



Council

Distr.: General
31 January 2022

Original: English

Twenty-seventh session

Council session, part I

Kingston, 21 March–1 April 2022

Item 11 of the provisional agenda*

Draft regulations on exploitation of mineral resources in the Area

Draft standard and guidelines for the preparation and implementation of emergency response and contingency plans

Prepared by the Legal and Technical Commission

* ISBA/27/C/L.1.



Standard for the preparation and implementation of emergency response and contingency plans

Contents

	<i>Page</i>
I. Introduction	3
A. Scope	3
B. Purpose	3
II. Emergency preparedness scenarios	3
A. Definition of objectives	5
B. Definition of scope	5
C. Description of premises	5
D. Definition of roles and responsibilities	6
E. Competence and participation in emergency preparedness assessments	6
F. Methods, models and tools	6
G. System boundaries	6
H. Definition of the plan of execution	7
III. Incidents having harmful effects on the marine environment	7
IV. Barrier management	7
V. Emergency response organization	8
VI. Communication lines and notification process	8
VII. Drills	8
VIII. Internal and external audits	9
IX. Process improvement	9
X. Definitions and abbreviations	9

I. Introduction

1. In the present standard, the Legal and Technical Commission sets out the process to be followed for the preparation and implementation of emergency response and contingency plans for the exploitation of mineral resources in the Area in accordance with the regulations on exploitation of mineral resources in the Area (regulations on exploitation).
2. The standard is to be read in conjunction with the regulations on exploitation, in particular regulations 33 and 53 and annex V, as well as other relevant International Seabed Authority standards and guidelines, including, but not limited to, those related to:
 - (a) Environmental impact assessments and environmental impact statements;
 - (b) Environmental management and monitoring plans;
 - (c) Environmental management systems;
 - (d) Safe management of mining vessels and installations;
 - (e) Tools and techniques for hazard identification and risk assessment.

A. Scope

3. The present standard applies to assets intended to be deployed for exploitation of mineral resources in the Area and sets out mandatory requirements for the preparation and implementation of emergency response and contingency plans.
4. The standard shall be read in conjunction with the equivalent sections in the guidelines for the preparation and implementation of emergency response and contingency plans.

B. Purpose

5. The objective of the standard is to describe the process for preparing and implementing emergency response and contingency plans for managing accidents and incidents that could potentially occur during mining operations in the Area, and to establish a set of unified and coordinated response mechanisms.
6. While identifying potential accidents and incident scenarios, it is important to consider mitigating actions for controlling the associated risks. An emergency response and contingency plan is a vital contributor to mitigating the risk of incidents occurring during exploitation of mineral resources

II. Emergency preparedness scenarios

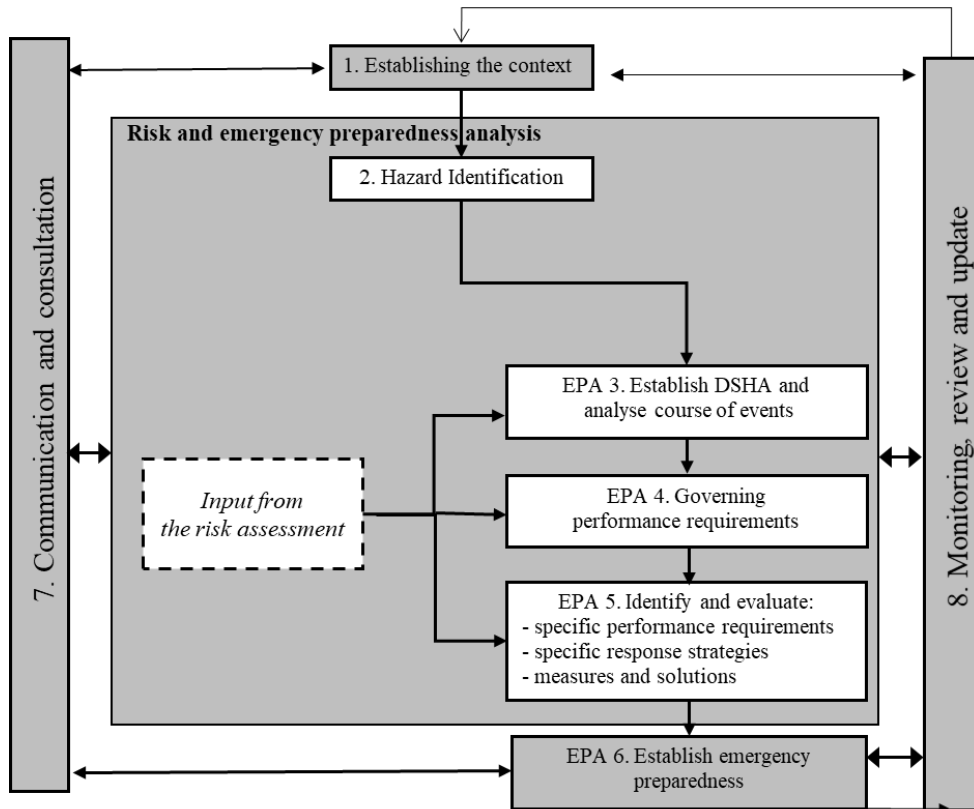
7. The contractor shall carry out a hazard identification process that provides a balanced and comprehensive representation of potential hazards throughout the total mining life cycle in order to inform the development of an emergency response and contingency plan. The hazard identification process shall be appropriate and consider potential incident scenarios associated with the processes, operations or phases of mining operations.
8. The contractor shall carry out risk analyses to identify and assess the potential cause, likelihood and consequence of potential incidents, in order to identify appropriate actions and management strategies for preventing and responding to such

