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Petroleum and natural gas industries — Offshore production installations — Requirements and guidelines for emergency response

Industries du pétrole et du gaz naturel — Installations de production en mer — Exigences et lignes directrices pour les réactions d'urgence

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Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 15544 was prepared by Technical Committee ISO/TC 67, *Materials, equipment and offshore structures for petroleum and natural gas industries*, Subcommittee SC 6, *Processing equipment and systems*.

Annexes A, B, C, D, E, F and G of this International Standard are for information only.

Introduction

The successful development of the arrangements required to promote safety and environmental protection during the recovery of hydrocarbon resources requires a structured approach to be applied to the identification and assessment of the hazards which may be present during the various phases in the lifecycle of an offshore installation. These principles also apply to the development of the strategy, arrangements and procedures required to respond to emergencies. An understanding of the hazards can be achieved by the application of ISO 17776 [4], which gives guidelines for the processes of hazard identification and assessment for the offshore industry.

The content in this International Standard on escape, refuge, evacuation and rescue is consistent with the content of ISO 13702 [1] but addresses in more detail how these aspects are built into development of emergency response measures.

This International Standard has been prepared primarily to assist in the development of new installations, and as such it may not be appropriate to apply some of the requirements to existing installations. Retrospective application of this International Standard should only be undertaken where it is reasonable to do so. During the planning of a major change to an installation there may be more opportunity to implement the requirements, and a careful review of this International Standard should be undertaken to determine those clauses which can be utilized in the change.

This International Standard is based on an approach where the selection of measures for emergency response is determined by an evaluation of hazards on the offshore installation. The methodologies employed in this assessment and the resultant recommendations will differ depending on the complexity of the production process and facilities, type of facility (i.e. open or enclosed), manning levels, and the environmental conditions associated with the area of operation.

The verbal form “shall” indicates provisions that are mandatory and “should” indicates provisions to be considered.

Users of this International Standard should note that, while observing its requirements, they should at the same time ensure compliance with such statutory requirements, rules and regulations as may be applicable to the individual offshore installation concerned.

The principal objectives of this International Standard are to describe both the approach to be used and important considerations in determining the emergency response measures that are required on an offshore installation in order to:

— assure the safety of all personnel;

— minimize impact on the environment;

— minimize impact on assets and operations.

The technical guidance in clauses 4 to 13 of this International Standard is arranged as follows:

Objectives identify the goals to be achieved by the emergency response measures being described.

Functional requirements represent the minimum conditions which shall be satisfied to meet the stated objectives. The functional requirements are performance-orientated measures and, as such, should be applicable to the variety of offshore installations utilized for the development of hydrocarbon resources throughout the world.

Guidelines describe recognized practices which should be considered in developing the measures for emergency response. The guidelines are limited to principal elements and are intended to provide specific guidance which, due to the wide variety of offshore operating environments, may in some circumstances not be applicable.

The functional requirements and guidelines are supplemented by annexes A to H. The guidelines and annexes should be considered in conjunction with statutory requirements, industry standards and individual company philosophy, to determine the particular measures that are necessary for emergency response.

Petroleum and natural gas industries — Offshore production installations — Requirements and guidelines for emergency response

1 Scope

This International Standard describes objectives, functional requirements and guidelines for emergency response (ER) measures on installations used for the development of offshore hydrocarbon resources. It is applicable to fixed offshore structures or floating production, storage and off-take systems.

NOTE For mobile offshore units, the ER plans developed in conformance with the requirements and recommendations of the International Maritime Organization (IMO) are generally adequate for the normal, independent operation of the unit in most locations. The following aspects of ER planning are generally not addressed by IMO and should be specially considered:

— area evacuation, e.g. precautionary evacuation in areas of tropical revolving storms;

— combined operations wherein an integrated command and ER system should be developed;

— arctic operations;

— uncontrolled flow from a well.

2 Terms, definitions and abbreviated terms

For the purposes of this International Standard, the following terms, definitions and abbreviated terms apply.

2.1 Terms and definitions

2.1.1
abandonment
act of personnel onboard leaving an installation in an emergency

2.1.2
accommodation
place where personnel onboard sleep and spend their off-duty time

NOTE It may include dining rooms, recreation rooms, lavatories, cabins, offices, sickbay, living quarters, galley, pantries and similar permanently enclosed spaces.

2.1.3
control
<of hazards> limiting the extent and/or duration of a hazardous event to prevent escalation

2.1.4
control station
place on the installation from which personnel can monitor the status of the installation, initiate appropriate shutdown actions and undertake emergency communication

2.1.5
embarkation area
place from which personnel leave the installation during evacuation

EXAMPLES A helideck and associated waiting area or a lifeboat/liferaft boarding area.

2.1.6
emergency
hazardous event which cannot be handled by normal measures and requires immediate action to limit its extent, duration or consequences

2.1.7
emergency command centre
location from which the person in overall charge coordinates ER activities

2.1.8
emergency response
ER
action taken by personnel on or off the installation to control or mitigate a hazardous event or initiate and execute abandonment

2.1.9
emergency response arrangement
plant and equipment provided for use under emergency conditions

2.1.10
emergency response measure
anything provided to facilitate the management of an emergency

NOTE This is a generic term which includes emergency response arrangements, as well as the planning, procedural and organizational aspects of managing emergencies.

2.1.11
emergency response team
group of personnel who have designated responsibilities in an emergency for the safety of the installation, the safety of others or for environmental protection

2.1.12
emergency station
place to which emergency response personnel go to undertake their emergency duties

2.1.13
escalation
increase in the consequences of a hazardous event

2.1.14
escape
act of personnel moving away from a hazardous event to a place where its effects are reduced or removed

2.1.15
escape route
route leading to the place where people muster, or to an area from which people may leave the installation in an emergency

2.1.16
essential safety system
system which has a major role in the control and mitigation of a hazardous event and in any subsequent evacuation, escape and rescue activities

2.1.17
evacuation
planned method of leaving the installation in an emergency

2.1.18
evacuation, escape and rescue
EER
range of possible actions in an emergency

NOTE Such actions may include escape, muster, refuge, evacuation, escape to the sea and rescue/recovery.

2.1.19
evacuation, escape and rescue strategy
EERS
strategy that results from an evaluation of events that may require EER

NOTE This strategy describes the measures required and their role.

2.1.20
evacuation route
escape route which leads from the muster area to the place(s) used for primary or secondary evacuation from the installation

2.1.21
hazard
potential for human injury, damage to the environment, damage to property or a combination of these

2.1.22
hazard assessment
process whereby the results of an analysis of a hazard or hazardous event are considered against either judgement, standards, or criteria which have been developed as a basis for decision-making

2.1.23
hazardous event
incident which occurs when a hazard is realized

EXAMPLES Release of gas, fire, loss of buoyancy.

2.1.24
life-jacket
device worn by personnel which has sufficient buoyancy and stability in water to turn the body of an unconscious person and keep the person's mouth clear of the water

2.1.25
mitigation
limitation of the undesirable effects of a particular event

2.1.26
manned installation
installation which is normally occupied

2.1.27
mobile offshore unit
mobile platform, including drilling ships, equipped for drilling for subsea hydrocarbon deposits and/or for purposes other than production and storage of hydrocarbon deposits

2.1.28
muster
movement of people to a designated area so that the person in overall charge can account for all people and thereby facilitate subsequent emergency response actions

2.1.29
muster area
designated area to which personnel report when required to do so in an emergency

2.1.30
prevention
<of hazards> reduction of the likelihood of a hazardous event

2.1.31
primary method
<of evacuation> preferred method of leaving the installation in an emergency which can be carried out in a fully controlled manner under the direction of the person in charge

2.1.32
rescue
process by which those who have entered the sea directly or in survival craft/liferafts are retrieved to a place where medical assistance is available

2.1.33
risk
combination of the chance that a specified hazardous event will occur and the severity of the consequences of the event

2.1.34
secondary method
<of evacuation> method of leaving the installation in an emergency which can be carried out in a fully controlled manner under the direction of the person in charge, independent of external support

2.1.35
survival suit
protective suit made of materials which reduce body heat-loss of a person wearing it in cold water

2.1.36
survival craft
craft capable of sustaining the lives of persons in it from the time of abandoning the installation

2.1.37
temporary refuge
TR
place provided where personnel can take refuge for a predetermined period whilst investigations, emergency response and evacuation preparations are undertaken

NOTE A temporary refuge, where provided, need not necessarily be useable under all accident scenarios.

2.1.38
tertiary method
<for escape to the sea> method which relies considerably on the individual's own action

2.2 Abbreviated terms

EPIRB emergency position-indicating radio beacon

ERP emergency response plan

ERS emergency response strategy

ESD emergency shutdown

F&G fire and gas

HSE	health, safety and environmental
IEC	International Electrotechnical Commission
IMO	International Maritime Organization
SOLAS	Safety Of Life At Sea (Conference)
TR	temporary refuge

3 Framework for emergency response

Effective management systems are required to address the health and safety aspects of the activities undertaken by all companies associated with the offshore recovery of hydrocarbons[1)]. These management systems should be applied to all stages in the life cycle of an installation and to all related activities. Such a management system, which has been developed for environmental issues, is described in ISO 14001 [2] and the principles contained therein can also be applied to issues relating to health and safety.

One key element of effective management systems is a systematic process of identification of hazards, followed by evaluation and risk management. Risk reduction is an important component of risk management, and the selection of risk reduction measures will predominantly entail the use of sound engineering judgement. However, such judgements may need to be supplemented by recognition of the particular circumstances which may require variation to past practices and previously applied codes and standards. In certain circumstances, risk assessment may be able to provide useful input to the decision-making process providing that the operator has established criteria for this purpose. Risk reduction measures should include those to prevent incidents (i.e. reducing the probability of occurrence), to control incidents (i.e. limit the extent and duration of a hazardous event) and to mitigate the effects (i.e. reducing the consequences). Preventative measures such as using inherently safer designs and ensuring asset integrity should be emphasized wherever practicable. Measures to recover from incidents should be provided based on the evaluation and should be developed taking into account possible failures of the control and mitigation measures. Based on the results of the evaluation, detailed health, safety and environmental objectives and functional requirements should be set at appropriate levels.

