. Management reviews should:

- (a) evaluate the overall strategy of the OSH management system to determine whether it meets planned performance objectives;
- (b) evaluate the OSH management system's ability to meet the overall needs of the establishment and its stakeholders, including its workers and the regulatory authorities;
- (c) identify what action is necessary to remedy any deficiencies in a timely manner, including adaptations of other aspects of the management structure and performance measurement of the establishment.

15.2. The findings of the management review should be recorded and formally communicated to:

- (a) the persons responsible for the relevant element(s) of the OSH management system so that they may take appropriate action; and
- (b) the safety and health committee, workers and their representatives.

16. Preventive and corrective action

16.1. Arrangements should be established and maintained for preventive and corrective action resulting from OSH manage-

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ment system performance monitoring and measurement, OSH management system audits and management reviews.

16.2. When the evaluation of the OSH management system or other sources show that preventive and protective measures for hazards and risks are inadequate or likely to become inadequate, the measures should be addressed according to the recognized hierarchy of preventive and protective measures, and completed and documented, as appropriate and in a timely manner.

17. Continual improvement

17.1. Arrangements should be established and maintained for the continual improvement of the relevant elements of the OSH management system and the system as a whole. The safety and health processes and performance of the facility should be compared with others in order to improve safety and health performance.

Annex IV

IMO inventory of potentially hazardous materials on board ships

This model inventory is part of the ship's green passport and provides information with regard to materials known to be potentially hazardous and utilized in the construction of the ship, its equipment and systems. It may be supplemented, as appropriate, with technical information in respect of certain categories of potentially hazardous materials listed in this document, particularly with regard to their proper removal and handling.

Part 1 – Potentially hazardous materials in the ship's structure and equipment

1A. Asbestos

(Note: All asbestos-containing materials (ACMs) or presumed asbestos-containing materials (PACMs) should be prominently labelled as such.)

<i>Type of asbestos materials (board, pipe lagging, contained)</i>	<i>Location</i>	<i>Approximate quantity/volume</i>
	Engine room/machinery rooms	
	Steam supply piping and hangers (general)	
	Steam exhaust piping and hangers (general)	
	Relief and safety valves (general)	
	Miscellaneous piping outer covering and hangers (general)	
	Water pipes and hangers (general)	
	HP turbine insulation (general)	

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<i>Type of asbestos materials (board, pipe lagging, contained)</i>	<i>Location</i>	<i>Approximate quantity/volume</i>
	Boiler drums and casings (general)	
	Heaters, tanks, etc. (general)	
	Other (general)	
	Specific machinery locations, e.g. pump room, boiler room	
	Accommodation	
	Sanitary and commissary spaces (general)	
	Interior decks – including underlay (general)	
	Steam and exhaust pipes (general)	
	Refrigeration pipes (general)	
	Air-conditioning ducts (general)	
	Cable transits (general)	
	External bulkheads (general)	
	Internal bulkheads (general)	
	External deckheads (general)	
	Internal deckheads (general)	
	Decks adjoining machinery spaces (general)	
	Other (general)	
	Specific accommodation locations	

<i>Type of asbestos materials (board, pipe lagging, contained)</i>	<i>Location</i>	<i>Approximate quantity/volume</i>
	Deck	
	Steam supply piping (general)	
	Exhaust piping (general)	
	Tank cleaning piping (general)	
	Stripping pump (general)	
	Other (general)	
	Specific deck locations	
	Machinery	
	Brake linings	

Caution!! Asbestos-containing material (ACM) may be found underneath materials that do not contain asbestos.

1B. Paint (on vessel's structure) – Additives

<i>Additive (lead, tin, cadmium, organotins (TBTs), arsenic, zinc, chromium, strontium, other)</i>	<i>Location</i>

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1C. Plastic materials

<i>Type</i>	<i>Location</i>	<i>Approximate quantity/volume</i>

1D. Materials containing PCBs, PCTs, PBBs at levels of 50mg/kg or more

<i>Material</i>	<i>Location</i>	<i>Approximate quantity/volume</i>

1E. Gases sealed in ship's equipment or machinery

<i>Type</i>	<i>Location</i>	<i>Approximate quantity/volume</i>
Refrigerants (R12/R22)		
Halon		
CO ₂		
Acetylene		
Propane		
Butane		
Oxygen		
Other (specify)		

1F. Chemicals in ship's equipment or machinery

<i>Type</i>	<i>Location</i>	<i>Approximate quantity/volume</i>
Anti-seize compounds		
Engine additives		
Antifreeze fluids		
Kerosene		
White spirit		
Boiler/water treatment		
De-ionizer regenerating		
Evaporator dosing and descaling acids		
Paint/rust stabilizers		
Solvents/thinners		
Chemical refrigerants		
Battery electrolyte		
Hotel service cleaners		
Other (specify)		