incidents, as well as ascertaining the effects that various processes, operations and modifications will have on major incidents and environmental risk.

9. The contractor shall prepare an emergency preparedness manual, which shall cover the areas set out in the present standard of the contractor’s health, safety, environment and quality management systems.

10. An overview of the emergency preparedness assessment process is set out in the figure below.

Emergency preparedness assessment process



Abbreviations: EPA, emergency preparedness assessment; DSHA, defined situations of hazards and accidents.

11. An emergency preparedness assessment combines all the elements shown in the figure above. The first element of the emergency preparedness assessment starts with defining the basic parameters for emergency preparedness and setting the scope. The establishment of the context for the emergency preparedness assessment shall include, as a minimum, the steps outlined in the present section.

12. In contingency planning, the contractor shall consider and cover the major categories of scenarios that are foreseen as occurring as a result of an incident such as collision, grounding, fire and explosion, pollution incidents, safety incidents and security incidents. Contractors shall establish their own individual manuals for security planning and ensure that they undertake thorough information management.

13. The second element of the emergency preparedness assessment is hazard identification. That is followed by the third step (EPA 3), which involves establishing defined situations of hazards and accidents and then preparing for each of the situations so defined.

14. The contractor shall carry out emergency preparedness analyses, which shall be part of the basis for making decisions when, for example, defining hazard and accident situations, stipulating performance requirements or success criteria for emergency preparedness, or selecting and setting out the dimensions of emergency preparedness measures. The output from hazard identification or risk assessments shall be used as a basis for establishing defined situations of hazards and accidents. The course of events will be analysed according to those situations and the governing performance requirements for emergency preparedness identified, as seen under EPA 4 in the figure above.

A. Definition of objectives

15. The contractor shall define the objectives for the emergency preparedness assessments that are relevant for the project according to the phases of the proposed operations. The objectives shall be suitable for the purpose of the assessments, particularly with respect to providing sufficient and appropriate input to decision-making at the right time. The defined objectives for the emergency preparedness assessments (and the elements included) shall be documented.

B. Definition of scope

16. The contractor shall define the scope of the emergency preparedness assessments, which shall include, as a minimum: (a) defined objects of analysis or in other words, installation(s), plant(s), system(s), activity/activities, operation(s) and/or phase(s) that are the subject of analysis; and (b) a description of the activities to be carried out. Guidance on the subjects to be included in the emergency preparedness assessment is included in the guidelines for the preparation and implementation of emergency response and contingency plans and in annex V to the draft regulations on exploitation.

C. Description of premises

17. The contractor shall identify and describe the premises for an emergency preparedness assessment. The premises shall, as a minimum:

- (a) Define the purpose of the assessment in accordance with the needs of the activity;
- (b) Identify and describe the target groups for the results of the assessment;
- (c) Identify the relevant regulations, requirements, specifications and classification society rules;
- (d) Identify the overall emergency preparedness approach;
- (e) Identify other internal company requirements;
- (f) Identify the relevant risk assessment premises and assumptions that may influence the emergency preparedness assessment;
- (g) Identify the relevant operational premises for the assessment.