The above is general and applies to all hazards and potentially hazardous events. ER should be treated in the same manner, and ER measures should be provided based on an evaluation that takes into account possible failures of the control and mitigation measures. It is these ER measures which, as an integrated system, provide the appropriate response to an incident occurring on or near the installation.

The results of the evaluation process and the decisions taken with respect to the need for, and role of, any measures required for ER should be fully recorded, in which case the record shall be available to those who operate the installation and to those involved in any subsequent change to the installation. This record is the emergency response strategy (ERS).

ISO 13702 introduced the concept of strategies but stated that such strategies do not have to be separately documented, as the relevant information may be included with other HSE information for an installation or may be contained in recognized codes and standards that are relevant to the operating location. Indeed there can be significant overlap between strategies and other HSE information, so that combining this information into one source is likely to assist the understanding by the people on the installation of how the various measures are integrated.

The ERP should set out the operational and procedural requirements to be followed under the various emergency scenarios that are relevant for a particular installation.

1) For example, operators should have an effective management system. Contractors should have either their own management system or conduct their activities consistently with the operator's management system.

The resources that typically are involved in ER can be divided into three categories:

a) **unit resources**

Resources which are under the direction of the person in overall charge of the installation, and which are immediately available. They include personnel and equipment, vessels and helicopters that have been assigned ER duties.

b) **area resources**

Resources which are not under the direction of the person in overall charge of the installation, but which are located in the same area. The resources are made available by a mutual aid or cooperation agreement, and may include installations in the vicinity, supply vessels, other vessels and helicopters.

c) **external resources**

Resources which are not under the direction of the person in overall charge of the installation, and which are not located in the area. Such resources may be the organization and resources of national and international rescue services, as well as other resources which professional bodies or others may place at the disposal of the field or installation manager. This may include aircraft, helicopters, coast guard and navy vessels, shore-based personnel resources, regional or national oil pollution resources, the public health service and resources governed by international agreements and other agreements among the operators of installations.

4 Emergency response strategy (ERS)

4.1 Objectives

— To identify in broad terms the means to be used to secure an adequate ER.

— To provide a statement which will permit monitoring of the adequacy of the ER measures so that they can be modified when necessary.

4.2 Functional requirements

An ERS shall be available for all offshore installations based on an assessment of the events that can arise.

The ERS shall address the issues of organization, procedures, equipment, information, training and the role of any other measures that are necessary to achieve a successful ER.

Functional requirements for ER measures shall be set at appropriate levels, as part of the ERS, against which the adequacy of the measures can be judged.

ER measures shall be developed taking into account possible failures of the control and mitigation measures.

In developing the ERS, the reliability and availability of equipment shall be considered to determine whether additional components are required to deal with periods of non-availability, e.g. due to maintenance or breakdown.

Strategies shall be periodically reviewed to confirm that they are still appropriate, and updated whenever there is a change to the installation or external situation which may significantly affect the content of the strategy.

4.3 Guidelines

The emergency planning and the communications arrangements should be sufficiently flexible and robust to allow effective assessment of the emergency as it develops and to ensure that all personnel are informed as to the action that must be taken.

For new installations, the development of ERS and the measures required should be an integral part of the design process.

Any key assumptions used in the development of the ERS should be clearly stated, so that they can be reviewed to confirm that they are still valid.

The ERS should be periodically reviewed for adequacy by the custodian of the strategy.

ER measures to deal with acute oil pollution should be integrated into the overall ERP. The company responsible for an offshore installation should liaise with relevant authorities to develop plans to deal with any oil spills that may affect the shoreline.

When developing the ERS, the maximum number of people who might be involved in an emergency should be considered. During some phases of life cycle of an installation, such as during major construction work, the number of people on the installation can be significantly higher than assumed in the ERS. Prior to such phases of work, the impact on ER should be considered so that changes to the ER measures can be implemented before the complement increases.

Further guidance in strategies is given in annex A.

5 Emergency response plan (ERP)

5.1 Objective

— To provide a clear statement of the key ER information and the actions expected under emergency conditions.

5.2 Functional requirements

The ERP shall cover all stages of an ER, from detection of the emergency until the emergency is over and persons are considered to be in a place of safety. The ERP shall embrace all types of emergency, from minor incidents with no potential to require installation abandonment to major accidents.

The ERP shall address the operational and procedural requirements for all persons that have a role in managing an emergency, from detection of the event until the emergency is considered to be over and all people are in a place of safety.

In preparing the ERP, the various emergency scenarios requiring a response shall be considered and the appropriate organization to deal with these scenarios put in place. However, to avoid excessive detail and repetition it may be appropriate, for the purposes of planning, to group emergencies into generic types.

The ERP shall contain a clear statement of key individuals' responsibilities during emergencies.

Personnel shall be available to carry out their designated role when required to do so, or adequate alternative arrangements shall be provided.

The ERP shall address the actions required in an emergency on any other installations connected by pipelines.

The ERP shall cover other groups who are expected to provide services in the event of an emergency, but who are not themselves directly involved in the installation operations.

Those individuals or organizations who have specific actions during an emergency shall be consulted during the development of the ERP.

5.3 Guidelines

The alarm signals used on the installation and their meaning should be described in the ERP. The general procedures to be followed in the event of each alarm should also be included in the ERP.

Practices and drills should be undertaken as frequently as necessary to ensure that all personnel on the installation, whether direct employees, contractors or visitors, are aware of and fully familiar with their responsibilities under the plan.

The consequences of a loss of containment can be significantly increased if installations connected by pipelines continue to export hydrocarbons in the event of an emergency. Clear instructions should be included in the ERP on the actions to be taken on these connected installations under emergency conditions. The ERP should also detail how connected installations are alerted of the need to respond.

To ensure that there is an effective and comprehensive ERP, the following should be considered in preparing the plan:

— clearly identified responsibilities for decision-making;

— clearly identified lines of command, including how the 'on-scene' commander interfaces with area and external resources;

— competence of those with responsibility for decision-making;

— contingency arrangements to cope with key personnel being unavailable;

— effective communications to provide sufficient information for decision-making and to ensure that all personnel are adequately informed of the action they should take;

— resources available to provide assistance;

— the drills and practices required to ensure that the ERP will be effective.

In order to maintain the ERP, there should be a process to verify that:

— all the basic assumptions made in establishing the ERP are met in practice;

— people with roles in an emergency have the required competencies;

— ER equipment is being adequately maintained;

— the ER procedures are appropriate for the current understanding of the events that require ER and how they may escalate;

— area and external resources are able to perform their roles.

The ERP should be subject to the same assessment and development procedures as all other measures necessary to achieve a satisfactory ER.

Where it can be safely undertaken, consideration should be given to conducting some drills without prewarning in order to test the effectiveness of the ER procedures.

Examples of the issues that should be taken into account in drawing up the ERP are described in annex B.

6 Command and control

6.1 Objectives

— To provide a command structure which is suitable to deal with foreseeable emergencies.

— To establish the roles of any individuals or organizations that may have a role in the management of an emergency.

6.2 Functional requirements

The measures provided for command and control shall ensure that

— an effective command structure is established which is sufficiently flexible to cope with the full range of emergencies;

— the command hierarchy is clear and unambiguous and is well understood by all people on the installation;

— all personnel on the installation are adequately instructed on the appropriate action to take in an emergency;

— there is adequate redundancy such that successful ER is likely, even if key individuals are not able to perform their assigned roles;

— liaison with area and external resources can be undertaken effectively.

A command structure shall be established that will, so far as is reasonable, remain effective throughout all stages of an emergency.

6.3 Guidelines

Any emergency should have a single person accountable for the coordination of ER actions. Command and control arrangements in an emergency should be developed which take into account the normal lines of command.

For emergencies likely to be confined to the installation, the individual with responsibility for coordinating ER is likely to be the person in overall charge of the installation. For escalating emergencies, requiring assistance by area or external resources, the overall coordinator of ER is likely to be on another installation or onshore.

The command structure should be capable of functioning in different circumstances and, in particular, there should be contingency arrangements to ensure that if individuals are, or become, unavailable there will be others identified as capable of discharging the relevant responsibilities so that the ER remains effective.

The respective responsibilities between offshore and onshore support facilities, and among those on the installation, should be specified and clearly understood by all those involved. There should be adequate arrangements for hand-over of command and control functions, where necessary for different stages of the emergency.

In allocating tasks, care should be taken to avoid the assigning to an individual of multiple responsibilities that may be incompatible in an emergency.

7 Detection of the need for emergency response

7.1 Objective

— To provide arrangements and procedures that indicate the need for ER in sufficient time for the necessary actions to be successfully executed.

7.2 Functional requirements

The method and speed of response of the arrangements used to detect the need for ER shall be based on an understanding of the speed with which the incident can escalate.

All appropriate persons shall be alerted in a timely manner of the need to perform their allocated ER activities as described in the ERP.

Alarms to alert people of the need for ER shall include audible and visual alarms and voice communication systems.

7.3 Guidelines

The detection system should provide sufficient information on the nature and location of the incident to allow the appropriate ER activities to be initiated.

The primary alarm should be audible, supplemented by flashing lights in high noise areas. Alarms should be kept as simple as possible to avoid misinterpretation. The characteristics and severity of the incidents that trigger them should determine the nature and location of alarms.

Particular attention should be paid to ensuring that the alarm is raised at locations where individuals are expected to initiate control or mitigation measures. Alarm and other key status information should always be annunciated at the main control point.

Where it is not reasonable to give an alarm automatically (for example in a remote, rarely visited part of an installation), there should be clear procedures for communicating information to the appropriate people in the event of an incident being detected.