1G. Other substances inherent in ship's machinery, equipment or fittings

<i>Type</i>	<i>Location</i>	<i>Approximate quantity/volume</i>
Lubricating oil		
Hydraulic oil		
Lead acid batteries		
Alcohol		
Methylated spirits		

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<i>Type</i>	<i>Location</i>	<i>Approximate quantity/volume</i>
Epoxy resins		
Mercury		
Radioactive materials		
Other (specify)		

<i>Part 1 completed by</i>		<i>Date</i>	

Part 2 – Operationally generated wastes

2A. Dry tank residues

<i>Description of residues</i>	<i>Location</i>	<i>Approximate quantity/volume</i>

2B. Bulk (non-oily) waste

<i>Type</i>	<i>Location</i>	<i>Approximate quantity/volume</i>
Ballast water		
Raw sewage		
Treated sewage		
Garbage (inc. plastics)		
Debris		
Galley wastes		
Other (specify)		

2C. Oily waste/oily residues

<i>Type</i>	<i>Location</i>	<i>Approximate quantity/volume</i>
Cargo residues		
Tank scale		
Bunkers: Fuel oil		
Diesel oil		
Gas oil		
Lubricating oil		
Grease		
Hydraulic oil		
Waste oil (sludge)		

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<i>Type</i>	<i>Location</i>	<i>Approximate quantity/volume</i>
Oily water		
Oily/contaminated sludge		
Oily/contaminated rags		
Other (specify)		

<i>Part 2 completed by</i>		<i>Date</i>	

Part 3 – Stores

3A. Gases in store

<i>Type</i>	<i>No. and size of cylinders</i>	<i>Location</i>	<i>Approximate quantity/volume</i>
Refrigerants (R12/R22)			
Halon			
CO ₂			
Acetylene			
Propane			
Butane			
Oxygen			
Other (specify)			

3B. Chemicals in store

<i>Type</i>	<i>Location</i>	<i>Approximate quantity/volume</i>
Anti-seize compounds		
Engine additives		
Antifreeze fluids		
Kerosene		
White spirit		
Boiler/water treatment		
De-ionizer regenerating		
Evaporator dosing and descaling acids		
Paint/rust stabilizers		
Solvents/thinners		
Refrigerants		
Battery electrolyte		
Hotel service cleaners		
Other (specify)		

3C. Other packaged items in store

<i>Type</i>	<i>Location</i>	<i>Approximate quantity/volume</i>
Lubricating oil		
Hydraulic oil		
Lead acid batteries		
Medicines		
Insecticide sprays		
Alcohol		

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<i>Type</i>	<i>Location</i>	<i>Approximate quantity/volume</i>
Methylated spirits		
Epoxy resins		
Paint		
Fire-fighting clothing, equipment (e.g. blankets)		
Other (specify)		

<i>Part 3 completed by</i>		<i>Date</i>	

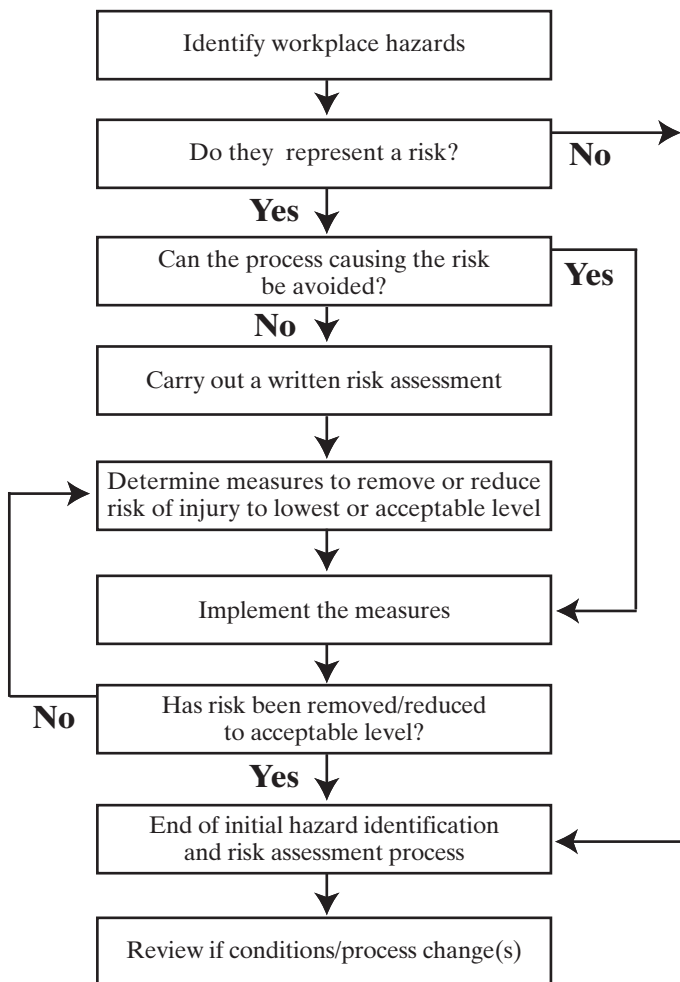
Annex V

Example of a model risk assessment tool

There are numerous ways for risks to be assessed and there are no fixed rules concerning how a risk assessment should be carried out or recorded. The following represents only one method that is simple and easy to administer.