D. Definition of roles and responsibilities

18. The contractor, with other involved parties, shall define the responsibilities related to the planning and execution of the entire emergency response and contingency plan process, as well as the elements and the various tasks and activities to be undertaken. The other involved parties shall mean the contractor's organization, subcontractors, if relevant, and other external participants that are likely to play a role in the mining operations. This process shall be undertaken in consultation with the sponsoring State(s), the flag State(s) and coastal States and other entities having relevant jurisdictional competence or rights and legitimate interests with regard to specific components of the plan.

E. Competence and participation in emergency preparedness assessments

19. During an emergency preparedness assessment, the relevant personnel with the necessary competence shall be included and involved in all phases of the life cycle. The guidelines for the preparation and implementation of emergency response and contingency plans provide an example of the relevant personnel.

20. In addition, personnel with engineering or design competence shall be involved during the phases of the project, Personnel from the emergency preparedness organization shall be involved in assessments in the operational and modification phases.

F. Methods, models and tools

21. All methods, models and tools that are used shall be tailored to the needs of the decision support system and the objectives and scope of the individual analysis.

G. System boundaries

22. The contractor shall define and describe in a suitable manner the boundaries of the emergency preparedness assessment. The description shall, as a minimum, include the following main aspects:

(a) The technical system (process, structure, utility, safety, emergency preparedness systems);

(b) The period of time and types of operations and activities to which the analysis relates;

(c) Available resources on the vessel/installation;

(d) Interaction with relevant resources – company, field, area and external emergency resources;

(e) Definition of groups that are exposed to risk, including possible third party groups.

23. The boundaries of the emergency preparedness assessment shall be documented.

H. Definition of the plan of execution

24. The contractor shall establish a plan for the execution of the emergency preparedness assessment. The plan shall include the expected deliveries, schedule, decision milestones and target groups for assessment. Responsibilities for executing, follow-up and management of deviations from the plan shall be established and the plan, including its follow-up, shall be documented.

III. Incidents having harmful effects on the marine environment

25. The contractor shall update the environmental risk and emergency preparedness analyses if there are significant changes affecting the environmental risk or the emergency preparedness situation. The effectiveness of the emergency response and contingency plan shall be tested on an annual basis and the plan updated as needed, but in any event at least once every five years. The contractor's management systems and their alignment with those of the subcontractors, if any, are vital during the mining operations. The emergency preparedness manual shall therefore establish such links, common goals and objectives for the handling of an emergency incident. The emergency preparedness manual shall also refer to the relevant parts of the subcontractors' safety management and environmental management systems and vice versa. The health, safety, environment and quality manual or management systems manual shall contain sections including emergency preparedness and environmental management.

26. For environmental risk analyses, varying vulnerability in different geographical areas shall be accounted for and the respective regional environmental management plans must be taken into account.

27. In environmental risk analyses, the contractor shall include and document an assessment of pollution hazards and the measures to be taken to prevent or reduce such hazards; for example, mining discharges and measures to control such discharges.

28. The contractor shall take into account historical incidents, ensuring that the dimensions of the contingency are in accordance with the environmental risk.

IV. Barrier management

29. Barriers shall be established to identify conditions that could lead to failures, hazards or accidents, reduce the possibility of such failures, hazards or accident, or limit serious harm to the marine environment. A description of the mining operations and equipment, including the emergency response plan and emergency response equipment, shall be listed as part of the emergency preparedness manual where the barriers are specifically identified.

30. Where more than one barrier is necessary, they shall be independent of one another. The contractor or the party responsible for operations shall specify the strategies and principles that form the basis for the design, use and maintenance of barriers, so that their function is safeguarded throughout the life of the asset.

31. The contractor shall ensure that personnel are aware of which barriers have been established and the function that they are intended to fulfil, as well as the performance requirements that have been defined in respect of the finalized technical, operational or organizational elements necessary for the individual barrier to be effective. Personnel shall also be aware of which barriers and elements of barriers are not functioning or have been impaired. Details of the known natural marine

environmental conditions that may influence the efficiency of response equipment or the effectiveness of a response effort shall be presented. The contractor shall implement the necessary measures to remedy or compensate for missing or impaired barriers as fast as is practicable.