The detection system should be adequately maintained, and contingency arrangements which may require limiting operational activities should be established for situations where all or part of a detection system is not available; for example during maintenance.

More guidance on detection of the need for ER is given in annex C.

8 Competence

8.1 Objectives

— To identify the competencies that are required to deal with emergencies.

— To provided individuals with the proven ability to fulfil their role in an emergency.

8.2 Functional requirements

Key individuals, such as the person in overall charge and the control room operator, shall be shown to be competent to perform their emergency duties before they are appointed.

When an installation is manned, there shall be sufficient competent personnel present on the installation at all times to carry out the required emergency duties, including the operation of equipment specifically provided for emergencies.

The required level of competence shall be assessed for

— the general workforce on the installation;

— people on the installation with specific emergency duties;

— senior staff in the company's organization, including the person in overall charge;

— people on other installations or vessels and onshore, who have a role in an emergency.

Individual competencies shall be periodically tested to determine whether further training and knowledge is required to allow them to effectively perform their emergency duties. The ERS shall include the measures to be taken to maintain this competence by, for example, drills, practices and refresher training.

8.3 Guidelines

In order to be considered competent, the individual concerned should have been assessed to have the proven ability to apply training, experience and knowledge to undertake the tasks for which he/she is responsible. Where practical the assessment should be carried out under simulated conditions, either individually or with the appropriate ER team.

So far as is possible, the organization that is used for ER should reflect the organization that is used in normal operating conditions. In this way ER is emphasized as a responsibility embodied in the normal management structure. However, in the case of non-routine activities such as combined operations with a crane barge or flotel, an alternative organization for ER may be appropriate.

The ER organization should be flexible, taking into account human behaviour under stress and that key personnel may be unavailable or injured in the emergency. Flexibility in the ER organization should therefore be included in training, practices and drills to ensure that those required to substitute for key personnel are competent to do so.

Generally a person should have only one duty in an emergency. However, if a person must have more than one duty in an emergency, care is needed to ensure that assigned roles are compatible and do not introduce unrealistic expectations for the actions that can be undertaken by one individual (e.g. combining medical and radio operator roles).

Adequate arrangements should be made for visitors or other special groups, such as short-term contractors, who may be particularly unfamiliar with the installation or who may have particular activities to carry out in emergencies. These arrangements should include general training in emergencies, installation-specific induction training and training based on the ERP. Information, instruction and training should be refreshed periodically as necessary.

More guidance on competence is given in annex D.

9 Maintenance of emergency response equipment

9.1 Objective

— To maintain the arrangements required for ER in such a condition that they will reliably perform their role when required to do so.

9.2 Functional requirements

As part of an overall management system, each operator shall establish effective operations, inspection, testing and maintenance procedures to ensure that the functional requirements of the equipment and systems provided for ER are maintained. These procedures shall take due account of the safety of personnel, protection of assets and the environment and compliance with any local regulatory requirements.

In order to provide effective procedures, the following shall be carried out:

— systems shall be subjected to appropriate testing prior to first use, to confirm that they meet the appropriate functional requirements;

— a schedule shall be prepared, detailing the inspection, testing and maintenance routines and frequencies to be followed;

— all systems shall be thoroughly inspected, following established procedures. This determines if remedial measures are needed to ensure that the item inspected will function satisfactorily;

— adequate records of the results of the inspection, testing and maintenance shall be kept and shall be periodically reviewed to confirm that the written scheme is appropriate and is being adequately implemented;

— maintenance procedures shall include regular visual inspection;

— appropriate operational tests shall be conducted;

— use, impairment and restoration of equipment or systems shall be recorded and reported as appropriate;

— any identified failures or impairments shall be promptly corrected. Where equipment cannot be promptly returned to service, contingency plans shall be implemented.

9.3 Guidelines

Where arrangements provided for ER will not be available for any reason, the person in overall charge should consider the impact of this on the ability to respond to an emergency and introduce any controls that are needed to ensure that effective ER is still possible.

It can be readily foreseen that some ER equipment will be unavailable from time to time (e.g. survival craft for routine maintenance). The ERP should contain preplanning to define the actions that are required when such non-availability occurs.

Certain facets of the ER arrangements such as adequate escape and evacuation routes should be provided at all times. Every effort should be made to retain diversity of routes from all work locations to the muster area.

Equipment provided for ER purposes should not be used for any other purpose, even temporarily, if this could jeopardize the ability of the equipment to perform its functions under emergency conditions.

Maintenance, inspection and testing of emergency equipment should only be undertaken by people who are competent to perform this role and interpret the results of any tests. In some cases this may require resources from the supplier of the equipment or other expertise not routinely available on the installation.

As a minimum, plans for periodic inspection and testing should be established to ensure that there are no hidden failures which would prevent a system needed for ER achieving the essential functions and reliability targets given in the functional requirements.

On some installations, a risk-based approach is used to determine the inspection and testing requirements. In this case the inspection and testing frequencies will be developed for individual installations.

The frequency of inspection and testing of ER equipment on normally unattended installations should be balanced to reflect the need to maintain the equipment in good condition but not to require unnecessary visits to maintain an arbitrary inspection programme.

Examples of typical frequencies of inspection and testing of equipment associated with mitigation and control of fires and explosions and in evacuation, escape and rescue are addressed in ISO 13702.

10 Communications

10.1 Objectives

— To provide sufficient reliable information to people on the installation so that they are able to take the appropriate emergency action.

— To provide means for those on the installation to communicate with the person in overall charge.

— To provide reliable arrangements to allow the person in overall charge to communicate with all people on the installation regarding the nature of any emergency and the actions they are required to take.

— To provide reliable means to allow the person in overall charge to communicate with area and external resources who have a role in ER.

10.2 Functional requirements

Information, instruction and training on ER shall be given on or before arrival at the installation. Personnel with key ER roles shall be trained and competent prior to arrival offshore.

Communications related to ER shall be given in a manner that will be readily understood by the recipient. In particular, the communication arrangements, such as the installation alarm system, shall ensure that people know when they are required to muster.

The means of communication shall be selected based on the need for communication in likely scenarios.

Arrangements shall be in place to enable effective communication between persons with command and control responsibilities and all others on the installation or engaged in activities connected with it, to enable them to take appropriate action in an emergency.

10.3 Guidelines

Suitable equipment, information processing and procedures should be in place to enable effective communication between persons with command and control responsibilities and all others on the installation or engaged in activities connected with it (e.g. diving, support or construction vessel activities, loading and unloading operations). The purpose of these communication arrangements is two-fold:

— to enable information on the developing incident to be reported to those in command (to facilitate an assessment of what action is required);

— to enable the person in overall charge to take the action necessary to safeguard people on the installation.

There should be adequate provision for communicating with those at other locations who may have to take action in an emergency (e.g. to shut down pipelines) and with possible sources of external assistance, such as other installations, vessels, other search and rescue facilities and shore-based facilities.

When selecting the means of communication, both for internal use and for communication with area and external resources, the operational conditions under which they are to function should be taken into consideration, including:

— noise (both operational and weather);

— ambient conditions;

— light and visibility conditions, including smoke;

— gas concentrations (flammable and toxic);

— susceptibility to damage.

So far as reasonable, communication arrangements should remain available throughout the emergency.

Visitors who have not undergone adequate training should normally be accompanied during their stay, in addition to being given suitable instructions for the time that they are on the installation. The person in charge of them should, so far as is reasonable, ensure that they take the correct actions in an emergency.

More guidance on communications is given in annex E.

11 Escape, refuge, evacuation and rescue

11.1 Objectives

— To provide routes, which will be useable under emergency conditions, from all work locations to the place where people muster.

— To provide a place, or places, where people can muster while an emergency is being investigated and, if appropriate, while evacuation preparations are being made.

— To provide arrangements that are suitable to allow all people on the installation to leave in a controlled manner under emergency conditions.

— To make arrangements to recover people who leave an installation in an emergency and transport them to a place of safety.

11.2 Functional requirements

Escape and evacuation routes shall be provided from all areas of an installation where people may be expected to be present during their normal activities. Escape and evacuation routes shall have adequate illumination to ensure that they can be used during emergency conditions.

Alternative means to allow people to safely leave the installation in an emergency shall be provided.

All people on the installation shall be informed of the signs and markings as part of the installation induction process.

The need for redundancy in the escape, refuge, evacuation and rescue arrangements shall be considered, to allow for personnel or facilities and equipment becoming unavailable in an incident.

Casualty recovery may extend the time for which routes need to remain available, and account shall be taken of the possible requirement to use stretchers, particularly where corners and doorways have to be negotiated. A route suitable for stretcher cases shall be identified between the sickbay and a preferred evacuation point.

Where the means of access or egress may be impaired, alternative means shall be provided which are unlikely to be affected by the same incident.

Arrangements shall be made for recovery and rescue of people who have to leave their installation because of an incident, who have entered the sea as a result of a helicopter ditching close to the installation, or who have fallen into the sea whilst undertaking a work activity.

The arrangements for evacuation shall take into account any constraints on their use imposed by such factors as the weather conditions, the nature and location of the emergency and the time available to evacuate. The means of evacuation shall take into account the likely distribution of personnel and likely evacuation scenarios, and in particular they shall be readily accessible from the muster area(s).

There shall be spare capacity in this evacuation system such that, in the event of some part of the system becoming unavailable, there remains sufficient capacity elsewhere to accommodate safely all persons on the installation. The degree of spare capacity shall be determined and justified by the assessment of the EER arrangements.

11.3 Guidelines

Escape and evacuation routes may not be required for the full duration of an emergency and, for example, may only be required for a short time to allow people to reach their muster area.

Emergency doors should open in an appropriate direction or be sliding doors. They should not be fastened so that they cannot be readily opened in an emergency.

