

FRONTIER AND OFFSHORE REGULATORY RENEWAL INITIATIVE (FORRI)

PROPOSED POLICY INTENTIONS FOR PHASE 3 OF THE FRAMEWORK
REGULATIONS

Government of Canada
Government of Newfoundland and Labrador
Government of Nova Scotia

June 28, 2017

Table of Contents

INTRODUCTION	1
PART 5 – CERTIFICATE OF FITNESS	
5.1 – Installations and Vessels	3
5.2 – Issuance of Certificate of Fitness	3
5.3 – Substitutions	3
5.4 – Conditions for Certification	4
5.5 – Limitations	4
5.6 – Conflict of Interest	4
5.7 – Certification Plan	4
5.8 – Submission of the Scope of Work	5
5.9 – Approval of the Scope of Work	5
5.10 – Verification and Re-Certification	6
5.11 – Certification Period	6
5.12 – Applicable Site or Region	6
5.13 – Certificate No Longer Valid	6
5.14 – Change in Certifying Authority	7
5.15 – Revalidation	7
5.16 – Reporting and Records	8
PART 6 – INSTALLATION ANALYSIS, DESIGN, CONSTRUCTION AND MAINTENANCE	
6.1 – Quality Assurance Program	9
6.2 – Concept Safety Analysis	9
6.3 – Innovations	10
6.4 – Physical and Environmental Conditions	11
6.5 – Structural Design, Tests and Analysis	12
6.6 – Fire, Explosion and Hazardous Gas Risk Assessment	13
6.7 – Passive Fire and Blast Protection	14
6.8 – Prevention and Mitigation of Major Accidents	15
6.9 – Offshore Pipelines	15
6.10 – Materials for Installations and Pipelines	15
6.11 – Classification	16
6.12 – Air Gap and Freeboard	16
6.13 – Motion Response and Stability of Mobile Offshore Platforms	16
6.14 – Special Considerations for Self-Elevating Mobile Platforms	17
6.15 – Station Keeping	17
6.16 – Disconnectable Mooring System	19
6.17 – Ballast and Bilge Systems	19
6.18 – Watertight Integrity of Floating Platforms	20
6.19 – Classification and Access to Hazardous Locations	21
6.20 – Ventilation of Hazardous and Non-Hazardous Locations	21
6.21 – General Electrical Standards	22
6.22 – Design for Removal of Fixed Offshore Installations	23
6.23 – Offshore Transportation and Installation of Facilities (Installations)	23
6.24 – Asset Integrity	23
6.25 – Installations Operations	25
6.26 – Operations Manual	25
6.27 – Diving Vessels and Dive Plants	27

PART 7 – SYSTEMS AND EQUIPMENT DESIGN, OPERATION AND MAINTENANCE	
7.1 – Repair, Replacement and Modification of Installations	28
7.2 – Facilities for Inspection and Maintenance	28
7.3 – Piping Systems	28
7.4 – Mechanical Equipment	32
7.5 – Corrosion Management	33
7.6 – Control Systems	34
7.7 – Integrated Software Dependent Systems	34
7.8 – Monitoring Systems	35
7.9 – Communication Systems	35
7.10 – General Alarms	36
7.11 – Gas Release Systems	36
7.12 – Helicopter Facilities and Operations	37
7.13 – Cranes and Handling Devices	37
7.14 – Navigation Aids	38
7.15 – Drilling Fluids System	38
7.16 – Well Control	39
7.17 – Casing and Cementing	39
7.18 – Formation Leak-Off or Integrity Testing	40
7.19 – Well Completion	41
7.20 – Production Tubing	41
7.21 – Subsurface Safety Valve	42
7.22 – Marine Riser	42
7.23 – Well, Well Head and Tree Equipment	42
7.24 – Formation Flow Test Equipment	42
7.25 – Drilling and Well Operating Practices	43
7.26 – Well Verification Scheme	43
7.27 – Reference For Well Depth	43
7.28 – Directional and Deviation Surveys	43
7.29 – Subsea Production Systems	44
7.30 – Fire and Gas Detection	45
7.31 – Ignition Prevention	46
7.32 – Emergency Shutdown and Blowdown	46
7.33 – Fire Protection Systems and Equipment	48
7.34 – Temporary and Portable Equipment	49
7.35 – Emergency Electrical Power and Systems	50
7.36 – Evacuation and Escape	52
7.37 – Lifesaving Equipment for Offshore Installations	53
PART 8 – GEOSCIENCE, GEOTECHNICAL AND ENVIRONMENTAL PROGRAMS	
8.1 – Geoscience, Geotechnical and Environmental Programs	55
8.2 – Damage to Property	55
8.3 – Testing of Energy Sources	56
8.4 – Vessel Classification and Helicopter Deck	56
8.5 – Marine Warrantee Surveyor	56
8.8 – Evacuation Systems	56
8.9 – Training Requirements	56
PART 9 – SUPPORT OPERATIONS	