V. Emergency response organization

32. The structure and function of the internal groups, both offshore and onshore, that will have responsibility for the implementation of the emergency response and contingency plan shall be set out in the plan. That may involve such designations as the incident response team, for both vessel and shore-based management aspects associated with emergency response.

VI. Communication lines and notification process

33. Together with the emergency preparedness organization, the contractor shall also identify the communication lines within the organization. The communication process shall also be included in the contingency plans that address the different scenarios being considered.

34. The communication lines shall be presented by means of flow charts, organization charts and so on, complete with a list of the functions expected to be fulfilled by a certain position, including the competence requirements for that position. The key functions shall participate in drills and exercises once every year and their participation recorded.

35. Together with communication lines, a notification process for informing or notifying the relevant stakeholders in the event of an incident shall be established.

36. The regulations on exploitation require that the contractor shall not proceed or continue with exploitation if it is reasonably foreseeable that proceeding or continuing would cause or contribute to an incident or prevent the effective management of such incident. The communication lines shall be prepared in accordance with the regulations on exploitation. A deadline for notifications shall also be included. The contractor shall ensure that any subcontractors are obliged to promptly notify any incidents.

VII. Drills

37. Drills and exercises are vital for contingency planning. As a minimum, the drills and exercises shall be prepared and conducted according to the different scenarios considered under contingency planning. The contractor shall ensure that the necessary training and drills are conducted regularly, so that all personnel are always able to handle operational disturbances and hazard and accident situations in an effective manner. Personnel shall carry out training and exercises related to the specific facility where the work is to be performed.

38. Through drills, the contractor shall verify that all the performance requirements for emergency preparedness against serious pollution are fulfilled and that the emergency preparedness resources that are intended to be used are operational and available. The verification shall be completed prior to starting the planned activity and the documentation shall be made available to the International Seabed Authority upon request.

VIII. Internal and external audits

39. Periodic audits shall be conducted, and the results of such audits shall be made available. The contractor shall provide the outcomes of the three types of audit set out below to the International Seabed Authority. It is the responsibility of the contractor to ensure that the subcontractor and independent audits are conducted in accordance with the requirements listed in the present standard.

40. The first type of audit involves the subcontractor, who shall carry out an internal audit. The level of authority of who shall execute such audits shall be documented, with the expectation that such personnel are competent in carrying out audits with a high-level understanding of operations. Such audits shall be performed twice a year. While documenting the audits in the form of an audit report, a separate record of nonconformities and observations shall be documented.

41. The second type of audit involves the contractor, who shall audit the subcontractor and the asset(s). The contractor shall be responsible for documenting such audits and the maintenance of a separate register for nonconformities and observations along with the audit report. Such audits shall be conducted at least once a year. Any nonconformities identified during the audit must be rectified.

42. The third type of audit involves an audit by an external party of the contractor and the subcontractor. The basis for such an audit shall be the audit reports from both the subcontractor and the contractor. However, the audit shall be carried out independently and may cover additional information beyond what has already been reported. It shall also be possible to align the audit to coincide with a drill to enable the active participation of all parties. Such audits shall be conducted at least once a year.

IX. Process improvement

43. The Contractor shall continuously improve health, safety and the working environment by identifying the processes, activities and products in need of improvement, and implementing the necessary improvement measures. Those measures shall be followed up and the effects evaluated and documented. Individual employees shall be encouraged to actively identify weaknesses and suggest solutions.

44. Applying experience from one's own activities and those of others shall be facilitated in the improvement work.

45. The process improvement shall be part of the audits and this needs to be documented and demonstrated during the periodical audits.

X. Definitions and abbreviations

46. Except as otherwise specified herein, the terms and phrases defined in the regulations on exploitation shall have the same meaning in the present standard.

47. "Asset" means all vessels and installations used in the mining operation.

48. "Classification society" means a body or entity (known as "the society") which is responsible for the development and maintenance of rules and the verification of compliance with the rules throughout the life of a vessel, as well as the assignment of a class to a ship upon the completion of satisfactory surveys.

49. "DSHA" means defined situations of hazards and accidents.

50. “EPA” means emergency preparedness assessment.
51. “HSEQ” means health, safety, environment and quality.
52. “Subcontractor” means a party in a contractual relationship with the contractor to support the execution of the mining operation.