Whilst all installations should have a place where people can muster (a TR), there may be some incidents when it is not possible for everyone to return to the TR or when the TR will not be a safe location. In developing the ERS, the role of the TR should be defined and the ERP should address the actions required if people are not able to use it. The designation of alternative muster locations should be considered for such situations.

Means of evacuation by sea should be suitably located to be readily accessible to all persons from the muster area.

A variety of evacuation measures should be provided to allow the person in overall charge to organize the evacuation in the appropriate manner, taking into account the conditions that may be present when there is a need to evacuate the installation.

In many emergencies, it is possible to evacuate using area or external resources, as this is the normal method of travelling to the installation. However, the evacuation arrangements provided on the installation should allow the person in overall charge to evacuate the installation in a controlled manner, without reliance on area or external resources. Area or external resources should be used, where available, to assist in the recovery of people from survival craft and from the sea.

It is possible that some emergencies on some installations develop so rapidly that the person in overall charge cannot evacuate the installation in a controlled manner. To cover this situation, arrangements for escape to the sea should be provided.

The ERS should determine whether a vessel permanently stationed in the vicinity of an installation is required in order to assist with evacuation of the installation or recovery of people from the sea. Where such a vessel is required, the vessel and associated equipment provided should be specified, to ensure that the vessel can perform the required functions.

The design of the evacuation facilities should take into account that there may be multiple casualties who may need to be taken to the muster area and evacuated under emergency conditions.

Signs should indicate the way to, or mark the location of

— escape routes;

— ER equipment, including for example emergency telephones;

— safety equipment and first aid equipment;

— evacuation routes;

— safe areas and muster areas,

— evacuation equipment;

— equipment for escape to the sea.

More guidance on this clause is contained in annex F.

12 Environmental emergency response

12.1 Objective

— To minimize, so far as is reasonable, the harm to the environment following an acute discharge from the installation or facilities related to its operation.

12.2 Functional requirements

During the design of the installation, the possible harm to the environment that could arise during emergency conditions shall be evaluated, and measures shall be provided so far as is reasonable to avoid these discharges or to reduce their likelihood.

Activities involving increased risk of environmental harm shall be avoided as much as possible during seasons when the environment is particularly sensitive to the effects of accidental release.

12.3 Guidelines

Effective management of environmental incidents should follow the principles set out in ISO 14001 [2] and the guidelines contained in ISO 14004 [3].

The effect of acute environmental discharges may be felt for a considerable distance from the installation. The ER arrangements should be based on a full assessment of the potential impact, and should be prepared in consultation with those who may have a role in minimizing the environmental effects.

More guidance on environmental ER is given in annex G.

13 Medical emergency response

13.1 Objectives

— To provide medical facilities on the installation capable of treating sick and injured people until more specialized help can be arranged.

— To arrange suitable specialist medical treatment for sick and injured people who cannot be adequately treated on the installation.

13.2 Functional requirements

Arrangements for emergency medical treatment shall consider

— injuries to personnel as a result of major accidental events;

— illness of personnel on board, e.g. heart attack;

— transportation and evacuation of sick and injured people;

— injuries to personnel as a result of minor accident;

— other medical situations which may impair the operational integrity of the installation, e.g. food poisoning.

Controlled drugs and medicines shall be stored in a secure place accessible only to those who are trained to administer such materials.

13.3 Guidelines

All regularly manned installations should have a place where a suitably qualified person can supervise injured or sick people.

The designated place on the installation for sick and injured people should be readily accessible to people carrying a stretcher, and should have easy access to the places on the installation used for evacuation.

Medical emergencies that should be considered, particularly if the operating environment means that external assistance may not be readily available, include food poisoning and epidemics.

The level of medical facilities and trained personnel provided should be in line with the requirements identified in the ERS.

Annex A
(informative)

Guidelines on the development and assessment of an emergency response strategy

A.1 Emergency response strategy (ERS)

The ERS should

— define and explain the objectives of the ER arrangements;

— explain in general terms how the objectives are to be achieved;

— define the role of area and external resources;

— take account of any installation and location-specific factors that have significance for the ER.

All credible emergency scenarios that may need ER should be identified in developing the ERS.

The information needed to prepare an ERS varies depending on the scale of the installation and the stage in the installation life-cycle at which the identification and assessment process is undertaken. For example:

— complex installations, e.g. a large production platform incorporating complex facilities, drilling modules and large accommodation modules, are likely to require detailed studies to address hazardous events such as fires, explosions, ship collisions, structural damage;

— for simpler installations, e.g. a wellhead platform with limited process facilities, it may be possible to rely on application of recognized codes and standards as a suitable base which reflects industry experience for this type of facility;

— for installations which are a repeat of earlier designs, evaluations undertaken for the original design may be deemed sufficient to determine the measures needed to manage hazardous events;

— for installations in the early design phases, the evaluations will necessarily be less detailed than those undertaken during later design phases and will focus on design rather than on the organization of ER. Any design criteria developed during these early stages should be verified once the installation is operational.

The ERS should describe the role and functional requirements for each of the systems required for ER. In developing these essential elements, the following should be considered:

— the functional parameters of the particular system, i.e. a statement of the purpose and essential duties that the system is expected to perform;

— the integrity, reliability and availability of the system;

— the survivability of the system under the emergency conditions which may be present when it is required to operate;

— the dependency on other systems which may not be available in an emergency.

The identified essential elements should form the basis for the specification for each of the systems to be provided, and should be verified periodically throughout the life of the installation to ensure that the strategies remain valid and to identify the need for any remedial action.

In developing the strategies, a wide range of issues should be considered to ensure that the measures selected are capable of performing their function when required to do so.

The general procedure for the design of ER measures should be

a) avoid and prevent events that may require ER;

b) integrate ER into design, through for example increasing capacity of the structure to withstand accidental loads, separating hazards from accommodation and from non-hazardous areas, providing passive fire protection, providing a secure refuge and evacuation routes that are likely to be available under emergency conditions;

c) provide automatic or remotely operated safety and supporting systems to mitigate the effects of an accident, for example fire protection systems, alarm systems and anchor-release systems;

d) design measures involving the ER organization, e.g. in connection with rescue, manual fire-fighting and treating of acute oil spills.

Normally unattended installations may not have automatic safety systems, and the safety of people visiting the installation is managed by application of other safeguards and controls.

A.2 Description of ER measures

ER measures include the hardware and equipment provided to deal with emergencies and the planning, management and organizational aspects required to successfully execute ER actions.

Existing installations will already have ER measures in place. These measures should be reviewed periodically to ensure that they are sufficiently well documented to permit the analysis to which they will be subjected as part of the assessment and development process.

For installations at the design stage, the ER measures may only be defined in terms of general outline. Nevertheless, the proposed measures should be set out clearly and in as much detail as is necessary to allow their proper consideration in the assessment and development process and their eventual verification.

ER measures are required for both limited emergencies which have no potential to escalate and major events when muster or evacuation may be required. The measures in place to respond solely to limited emergencies, such as minor injuries or local mechanical damage, would not normally be subjected to the same degree of assessment and justification as the measures provided to handle major accidents. Nevertheless, even the measures for lesser emergencies should be reviewed to ensure that the strategic objectives will, so far as is reasonable, be met under the circumstances in which the measures are anticipated to be needed.

A.3 Assessment, development and review of ER measures

The assessment of either existing or proposed measures essentially comprises an analysis of their performance followed by a judgement as to their adequacy. If the measures are judged to be inadequate, then some change is required which could be a combination of either modifying the measures or reducing the hazard to a level which can be handled by the measure. Following such modifications, the assessment stage shall be repeated to determine if the inadequacy has been corrected.

Typical data used for an ER assessment include a number of assumptions and variables, e.g.:

— type of hydrocarbons in production, and their properties;

— distance to the nearest installation;

— area and external resources available (e.g. through sector club agreements);

— distance to shore;

— environmental conditions, including variations throughout the year;

— environmental sensitivity;

— reservoir conditions and fluids;

— production rates;

— crew and variations in the crew;

— effect of time of day and day of week when an emergency arises;

— immediate effects of the incident on the installation and people (e.g. effects of blast);

— development of heat and smoke in the event of fire;

— human behaviour under stress;

— capacity for treatment at available medical facilities.

As part of the process for assessment of the ER arrangements, changes on the installation or the external situation that may affect the ERP should be considered. Such changes may involve

— the emergency scenarios that may arise;

— specific ER requirements for activities on the installation;

— the data assumptions used in the ER analysis;

— the ER equipment;

— the ER organization;

— agreements with area resources and external resources;

— competence requirements;

— the ER procedures and the ERP;

— ER control methods;

— operational experience, which may suggest that an alternative ERP will be more effective;

— experience from ER drills and practices;

— information regarding the capabilities of external organizations to assist in ER;

— experience from incidents, including near misses on comparable installations;

— changes in environmental assumptions and knowledge;

— information from maintenance of ER equipment;

— research results and new knowledge within technology, organization and management theory, etc.;

— changes in statutory legislation or recognized standards;

— revision of acceptance criteria for risk in the activity concerned;

— conversion of an installation or change in the use of the installation.

In selecting ER equipment, the following issues should typically be considered in developing the functional requirements:

— location;

— type;

— number;

— capacity;

— accessibility and survivability under emergency conditions;

— reliability and/or availability;

— procedures required when equipment is unavailable for any reason;

— ease of use;

— maintenance and training requirements;

— reliability and spare capacity.

Once the immediate threats of an emergency have been managed such that no further evacuation is necessary, there may be a phase of recovery from the emergency. This may involve

— organizing transportation for injured or sick personnel, with due regard given to the patient's condition and need for treatment and care;

— transportation of rescued personnel from a safe place to a place where their safety is comparable to that present on the installation before the emergency;

— transportation of evacuated personnel from a safe place to shore;

— recovery of released oil at sea and ashore;

— collection of released chemicals and any debris that may have been caused by the hazardous event;

— stabilization of reservoir damage;

— replacement and repair of damaged structure.