- Step 1** – The first step involves the initial identification of hazards. It should be carried out for all locations on the ship and within the shipbreaking facility. Hazards identified should be listed according to the work environment or processes to be carried out and records should be kept of each assessment.
- Step 2** – A list of the hazards should be circulated to those who are responsible for the location/work processes.
- Step 3** – The third step involves the assignment of the risk ratings to those hazards (using the scale and formulas contained on the accompanying model form). A common system should be adopted for universal use in the facility.
- Step 4** – The methods/action to prevent or reduce the risk should be decided on, recorded and then implemented.
- Step 5** – The final review stage involves the reassessment of the hazard as necessary or if there is any change in the process, techniques/tools used, organization or other element that can affect the assessment.

Safety and health in shipbreaking



Example of a model risk assessment form

Location: m.v. Iron Breaker	Ref. No.: 001
Assessment date: 31 December 2002	Assessor name: S. A. Links
Process/activity assessed: Burning/cutting/grinding	
Identified hazard/risk (potential to cause injury or harm): As per the attached report covering – cuts, abrasions, skin punctures, wounds, burns, electric shock, dust, fumes, explosions, etc.	
Risk level:* <div style="display: flex; justify-content: space-around; align-items: center;"> Low Medium High </div>	
Are preventive measures being applied? <div style="display: flex; justify-content: space-around; align-items: center;"> Yes No </div>	
List precautions/preventive actions: Scheduled tool maintenance, education and training, documented process procedures, PPE, risk assessments, worker restrictions, regular physical checks on work being carried out. See also National Standard WE12345 2001.	
If NO precautions/preventive actions are in place, what remedial action is proposed?	
Date by which precautions/preventive actions are to be implemented: Not applicable	
Assessor(s) name and signature:	Date: 31 December 2002
Safety Officer Union representative	
Assessor(s) comments:	Suggest three-monthly reviews be carried out. (conclusion overleaf)

Safety and health in shipbreaking

Calculate by using the following criteria:

HAZARD (Consequence)

1. Negligible

2. Slight

③. Moderate

4. Severe

5. Very severe

PROBABILITY

1. Unlikely

2. Possible

③. Quite likely

4. Likely

5. Very likely

To establish the **Risk**, multiply the **Hazard** by the **Probability**

1-7 **Low**

8-14 **Medium***

15-25 **High**

Example of model process for risk assessment

Operation/activity assessed	Cutting and transporting of ship's section from stranded position to beach/break-up area.
Hazards/risk identified – in sequence of events/operation	<p>Establishing working platforms: Lifting/erecting scaffold/ladders. (3 x 2 = 6)</p> <p>Cutting: Gas freeing, use of cutting equipment/tools, gas cylinders, clearing of personnel, structure collapse. (2 x 2 = 4)</p> <p>Lifting/hauling gear: Attaching lifting/pulling wires and lugs, welding, hauling wires breakage. (2 x 2 = 4)</p> <p>Hauling: Breaking of wires, hauling machinery failure. (2 x 2 = 4)</p> <p>Detaching lifting/hauling wires: Removal of wires and lugs, stabilizing structure on beach. (2 x 2 = 4)</p>
Risk assessment mark (summary of individual marks)	6 + 4 + 4 + 4 + 4 = 22 – HIGH risk activity.
Possible safety and preventive measures	<p>Establishing working platforms: Use only sound ladders and platforms/scaffold, secure ladders before use, wear helmets and safety shoes/other PPE and clothing.</p> <p>Cutting: Check gas-free certificate is valid, check cutting equipment is free from defect, check safety valves on gas cylinders, clear structure of personnel, ensure cut structure is stable before final cut is made, use PPE and clothing.</p> <p>Lifting/hauling gear: Ensure access for welding of lugs is safe, check welding equipment for defects.</p> <p>Hauling: Clear area around structure and vicinity of wires when tensioned and when hauling, maintain clear contact with winch operator.</p> <p>Detaching lifting/hauling wires: Release tension in wires, erect platforms/ladders for safe access, check burning gear, control lowering of lugs and gear.</p> <p><i>(conclusion overleaf)</i></p>

Safety and health in shipbreaking

Date preventive measures to be applied	Process has high risk: preventive measures essential before process commences.		
Assessed by (name)	A.N. Other – Safety Officer A.J. General – Union representative		
Calculation criteria:			
Potential injury	Probability		
1. Negligible	1. Unlikely		
2. Slight	2. Possible		
3. Moderate	3. Quite possible		
4. Significant	4. Likely		
5. Very significant	5. Very likely		
Risk = Potential x Probability			
1-7 Low	8-14 Medium	15 + High	

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