Guidelines for the preparation and implementation of emergency response and contingency plans

Contents

	<i>Page</i>
I. Introduction	12
A. Background	12
B. Purpose	12
II. Emergency preparedness scenarios	12
A. Definition of objectives	12
B. Definition of scope	12
C. Definition of responsibilities	12
D. Competence and participation in emergency preparedness assessments	13
III. Incidents having harmful effects on the marine environment	13
IV. Emergency response organization	13
V. Communication lines and notification process	14
VI. Drills and exercises	14
VII. Internal and external audits	15
VIII. Process improvement	15
IX. Definitions and abbreviations	15
Appendix	
Identification of accidental events	16

I. Introduction

A. Background

1. The present guidelines serve as a supporting document for the standard for the preparation and implementation of emergency preparedness and contingency plans for exploitation operations in the Area and should be read in conjunction with the corresponding sections in the standard, in particular draft regulations 33 and 53 and annex V to the regulations on exploitation. The standard describes the process to be undertaken to prepare and implement emergency response and contingency plans for managing accidents and incidents that could occur during mining operations in the Area.

B. Purpose

2. The objective of the present document is to provide guidance on the requirements set out in the regulations on exploitation and the standard.

II. Emergency preparedness scenarios

3. The purpose of an emergency preparedness assessment is to update the response strategies, performance requirements, emergency preparedness organization and measures to cover the design, construction and operational phase. The objective of this analysis is to provide the basis for the emergency preparedness plan and the drills and training plans, in accordance with the standard.

A. Definition of objectives

4. The objectives for the emergency preparedness plan should be clearly defined for each phase. The objectives may be function-based, goal-based or a combination of the two, depending on the framework chosen for establishing the plan. Functional objectives are those that relate to the specific functions of a given phase, while goal-based objectives are focused on achieving specific parameters within each phase.

B. Definition of scope

5. The scope should clearly define the object being addressed, namely installation, system, plant, activity and so on, and the description of actions involved for the object being addressed. Depending on the system(s) subjected to the assessment and the objectives of the process, the emergency preparedness assessment may include the establishment of escape, evacuation and rescue strategies.

C. Definition of responsibilities

6. When assigning responsibilities, it is imperative to factor in the necessary competence of the personnel involved and ensure a sufficient level of authority within the respective organizations to execute the relevant tasks expected. As an example, organizational hierarchy should not hinder the level of authority when executing the aforementioned responsibilities.

D. Competence and participation in emergency preparedness assessments

7. An example of relevant personnel to be included and involved in life-cycle phases during an emergency preparedness assessment is as follows:

- (a) Operational experience (e.g. senior marine crew, mining crew);
- (b) Emergency preparedness assessment (regulatory requirements, methods);
- (c) Health, safety and environment personnel;
- (d) External emergency resource representatives, if applicable and required.

III. Incidents having harmful effects on the marine environment

8. For environmental risk analyses, a reference-based environmental risk analysis may be performed if updated analyses for a comparable activity in the vicinity are available. The data should be based on the best available input data sourced from a relevant entity, including baseline data to be collected by the contractor. Evidence that the environmental risk will be similar or lower than in the reference activity should be provided. The analyses should give a brief description of the vulnerability of the selected environmental objectives. Further, the selection of the environmental objectives should be justified and the data source should be referenced.

9. The environmental risk analyses should have a description of the critical functions that are used to assess the damage and the degree of seriousness of the damage (the consequence) for the different environmental objectives. Any assumptions made in the estimations, for example based on insufficient knowledge, should be described.

10. For environmental emergency preparedness analyses, the contractor should set goals and mechanisms for reduction of the environmental risk, including goals for protecting the vulnerable environmental objectives prior to the emergency preparedness analysis. The analyses should also cover minor discharge incidents and measures to limit and combat them.

IV. Emergency response organization

11. The emergency preparedness analyses based on the risk ownership identified could be further developed to assign different roles to handle a risk or a risk group. As an example, two defined situations of hazards and accidents are described below for illustrating this point.

12. The two defined situations of hazards and accidents considered are:

- (a) Occupational/acute medical condition (DSHA 1);
- (b) Release of toxic gas/asphyxiant gas (DSHA 2).

13. The organization may consist of lifeboat 1 team, lifeboat 2 team, helideck team, man overboard boat team, technical team, on-scene commander, emergency response team, medical personnel, first aid team and so on.