Assurance that the appropriate ER arrangements have been identified, are in place and are effective involves a process of

— verification that the measures meet the functional requirements identified in the ERS;

— system audits to ensure that the ER objectives are being met.

Annex B
(informative)

Guidelines on emergency response plans

B.1 Formulation of the plan

B.1.1 General

The ERP is part of the ER measures, and as such its formulation, assessment and development should follow the guidelines given in clause 5. It should set out the operational and procedural part of the arrangements by laying down who does what, where, when, how and to what effect. It is a working tool that will be used regularly for training and practices, and is the basis on which a real emergency will be handled. It needs to be clearly written with the emphasis on ease-of-use and practical information that would be required in an emergency.

The parameters of the plan should cover all stages of an ER, from detection of the emergency until the emergency is over and persons are considered to be in a place of safety. For example, the stages in an ignited hydrocarbon release may involve detection, alarm, fire-fighting, muster, evacuation and recovery from the sea. Other accidents may involve a very different sequence of events.

Where onshore facilities are required as part of the plan, the interface between the installation's arrangements and the onshore arrangements should be fully integrated.

The ERP should be relevant to the installation(s) covered by the plan. Many ERPs will be installation-specific, but in some circumstances the ERP may cover a number of nearby installations. In this case installation-specific variations (e.g. the station bill) should be posted on each installation. The ERP should provide instruction and procedures to be followed in the event of a major incident and other minor or single-event incidents. These minor incidents may not affect the whole installation or all personnel, but still require an ER.

The ERP should address the implications and procedures required for an installation that is part of a larger production and transportation system. Depending on how the installations are interlinked, e.g. through a common pipeline system, it may be necessary to define certain specific ER requirements and communication protocols.

Weather conditions have a major impact on the options available during offshore emergencies. The ERP should be designed to consider the implications of weather conditions upon the full range of emergency scenarios envisaged.

Issues that may need to be addressed in developing the ERP include

— accessibility of designated muster areas, means of evacuation and lifesaving appliances;

— reliability of emergency shutdown systems;

— accessibility of the fire water system;

— reliability of the means of communication;

— maximum acceptable time for transportation of sick or injured personnel ashore;

— weather criteria for safe evacuation;

— medical facilities available on the installation;

— competence of personnel included in the ER organization;

— maximum acceptable mustering time for personnel not included in the ER teams;

— maximum acceptable recovery time in the event of a man-overboard situation, on helicopter ditching in the vicinity of the installation, and during installation abandonment;

— maximum acceptable mobilization time for helicopters participating in medical emergencies, rescue or evacuation;

— handling of oil spills;

— handling capacity of the oil pollution control equipment;

— oil pollution response time;

— storage capacity for recovered oil;

— competence of personnel participating in oil pollution control operations;

— endurance of oil pollution control equipment and oil pollution ER organization.

B.1.2 Organization

Ensuring effective ER is a management task requiring a management structure, both offshore and onshore. The ERP should be developed with this structure in mind, and contain sufficient information to enable decisions and command actions to be taken. In the event of an emergency the prime role of management is to implement the ERP with a view to achieving the objectives laid out in the ERS. A command structure should be established which can remain effective in an emergency.

The organization should take into account the existing or proposed command structure for non-emergency operations.

Where contractor's employees form part of the ER organization, there shall be an arrangement with the contractor's employer that these personnel will be available and that they are capable of carrying out their designated role.

The structure of the ER organization should ensure that enquiries and requests, for instance from media and next of kin, do not obstruct the handling of hazardous situations and accidents that have occurred.

B.1.3 Command and control

B.1.3.1 General

Final decisions and control on the installation, including communications with other agencies off the installation, should always lie with one clearly designated individual (usually the person in overall charge), with a designated deputy in the event of an unplanned transfer of command (e.g. if the person in overall charge is injured). Consideration also needs to be given to the planned transfer of command at a selected point in the ERP (e.g. after all the personnel have left the installation).

B.1.3.2 Flexibility

It may not be possible to accurately predict the actual conditions that will arise during an incident. Therefore the plan should not be overly prescriptive and, where appropriate, should allow sufficient flexibility to ensure the most effective response.

B.1.3.3 Familiarity

The organization developed, including the chain of command, should follow as closely as possible the day-to-day organization for normal operations on the installation, since in an emergency, personnel may not respond favourably to an unfamiliar approach. This also has the advantage that skills and experience can be directly transferred from the 'normal' role to 'emergency duties'. Suitable ER often relies on quick decisions and actions. It is important that personnel are not only aware of the command structure, but also how their role and actions could affect others.

B.1.3.4 Simplicity

In an emergency, the situation can change rapidly and it is essential that the transmission of information and decisions are effective. An overly complex organization may not be able to respond quickly and may need to rely on the continued operation of numerous interlinked facilities, any one of which may become unavailable.

B.1.3.5 Redundancy

No area of the organization should rely totally on the availability of any single element. This means that backup systems are required for essential facilities and that personnel should have designated deputies who can take over their role. Such deputies should have the same level of training.

B.1.3.6 Availability

During an incident, there should be no conflict created by personnel being assigned to two or more key roles. This also means that sufficient personnel with the required experience and skills should be available on the installation to carry out the roles identified within the organization.

B.1.4 Human factors

In formulating the ERP and in carrying out the assessment, it is important not to concentrate solely on the plant and equipment provisions and assume that the management of the emergency will necessarily run to plan and that people will always respond as required. Realistic assumptions need to be made regarding the likely pattern of human behaviour in an emergency so that, for example, due cognizance is given to the potential effect on human performance levels of factors such as increased stress, reduced visibility, etc. and personnel are not automatically assumed to be both intrinsically capable and reliable in carrying out all duties required of them. In particular:

— where a person is required to perform a key task as part of the ERP, it is essential that factors relevant to its success (information flows, physical requirements, etc.) are assessed to ensure that the probability of a successful outcome is acceptably high and that the possibility of the situation being made worse by incorrect actions being taken is considered;

— the time allowed to complete an action, e.g. mustering, should adequately reflect the possibilities of delays being introduced by stress, physical conditions, etc. and not just be based on times obtained in practices where such performance modifying factors may not be present;

— the nature of the emergency may limit the time available for the decision-making process. The degree and complexity of the decisions which are required to be made should take these time constraints into account;

— all personnel who have a significant role to play in the ERP (e.g. emergency team members, person in charge of the survival craft) should be identified by role/function. Contingency arrangements should be put in place to accommodate injury or unavailability of key personnel or information sources. The way in which emergency command and control structures respond to changed circumstances should be considered, e.g. loss of part of the evacuation system.

B.1.5 External resources

Information on the external resources that are likely to be available should be identified within the ERP. The functions which it can perform, the timescale and mechanism for obtaining use of the resource and its likely availability should all be included in the ERP.

External resources that may be involved in ER include the coast guard, other operators, air/sea rescue services, helicopter operators, marine support operators.

B.1.6 Consultation with external resources

Apart from the opportunity for the external resource persons to contribute their expertise and experience to the plan, the ERP should ensure that these same persons are familiar with what is required of them during an emergency, and what effect their input will have.

Primary external resources should also be consulted, e.g. the coastguard who have a statutory responsibility for the coordination of all search and rescue operations.

B.1.7 Combined operations

Where installations are involved in combined operations (e.g. during workovers or where a flotel is brought alongside), the ER for both installations should be reviewed and, if necessary, revised. The presence of another installation alongside may impair certain options for evacuation or escape, but may also provide other options via the other installation, for example if a bridge link is established. A combined ERS should be agreed prior to commencing operations, and the arrangements of both installations modified accordingly.

A command structure for the combined operations should be established to define the respective emergency command responsibilities.

B.1.8 Installations connected by pipelines

It is important that installations connected by pipelines coordinate their ER procedures, as an installation continuing to export fluids into a pipeline could increase the consequences of a loss of containment. For some pipeline systems, installations have signals to indicate the status of the pipeline isolation valves on connected installations and may even be able to remotely close these valves. It is good practice for any installation that suspects that there may be a loss of containment in a pipeline system to immediately stop export of fluids until they have confirmed that it is safe to resume export.

B.2 Implementation of the plan

B.2.1 Presentation

Although the topics required to be considered in the ERP are wide-ranging, the plan itself should be clear and concise. It should be user-friendly to assist understanding and inspire confidence in the plan itself.

For the above reasons and to assist in decision-making, it may be useful to prepare a series of schematic diagrams with respect to the control of major incidents and the decisions faced by the person in overall charge, with related factors from

a) the incident itself;

b) the status of support, emergency and environmental conditions.

The information presentation system should take into account the requirements for diagnosis of technical information, so that a timely response can be made to the emergency.

The content of the ERP is likely to vary significantly for different operators, different locations and different installations. An ERP however, typically includes

— organization charts;

— escape route plans;

— drawings showing layout of safety equipment;

— schematic drawings illustrating typical ER scenarios and action plans;

— emergency contact arrangements.

A competent person should be appointed for the ERP who is responsible for maintaining the accuracy of the document and for including any lessons learnt from the use of the ERP. Copies of the ERP should normally be available at any location that may have a role in an emergency.

B.2.2 Guidance

Guidance should be provided in the plan on the criteria for choosing particular courses of action (e.g. when to instigate downmanning, when to inform the coast guard). In most situations it will be obvious when there is an emergency requiring a response. However there may be some circumstances when the transition from normal operations to an emergency is less obvious, and account should be taken of these in deciding when to initiate the plan. For example, where a particular operation has the potential to become unstable to the point at which the installation integrity may be threatened, it would be appropriate to initiate an ER.

B.2.3 Training

The objective of training is to ensure that individuals are familiar with their role in the ERP, any equipment that they may have to operate in emergency procedures and other relevant aspects. It is also necessary that they retain this awareness in demanding circumstances.