14. For DSHA 1, the roles may be allocated to a first aid team, a helideck team, an emergency response team and a medical person. For DSHA 2, the roles may be allocated to a technical team, a first aid team, an emergency response team, an on-scene commander (in case of high fatalities) and a medical person. In this setting,

the overall risk ownership could lie with the on-scene commander but is distributed among different functions within the on-board organization.

15. A suitably manned and competent organization should be put in place to handle events that could have wide variations in terms of consequence and the probability of occurrence. Links to the shore-based organization in coordinating efforts during an incident should be ensured.

16. Examples of different levels of emergency preparedness organizations are, for example, first line or second line. The first line of emergency preparedness organizations is expected to be responsible for the direct management and control of any emergency occurring on board, including notification, mobilization, handling and normalization of the emergency. The shore-based organization is considered the second line emergency preparedness organization and constitutes the main onshore support centre for the asset in an emergency. More levels of such organizations should be evaluated and, if found necessary, presented.

V. Communication lines and notification process

17. The contingency plans are not expected to detail the communication lines as such but give an overview of the relevant parts of the emergency preparedness organization that can be linked to handling the different scenarios considered. The expectation in establishing such communication lines is to address the various stakeholder needs (International Seabed Authority, sponsoring State, flag State, coastal States, etc.), simplify the handling of incidents (roles and responsibilities) and establish the line of authority for onshore and offshore communications (namely who shall do what). It is expected that the key positions within the line of authority are manned by sufficiently competent personnel with relevant experience.

18. The notification process should include a list of notifiable events, the relevant personnel to be notified, both internal and external, and the means of notification. Personnel who are part of the contractor and the subcontractors are considered as internal while all personnel outside these are considered external. The contact details for relevant personnel should be easily available and the means of communication to each of the relevant personnel, email, fax, text message and so on, should be well established. This is to ensure that there is clarity in terms of notification during an incident. Drills and exercises may follow the system for communication and notification as best practice.

VI. Drills and exercises

19. In order to fulfil the requirements for training and drills, simulator training should be used for monitoring and control functions. Personnel who have emergency preparedness functions should practice their emergency preparedness tasks at least once during each period of stay. Mustering and evacuation routines should be included in the drill. At least one annual drill should be carried out for the emergency preparedness management and for personnel attending to collaborate on emergency preparedness against acute pollution.

20. Drills related to collaboration on emergency preparedness against acute pollution should include skills training in the individual emergency preparedness functions and co-training between the contractor and other involved parties. The result of the drill should be evaluated by the contractor.

21. When hired facilities or vessels are used, a drill should be conducted at an early point in time, in accordance with a coordinated emergency preparedness plan for the

contractor and the subcontractors, if any. If the same facility is used for a lengthy consecutive period, a major annual drill should be held involving both unit and area resources, relevant external resources, the contractor's and subcontractors' onshore emergency preparedness organizations and the supervisory authorities. A record of such drills is expected to be maintained and made available upon request by the International Seabed Authority.

22. While performing drills, the communication and notification process should, as far as possible, be adhered to. This is to test and ensure the necessary preparedness in case of a real emergency.

VII. Internal and external audits

23. Periodic audits may be conducted either by onshore personnel or the personnel on board. However, it is recommended that an audit be conducted by onshore personnel as far as is practical to ensure neutrality and also to avoid potential conflicts on board. The audits should have a structure that includes an audit notification, an audit plan, minutes of meetings, logging of observations and nonconformities. The level of information capture from different types of audits may be categorized and logged according to the type of audit performed. Regardless of the type of audit, the information collected and the resulting audit reports, including conclusions drawn, should be made easily available upon request by the International Seabed Authority.

VIII. Process improvement

24. A sound health, safety and working environment culture can be observed in enterprises that organize continuous, critical and thorough work in order to reduce risk and improve health, safety and the work environment. Elements of a sound health, safety and working environment culture include that:

(a) The effort and means in the health, safety and environment work are continuously subject to a critical assessment as regards potential goal conflicts and efficiency;

(b) There is a clear understanding in the organization that culture is not an individual quality but something that is developed in the interaction between people and the given framework conditions;

(c) Development and collective learning are facilitated through competence enhancement, participation and systematic and critical reflection at all levels;

(d) Health, safety and environment work cannot be viewed independently from each other or from other value-creating processes in the enterprise.