For most training courses and competency assessment, industry-approved guidelines should provide sufficient training standards. However, where specialist requirements are identified, the necessary training for these requirements should be provided (e.g. fire-fighting teams).

Where contractor's employees have specific ER duties and require specific training, this should be discussed with the contractor to ensure that such training is provided and to agree who is to provide it.

Training should seek to achieve the following:

— enable persons with command or other specific responsibilities within the ERP to achieve and maintain their required competence;

— enable everyone on the installation to become familiar with the actions expected of them in an emergency;

— enable all persons required to use specific equipment to be fully proficient in the use of this equipment;

— ensure that all persons new to the platform are given such instruction or training in the aspects of the ERP as they may require during their stay on the installation.

The training programme, including refresher training, should be subject to continual review to ensure that training is maintained in line with the needs of the ER organization.

B.3 Monitoring of the plan

B.3.1 General

The ERP should be subject to a monitoring programme to test that it continues to meet the needs of the installation and the situation existing on the installation. Practices are an important part of this monitoring process, and times to achieve certain aspects of the plan may well form part of the functional requirements referred to in clause 5.

The ERP should be reviewed and revised as appropriate in line with the findings from practices and drills and following changes to operations, plant and equipment or personnel.

B.3.2 Drills and practices

Significant benefit can also be gained from involvement of and good liaison with external parties such as the coastguard, stand-by vessels and helicopter operators.

Practices and drills should seek to achieve the following:

— provide practical experience to all personnel;

— provide practical experience in communications and the use of equipment;

— test all aspects of the plan through drills of individual parts of the plan, e.g. muster arrangements and response to specific incidents;

— test area and external resource capabilities to fulfil their role in the ERP;

— test all attendant procedures as necessary (e.g. pipeline emergency procedures, diving emergency procedures);

— assess competence of individuals and groups.

Safety should be a prime consideration when carrying out these practices, and there should be effective management judgement to ensure that unnecessary risks are avoided.

For some defined incidents, for example man-overboard, it may be sufficient to have standing instructions for raising the alarm that do not need to be regularly tested. For other types of incident, particularly those that might escalate rapidly, it is desirable to use the detection system itself to activate the early stages of ER; for example, automatic control action on a fire-monitoring system may also initiate the general alarm. This would ensure efficient use of time while the development of the incident is being assessed and possible control measures are initiated. However, there will generally be a need to assess an incident and its potential once it has been detected and a local alarm raised, before decisions can be made as to whether a continuing ER is required and, if so, what the most appropriate ER should be.

This assessment activity may in reality continue throughout the emergency, depending on the type of incident and the way it develops. Indeed, it is probable that only those incidents which have no potential to deteriorate into a situation that might call for abandonment would need little or no reassessment as the incident runs its course.

It is common on many installations to

— practice evacuation procedures as part of the weekly drills on the installation;

— undertake an ER team exercise during every offshore trip;

— organize an ER exercise whenever there is a significant change to part of the ER organization, such as when a new contractor is introduced to an installation;

— undertake an ER exercise on a yearly basis involving onshore support organizations;

— undertake an installation-based oil-spill exercise on an annual basis. Major oil-spill response is likely to involve several organizations which may be shared with several other operators. These shared facilities should also be periodically involved in ER exercises, but this may only involve a limited number of installations in a operating location;

— vary scenarios to avoid drills and practices being perceived as monotonous or tedious.

Annex C
(informative)

Guidelines on detection

The hazard identification and assessment process for an installation should have identified all those major accidents that require an ER. In addition, there are lesser incidents which have no potential to escalate to a point at which partial or complete evacuation is necessary, but which nevertheless require an ER. Suitable arrangements should be made for the detection of all these identified incidents to ensure, so far as is reasonable, that those responsible for the management of emergencies are made aware that a response is required.

The means of detection of an incident can range, for example, from complex automatic systems that continuously monitor for the occurrence of an incident, to operational procedures that inform personnel as to the actions to take on observing such an occurrence. Examples of the latter might include fire-watch arrangements for certain hot-work operations and man-overboard procedures.

Detection systems are provided to detect the abnormal conditions associated with an emergency. The characteristics and likely location of the incident that has to be detected and the environment in which it is expected to function should define the nature of the detection system. The availability and reliability of the detection system should take into account the risks to persons or the environment associated with the incident. Availability and reliability may be improved by introducing redundancy and/or diversity into the detection system.

For systems with in-built redundancy, consideration should also be given to the incidence of spurious detection that can degrade the effectiveness of the subsequent ER. This can be dealt with, for example, by the introduction of "voting logic" to ensure that more than one detector is required to raise an alarm.

For events that can develop rapidly into major accidents in the absence of successful control action, it may be appropriate to install continuous monitoring devices. For more slowly developing emergencies, periodic monitoring may be all that is required.

Detection may also arise as a result of people noticing abnormal conditions, and the actions expected when such detection occurs should be understood by all the people on the installation.

Following detection of an incident, alarms should be raised to ensure that all appropriate persons are alerted in a timely manner to the need to perform their allocated ER activities as described in the ERP. For example, these activities may range from making safe the workplace and mustering at predetermined locations, to assessing the nature of the incident and deciding which, if any, subsequent parts of the plan should be executed.

An alarm may be given by means of technical, operational and organizational measures, such as:

— automatic and manual warning systems, e.g.:
  — sounders;
  — warning lamps;
  — computer screens;
  — optical signals;
  — loudspeakers and telephones;
  — fire alarms;
  — Global Marine Distress Safety System (GMDSS);

— location of warning systems in relation to the various work positions;

— alert procedures which determine who is to do what, and when;

— organization of personnel, e.g. by:

  — continuous operational control;

  — fire guard during hot-work;

  — guard during work over open sea.

In deciding what types of alarm are appropriate and where they should be located, account should be taken of the environment in which they are expected to work, the speed with which the incident is likely to escalate, and the probable distribution of personnel around the installation.

An example of this is the alarm arrangements on a normally unattended installation. It may also be appropriate to relay alarms to those responsible for mobilizing emergency resources external to the installation.

ISO 13702 identifies audible and visual alarms that are being adopted in many offshore operating environments in an attempt to harmonize such alarms across the industry.

Annex D
(informative)

Guidelines on competence

Typically those people with key roles in the ER organization should have an appropriate understanding of:

— the underlying theory of ER for offshore installations;

— ER analysis and accident analyses;

— available ER technology and environmental technology;

— environmental data;

— methods and control systems for technical maintenance;

— methods and media for information communication;

— organizational theory and management;

— human behaviour in stress situations.

It is important for effective ER that the organization act in a manner that is suited to the purpose, logical and systematic. Thus those with roles in ER should be capable of dealing professionally with the situation irrespective of the

— time of day;

— duration of required effort (such as during oil-pollution control);

— shift duty rosters;

— phase of the activities;

— size of crew on the installation;

— composition of personnel.

All people on an installation should have at least basic training in ER, basic first aid, use of life-saving appliances and fire-fighting. In addition, as part of the installation induction process, all new people should be introduced to the installation-specific

— evacuation routes, any designated muster areas and ER equipment;

— main hazards and incidents that may arise;

— ER procedures and action plan (the station bill);

— ER organization.

People with key roles in ER should be given more advanced instruction in ER to make sure that they are able to:

— deal with their ER duties in a rational and professional manner;

— develop a clear strategy for managing the emergency;

— make good use of the available ER equipment;

— execute operational control of the ER resources;

— assess the adequacy of individual or group performance in practices, drills and emergency events;

— handle persons subjected to stress;

— deal with and communicate information.

Competence can be acquired through training, practice and drills, but requires a plan to be developed to build up competence for those who are new to a role or who do not have a demonstrable level of competence.

Training means acquisition of new knowledge and skills, e.g. through courses, attitude campaigns and safety meetings.

Practice means verification and maintenance of knowledge and skills to enable handling of individual parts of the total ER. Practice may involve refresher courses, familiarization with the use and operation of ER equipment and with the emergency control centres onshore.

Drills ensure verification and maintenance of knowledge and skills through simulation of an ER effort. A plan for drills should be drawn up for all units of the ER organization which takes into account

— the scenarios which may require ER;

— the shift duty roster;

— types of operation which may be in progress when an emergency arises;

— the level of activity on the installation;

— any organizational changes;

— time of year.

Annex E
(informative)

Guidelines on communication

ER relies upon effective and reliable communication between all personnel involved in the response. The ERP should describe the communications required and/or available for any incident (both on and off the installation) including detection and alarms, the information that is required, and when it is to be transmitted.

The following factors need to be considered and can be included in the procedures for each type of incident:

— what information needs relaying?

— who needs this information?

— when is the information required?

— how long will communications be required?

— information overload from non-essential information.

In addition to the specific communications needed concerning the control or handling of the incident between locations on and off the installation, information should also be given to personnel on the installation not directly involved in the control aspects of the incident; e.g. those personnel who are only required to muster will need regular information on the progress of the incident.

The communications system should remain available during an incident, long enough to ensure that all personnel are warned of the emergency and informed of the appropriate action they should take. The locations from which the system can be initiated should be identified and should include both manual and automatic initiation. Manual initiation should be possible from the control points and at appropriate locations around the installation.

Personnel should be provided with adequate information to allow them to

— initiate alarms where necessary;

— distinguish between alarms;

— respond to alarms.

In an emergency situation, the telecommunication systems provided for normal operation should remain active, provided that their continued operation does not create additional hazards. In order to prevent an incident such as a fire or explosion from disabling any part of the emergency communications critical to the ERS, the following should be considered:

— system diversity/duplication;

— separation/mechanical protection;

— selection of materials (e.g. fire-resistant cables).

Communications arrangements are likely to include

— telephone, telefax, telex, e-mail;

— public address system;

— radio equipment, with frequencies according to national or international agreements;

— satellite transmission equipment;

— sound and light signals;

— manual or electronic systems for editing and presentation of information, including systems for use in ER centres onshore.