25. Identification for improvements can be based, in part, on the results of analyses and surveys, on investigation of hazard and accident situations, on the handling of nonconformities and on the experience gained from internal follow-up or the experience gained by others. Applying experience can, for example, include information on faults and defects, as well as examples of good problem-solving and practices, including identification of the root causes.

IX. Definitions and abbreviations

26. The terms and abbreviations in these guidelines have the same meaning as in the standard.

Appendix

Identification of accidental events

A. For all assets, the risk analysis shall as a minimum consider whether the following accidental events are relevant

1. Collisions:
 - Collision with supply ship
 - Collision with fishing vessel
 - Collision with standby vessel
 - Collision with transport vessel (e.g. a bulk carrier)
 - Collision with underwater craft
 - Collision with drifting objects
2. Incorrect weight distribution:
 - Shifting of deck cargo
 - Swinging loads from cranes or derricks
 - Shifting of ballast
 - Shifting of mined materials
 - Icing
3. Falling objects:
 - Shifting, falling deck cargo
 - Falling crane booms
 - Falling crane lifts
4. Drift:
 - Line breakage
 - Multiple line breakage/dragging anchor
 - Failure of dynamic positioning system
 - Winch failure
5. Helicopter accident on the unit.
6. Hull/structural failure.
7. Fires in enclosed spaces:
 - Fire in accommodation spaces
 - Fire in machinery spaces
 - Fire in workrooms
8. Explosions in machinery spaces and other equipment rooms.
9. Loss of control during transit:
 - Collision during transit
 - Grounding
 - Towing failure

10. Incorrect operation of systems, including systems treating foodstuffs (storage method, etc.) and potable water.
11. Failure during ship-to-ship transfer of mined material:
 - Clogging of hose
 - Break of hose
 - Pump failure
12. Severe weather such as hurricanes, storms, squalls, lightning, waterspouts and extreme waves.
13. Responding to distress calls from nearby passing vessels in accordance with regulation 33 of the International Convention for the Safety of Life at Sea.

B. Accidental events to be especially considered for mining operations

1. Hydrocarbon blowout:
 - Shallow gas blowout on seabed
 - Reservoir blowout on drilling floor
 - Blowout caused by various possible events
2. Release of toxic gases.
3. Potential fire scenarios related to mining operations:
 - Fire in “high fire-risk” areas
4. Explosion scenarios related to mining operations:
 - Explosion in “high risk” areas
5. Vertical riser system:
 - Clogged buffer system
 - Clogged riser pipe
 - Leakage of riser pipe
 - Break of riser pipe
 - Failure of recovery system
 - Pump leakage
 - Entanglement
6. Seafloor collector:
 - Hydraulic/electrical failure
 - Lack of or limited manoeuvrability
 - Oil spillage
 - Collision with other equipment (e.g. remotely operated vehicles, autonomous underwater vehicles, monitoring equipment)
 - Collision with natural obstacles (rocks)
 - Collision with artificial obstacles (anchoring remains/weights)
 - A-frame failure
 - Lift wire winch failure

- Umbilical winch failure
- Umbilical cable internal failure
- Umbilical entanglement
- Severing of umbilical
- Surface equipment hydraulic power unit failure

C. Accidental events to be especially considered for vessels with diving capability

Critical accidental events in connection with diving operations in general.

D. Accidental events to be especially considered for a high number of personnel:

1. Smoke and gas due to fire, release from nearby installations.
2. Accident involving gangways.
3. Narrow escape routes.
4. Evacuation possibilities, in view of a large number of persons, life-saving appliances, etc.
5. Outbreak and spread of contagious diseases.

E. Notifiable events under the regulations on exploitation

1. Medical emergency.
2. Fatality of a person.
3. Missing person.
4. Occupational lost time illness.
5. Occupational lost time injury.
6. Medical evacuation.
7. Fire/explosion resulting in an injury or major damage or impairment.
8. Collision resulting in an injury or major damage or impairment.
9. Significant leak of hazardous substance.
10. Unauthorized mining discharge.
11. Adverse environmental conditions with likely significant safety and/or environmental consequences.
12. Significant threat or breach of security.
13. Implementation of an emergency response and contingency plan.
14. Major impairment/damage compromising the ongoing integrity or emergency preparedness of an installation or vessel.
15. Impairment/damage to safety or environmentally critical equipment.
16. Significant contact with fishing gear.
17. Contact with submarine pipelines or cables.