When designing the installation and selecting equipment for communications, the following should be considered:

— possibility of radio signal transmission for internal communication to and from every location on the installation where people may be found;

— audibility of the public address system;

— the functionality to allow people to easily use the communications equipment whilst performing their ER role.

During an emergency it is good practice to keep a record of

— the time and contents of important messages and decisions, e.g.:
  — alarm calls;
  — summoning of ER resources;
  — arrival of ER resources;
  — changes in strategy to manage the emergency (e.g. start or suspend fire-fighting);
  — decision to evacuate;
  — weather reports;
— muster list of personnel before and after rescue and evacuation, e.g.:
  — number of injured and, if applicable, fatalities;
  — type of injuries;
  — whereabouts of personnel;
— description of significant milestones in the development of the accident or the hazardous situation.

In the event of situations that may entail increased risk for the activity in question, a preliminary alert to relevant ER resources should be considered.

Communications with visitors need special care, as they may be unfamiliar with the installation and unsure of both the emergency procedures and the actions expected of them in an emergency situation. It is good practice to take them on a tour of the installation soon after their arrival and to specifically inform them of the emergency alarms and the actions that they are expected to take when the alarm is sounded. Visitors who are unfamiliar with offshore installations may need to be accompanied whenever they leave the accommodation area. Installation booklets providing visitors with essential information, including alarms and ER actions, are frequently found to be useful and should be considered for installations which are likely to have frequent visitors.

Annex F
(informative)

Guidelines on escape, refuge, evacuation and rescue

F.1 Escape

The safe and rapid movement of persons on the installation from wherever they may be to muster areas and from muster areas to evacuation and escape points is essential to successful ER.

These routes should remain passable, so far as is reasonable, for as long as they are needed during the emergency despite the effects of the incident. This should preferably be achieved by positioning, or direct protection, of the route rather than by the use of personal protective equipment. Nevertheless, personal survival equipment (e.g. breathing apparatus, smoke hoods) may be deemed necessary to facilitate egress from certain locations on the installation.

Where the means of access or egress can be impaired, alternative means should be provided which are unlikely to be affected by the same incident. Emergency doors should open in an appropriate direction or be sliding doors. They should not be fastened so that they cannot be readily opened in an emergency.

Opening devices, such as push bars, should be provided on escape doors if the hazards in a room may result in injuries that would make it difficult to open a door in an emergency.

Access and egress routes should be easily identifiable by the use of suitable signs and markings. All personnel arriving on the installation should be made aware of the signs and marking as part of the induction process. Adequate emergency lighting should be provided which illuminates the route for sufficient time for personnel to make use of it.

The access and egress routes, the protection required for these routes and the time for which they should remain available, is generally identified as critical to the success of ER and as such they should have appropriate functional requirements. These should take into account the number of personnel who may need to use the route, the distribution of personnel on the installation and the way in which incidents could affect the route.

Casualty recovery may extend the time for which routes need to remain available and account should be taken of the possible requirement to use stretchers particularly where corners and doorways have to be negotiated. A route suitable for stretcher cases should be identified between the sick-bay and a preferred evacuation point.

Escape routes from all manned areas and all main evacuation routes should be marked and lit so that they are readily identifiable by all personnel in an emergency.

Signs should be provided as necessary to allow personnel to identify escape routes, and should indicate the direction to muster areas, embarkation areas and means of escape to the sea. The type and location of signs should be selected to be suitable in the conditions, such as the presence of smoke, which may occur when the signs are needed.

On large or complex installations, plans showing local access and egress routes should be placed in prominent positions around the installation where necessary to assist personnel. Where doors are present on an escape route, it is useful for such plans to indicate the layout on the other side of the door so that people know what to expect when they pass through the door.

Escape and evacuation routes should, wherever practicable, be designed to remain passable by position rather than by special protection. To achieve this, external escape routes should wherever practicable be physically separated from explosion vent panels, sacrificial walls and open hazardous modules. Where this is not possible, alternative routes should be provided which are unlikely to be affected in the same incident.

The dimensions of escape routes should be adequate for the number of people who may be required to use them. In general, escape routes should be greater than 1 m wide. For routes which are unlikely to be used frequently (and then only by a small number of people), a reduction in this width may be acceptable. External escape routes and those used by personnel escaping from more than one area may need to be wider. All escape routes should have adequate vertical clearance.

The surface of escape routes should be safe and secure such that people can use the route without needing to exercise excessive care. Where practicable, the surface should be non-slip and free of water if prone to freezing.

Lifts, where provided, should not be used as parts of escape routes and should be equipped to allow people to escape from them in case they stop in an emergency.

F.2 Refuge and muster areas

A refuge is a place where people can muster whilst investigations, ER and evacuation preparations are undertaken. The refuge should have sufficient capacity to protect the maximum complement of the installation personnel.

A refuge can be an enclosure, more than one enclosure, or only an area of open deck. The refuge is required to maintain the safety of personnel during the period required for the evacuation process to be completed. This period includes the following:

— time to complete the full muster at the refuge;

— time to account for personnel not reporting to their assigned muster stations;

— time to evaluate the situation and make decisions;

— time to initiate responses to minimize the consequences and control the emergency, if possible;

— time to complete the evacuation (if required). This may be done in a phased manner, initially evacuating non-essential personnel;

— contingency time to allow for the unforeseen.

These times are not all necessarily additive, but the installation should be designed so that the conditions which could impair the refuge do not arise whilst people are still in or at the refuge. These conditions are:

— loss of life support (e.g. due to smoke/gas, excessive heat stress, oxygen deficiency, toxic gas accumulation);

— loss of structure (e.g. collapse of supporting structure, impairment of exterior fabric of an enclosed refuge);

— loss of essential command support (e.g. loss of essential communications within an enclosed refuge and with third parties, ESD, F&G and monitoring, emergency power/lighting). It is essential to provide effective communications between multiple refuges. The level of ESD, F&G and monitoring facilities required at a refuge should be considered in developing the EERS.

On small platforms, it may not be appropriate to integrate the refuge with the living quarters or to enclose it. The primary purpose of the refuge may be only to serve as a temporary muster point for a short period, until the platform can be safely evacuated. Such short-duration protection can be provided by partially enclosing the refuge or by locating the refuge away from the source of possible hazardous events. Whilst all installations should have a muster area, there may be some incidents during which the normal muster area will not be safe.

If it may not be possible for all personnel to reach the refuge under certain emergency conditions, there may be a need for alternative arrangements to allow safe evacuation of these personnel.

Where a control station is occupied in an emergency and is not situated at a refuge, it should be possible for the personnel at the control station to subsequently reach a refuge if the situation makes it necessary. An auxiliary refuge may be needed to ensure this. The muster areas should be clearly identified by suitable signs. Adequate emergency lighting should be provided, giving illumination throughout the period for which personnel may have to use the area. Appropriate facilities for communication should be provided in muster areas. The areas should remain unobstructed and be able to accommodate all personnel who may need to use them.

All personnel on arrival at the installation should be assigned to a muster area and be given adequate information about its location and all relevant procedures. A list of the assigned personnel should be displayed at the muster area. Procedures should be specified in the ERP for mustering at these areas, for accounting for personnel, and reporting back to the central control room. There should be contingencies to accommodate the possibility of personnel responsible for conducting the muster being unavailable.

F.3 Evacuation, rescue and recovery

F.3.1 Evacuation

All systems for evacuation and escape to the sea should be supported by personnel training or familiarization, based on the system requirements.

The normal method of getting to and from offshore installations is generally the preferred primary method (for evacuation). However, it is recognized that in many circumstances the primary method of evacuation will not be available, and thus there is a need to provide a secondary method (for evacuation) to allow a fully controlled escape from an installation to the sea, independent of external assistance. In some locations the secondary method may be the same as the primary method, providing it is always available and has sufficient capacity such that it is capable of dealing with the full complement of the installation personnel in a controlled manner without undue delay, for example due to awaiting the arrival of external assistance.

In many locations, the optimum secondary method of evacuation is by survival craft in accordance with IMO or other acceptable standards. It is important that full consideration be given to the type and design of the survival craft, their location, their ability to be safely launched and the conditions they will experience once launched (e.g. weather conditions, fires on the sea, smoke and radiation from topside fires). In some circumstances, the use of survival craft which are not totally enclosed may be acceptable.

Where provided, the survival craft should be readily accessible from the main TR and have a total capacity of at least the maximum personnel on board. The EER analysis may identify the need for additional survival craft so that the minimum capacity can be successfully reached and used for evacuation considering all credible scenarios and conditions. Consideration should also be given to severe weather conditions where the positions of certain survival craft may be particularly vulnerable and further redundancy may be required.

Typically, 50 % spare survival craft capacity is often provided in the evacuation arrangements.

Survival craft provided as a means of evacuation by sea should be easy to deploy, reliable in launch, give protection against hazards such as fire and smoke, be able to move away quickly from the installation and, where reasonable, should be oriented away from the installation on completion of launch. Totally enclosed motor-propelled survival craft (TEMPSC) provisions on floating installations where there will be a leeward and windward face need to consider the effect of weather on the ability to launch survival craft.

The EERS should give clear instructions on the actions to be taken after the launch of the survival craft. For instance, it is considered preferable to head away from the installation on a course that takes the survival craft out of the path of any smoke or gas clouds. However, heading directly upwind should be avoided as this presents the hazard of drifting back towards the installation in the event of engine failure.

Tertiary methods (for escape to the sea) are intended for use only in circumstances where evacuation by the primary or secondary method (for evacuation) is not possible.

The use of a tertiary method (for escape to the sea) is likely to introduce additional problems due to immersion of personnel in the sea and the requirement for subsequent rescue. Notwithstanding these problems, tertiary methods

(for escape to sea) should be considered for all installations to allow access to the sea. However, to maximize the chances of survival of personnel entering the sea, life-jackets and, where relevant due to sea temperature, survival suits, should be provided at suitable locations on the installation.

Tertiary methods (for escape to the sea) should adhere to the following general principles:

— they should take account of the likely scenarios;

— escape should be possible from several locations on the installation;

— there should be a viable means to reach sea level (e.g. knotted ropes, ladders, descent devices);

— liferafts which are capable of being easily deployed should be provided, if the EER assessment demonstrates these may be of benefit, to protect personnel who enter the sea;

— systems should be designed such that personnel who enter the sea can realistically use any available liferaft;

— effective training and familiarization should be provided for the use of tertiary methods (for escape to the sea).

In selecting the types, number and locations of tertiary methods (for escape to the sea), the likely demands from scenarios and the maximum personnel distribution should be considered. It is important that enough diversity and choice of method is available to enable personnel in a variety of situations to use them.

On some small installations, emergencies such as a major fire and explosion may not permit muster and planned evacuation. In these cases the best approach may be for people to immediately use tertiary methods for escape to the sea. This approach is only likely to be viable where there is a low likelihood of harm to those escaping under these conditions, for example if

— the environmental conditions are benign;

— there will be rapid recovery from the sea to a place of safety;

— life-jackets and survival aids are, if appropriate, readily available;

— there is no need to jump into the water from a height which is likely to cause injury;

— the workforce have been fully consulted on the EERS.

All personnel onboard should be provided with the equipment found necessary in developing the EERS. Equipment to be considered includes

— a survival suit which ensures that the survival time in the water exceeds the time required for rescue;

— a life-jacket;

— a device providing respiratory protection from smoke, asphyxiant or toxic gas which may be encountered during evacuation and escape;

— a torch (flashlight);

— heat-resistant gloves;

— any other equipment found necessary in developing the EERS.

Additional survival suits (where required) and life-jackets should be available for personnel at places which may be used for access to the sea, such as survival craft embarkation areas and at locations which may be used for tertiary escape.

The arrangements for evacuation should take into account any constraints on their use imposed by such factors as the weather conditions, the nature and location of the emergency and the time available to evacuate. The means of evacuation should take into account the likely distribution of personnel and likely evacuation scenarios, and in particular it should be readily accessible from temporary refuge.

There should be sufficient spare capacity in this evacuation system such that, in the event of some part of the system becoming unavailable, there remains available capacity elsewhere sufficient to accommodate safely all persons on the installation. The degree of spare capacity should be determined and justified by the assessment of the EER arrangements.

Recovery and rescue arrangements are required for all personnel using secondary or tertiary methods to abandon the installation. These arrangements should either be provided by the installation operator (e.g. helicopters or dedicated vessels) or use made of resources provided by other operators and national resources (e.g. search and rescue helicopters, passing vessels). The availability and suitability of such resources should be considered when developing the EER strategy.

It is necessary to take account of the needs of any special categories of personnel (e.g. divers in saturation). Additional facilities and arrangements may be needed to ensure they reach a suitable destination.

F.3.2 Recovery

Arrangements should be made for recovery and rescue of people who have had to leave their installation because of an incident, who have entered the sea as a result of a helicopter ditch close to the installation, or who have fallen victim to an incident such as man-overboard.

The evacuation and the escape process is only complete when all personnel reach a place offering a level of safety comparable to that existing before the event leading to the need for EER, and providing suitable medical facilities.

The objectives of recovery and rescue are to make arrangements to ensure a good prospect of the survival of people who need to escape from an installation. It should be demonstrable that these arrangements, necessary to effect satisfactory recovery and rescue, can reasonably be expected to be available when required. Important considerations in the recovery activity are

— number and condition of persons involved;

— time taken to find and effect a transfer of personnel;

— operational weather limits and weather conditions;

— risks to those being recovered;

— risks to those undertaking the recovery.

In a total installation evacuation, the rescue and recovery resources will not be under the direction of the installation and someone else has to assume the role of coordinating ER activities, including recovery of people from the water. As part of the ER exercises, it should be confirmed that effective arrangements are available for rescue and recovery when the person in overall charge on the installation has to evacuate.

Arrangements for recovery and rescue may include the use of a vessel stationed in the vicinity of the installation. Where provided, such a rescue and recovery vessel should be designed to be suitable for the operating environment and have adequate capacity, equipment, crew, etc. to allow it to meet its functional requirements and possibly the role of on-scene commander for rescue and recovery, at least in the early stages of an emergency.

If rescue and recovery will involve a dedicated vessel provided for this purpose, the vessel constitutes an integral part of the EER arrangements and as such should be included in EER exercises and drills.

Some means of evacuation, for example helicopters, bridge link, marine transfer to a vessel, etc., involve personnel being taken directly from the installation to a place of safety. However, some means of evacuation, for example survival craft, are not in themselves a place of safety and are not normally capable of taking persons directly to a

place of safety without some additional recovery activity. In such cases arrangements are needed to recover these persons from the means of evacuation to a place of safety, when it is safe to do so.

Means of recovery may include

— a rescue and recovery vessel;

— fast rescue craft;

— suitable helicopters;

— installation-based recovery facilities (e.g. for man-overboard or helicopter ditching);

— other vessels.

F.3.3 Rescue

Rescue is the process by which those who have entered the sea directly or in survival craft/liferafts are retrieved to a place where medical assistance is available.

Important considerations in the rescue of personnel are

— number of persons involved;

— time taken to find, reach and rescue persons in the sea;

— capacity of rescue facilities;

— operational weather limits and weather conditions;

— survival time for people in the sea, which is a function of sea state, sea temperature and degree of protection afforded by any protective equipment such a liferafts and survival suits;

— risks to those undertaking the rescue.

When vessels are stationed in the vicinity of an installation to assist in rescue and recovery, they may also have duties in connection with

— man-overboard;

— threat from a drifting object or from a vessel;

— fire-fighting activity on the installation;

— oil pollution control;

— preventing violation of safety zone;

— rescue of personnel in the sea, both individuals and larger numbers;

— evacuation, including hyperbaric evacuation;

— communications when this cannot be dealt with by the installation;

— providing an alternative landing option for helicopters, possibly with refuelling, particularly in areas with limited ER resources;

— installation support activities such as bunkering, transfer of cargo and control of remote underwater vehicles.

When a vessel has rescue- and recovery-related duties, the vessel should have suitable arrangements that will allow the people in the sea to be quickly brought onto the vessel without exacerbating or causing injury.

When the vessel is provided with fast rescue craft for rescue and recovery

— the launching and recovery arrangements for the fast rescue craft should be compatible with the weather conditions that may be present when rescue activities are carried out. Any restrictions in rescue capability should be communicated to the person in overall charge of the installation, so that suitable control measures (e.g. for over-side working) can be instigated;

— the fast rescue craft used should be compatible with the vessel provided for rescue and recovery, so that patients can easily taken from the craft to a suitable place on the vessel.

The shift duty rosters and a programme of drills are important to maintain the motivation of the crew and speed of response of a vessel used for rescue and recovery.

ER equipment such as life buoys, survival craft should be marked with the name of the installation.

Rapid rescue is crucial, as survival time in the sea is limited due to the effects of hypothermia, exhaustion and drowning, even for persons wearing survival equipment. Although rapid recovery (e.g. from survival craft) is desirable, personnel requiring recovery as opposed to rescue normally do not suffer unduly from a degree of delay. Indeed, in some cases some delay can significantly improve the chances of a successful transfer to a place of safety. For example, in severe weather it may be prudent to delay transfer of personnel from a survival craft until conditions improve, or until the survival craft reaches sheltered water.

F.3.4 Location devices

The ability to rescue and recover survival craft and liferafts is enhanced by the use of radar location devices such as EPIRB in line with SOLAS requirements. Some operators have found that use of personal locator beacons significantly improves the ability of helicopters and vessels to locate of people in the water and thus reduce the time taken to recover them.

F.3.5 Place of safety

Persons who have been evacuated and particularly those who have escaped from the installation are still at considerable risk. There is, therefore, a need to ensure their timely recovery or rescue to a place of safety is therefore needed, to reduce the risks to which they are subjected to as low as is reasonable.

A place of safety means an onshore or safe offshore location, installation or vessel where medical treatment and other facilities for the care of survivors are available. It should represent an environment in which the risks to which persons are exposed are no higher than those experienced on their installation under normal operational conditions.

Annex G
(informative)

Guidelines on environmental emergency response

ISO 14001 [2] describes the principles for an environmental management system and ISO 14004 [3] provides general guidelines on how to implement such system. An important part of environmental management is the planning for ER.

Typical oil-spill ER measures used in some areas of the world are given below. The actual requirements for any given operating location depends on a large number of factors, including

— environmental sensitivity of the area of operation;

— infrastructure in place to deal with oil spills;

— speed of response of shore-based assistance;

— size of credible spills;

— physical properties of the spill.

In developing the arrangements for environmental ER the following should be considered:

— proportion of oil pollution control equipment that should be operative within given time intervals from the start of the emergency;

— proportion of the oil-pollution control equipment that should be located on the installation;

— environmental conditions that may be present when the equipment is deployed;

— capacity of the oil recovery system;

— characteristics of the oil/emulsion to be recovered;

— means to identify the extent of the spill;

— facilities to handle any recovered oil.

The term production installation in this connection also includes installations carrying out any test production. The ER relating to acute oil pollution for production installations should be designed so as also to be capable of serving an effective frontline contingency function in the event of major oil spills.

Designing the ER relating to acute oil pollution should be based on an evaluation of environmental hazards in the event of discharge. Criteria should be based on available scientific data. This may include information concerning interests connected with birds, fish and outdoor life in the area. These data may vary with the seasons and should be included in the basis for establishing the ER relating to acute oil pollution.

International conventions have introduced the requirement to develop national plans for oil-spill response, and operators should ensure that their installations' ERPs are aligned with national requirements.

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