9.1 – Support Craft and Safety Zone	57
9.2 – Safety Zone	57
ANNEX 1 - WELL CONTAINMENT AND CONTROL	58
ANNEX 2 - DEFINITIONS	59

Introduction - Frontier and Offshore Regulatory Renewal Initiative

The Frontier and Offshore Regulatory Renewal Initiative (FORRI) aims to modernize the regulatory framework governing oil and gas activities in Canada's frontier and offshore oil and gas areas. It is a partnership of federal and provincial government departments and includes participation of the Boards responsible for the regulation of frontier and offshore oil and gas activities.

The objective of FORRI is to modernize the regulatory framework by:

- Reducing redundancy amongst multiple regulations;
- Moving, where possible, to performance-based requirements instead of prescribing specific technologies/approaches;
- Bringing standards up to date where they are required; and
- Ensuring an efficient and effective regulatory regime.

Modernizing the regulations governing frontier and offshore oil and gas activities will contribute to maintaining Canada's high standards for safety, environmental protection and resource management.

This regulatory framework applies to companies and/or individuals that propose to, or have been authorized to, carry out activities related to the exploration and drilling for, and the production, conservation, processing and transportation of oil and gas in Canada's frontier and offshore areas. These activities include geophysical operations (such as seismic activities), exploration and development drilling, and the construction, certification, operation and decommissioning of production facilities.

The Framework Regulations

Through FORRI, government partners will work to modernize the following five regulations, and integrate these into new Framework Regulations:

- Drilling and Production Regulations (2009)
- Geophysical Regulations
- Certificate of Fitness Regulations
- Operations Regulations
- Installation Regulations

Framework Regulations Consultation Process

FORRI will consult with stakeholders, Indigenous groups (utilizing separate meetings where necessary) and the public at various stages:

- Policy intent: one-day, multi-stakeholder consultation sessions on proposed policy intention followed by a written comment period
 - Anticipated March 2016 – August 2017
- Draft regulation: one-day, multi-stakeholder consultation session on draft regulatory text followed by a 30-day written comment period (materials to be shared two weeks in advance)
 - Anticipated Early 2018
- Pre-publication: Canada Gazette I pre-publication on draft Framework Regulations followed by a 30-day comment period
 - Anticipated Fall 2018
- Final publication: Canada Gazette II publication of final Framework Regulations at least 90 days prior to entry into force

- Anticipated 2019

Framework Regulations Consultation Process for the Policy Intent

The development of the policy intent for the proposed Framework Regulations occurred in three phases:

- Phase 1 – Board Powers, Applications, Management Systems and Operator Duties
 - Stakeholder consultation commenced March 2016
 - Written feedback has been received on Phase 1 from multiple stakeholders.
- Phase 2 – Reporting and Resource Management
 - Stakeholder consultation commenced June 2016
 - Written feedback has been received on Phase 2 from multiple stakeholders
- Phase 3 – Installations and Operations
 - Stakeholder consultation commencing in June 2017 with written feedback due by September 6th 2017.

The stakeholder feedback provided to date has been posted to the FORRI web page:

<http://www.nrcan.gc.ca/energy/crude-petroleum/17729>

Next Steps – Phase 3

This document outlines the proposed policy intent for Phase 3 of the Framework Regulations, specifically focusing on *Installation, systems and equipment design, operation and maintenance*.

Following receipt of this document, stakeholders are invited to a consultation session on July 25, 2017 in St-John's, NL, where governments and stakeholders can discuss the various elements of the draft policy intent.

Stakeholders are invited to provide written comments on this policy intent document by September 6, 2017 to Daniel Morin (Daniel.morin@canada.ca). For transparency, stakeholder comments will be posted on the FORRI web page: <http://www.nrcan.gc.ca/energy/crude-petroleum/17729>.

Following the receipt of written comments, governments will consider the feedback received, prior to submitting the policy intent for regulatory drafting. Governments will respond to stakeholders following receipt and analysis of written feedback and after a complete draft regulation has been created and shared with stakeholders.

PROPOSED POLICY INTENTIONS FOR PHASE 3 OF THE FRAMEWORK REGULATIONS

PART 5 – CERTIFICATE OF FITNESS

5.1 INSTALLATIONS AND VESSELS

The following installations and vessels are prescribed for the purposes of section 143.2 of the Act:

- each production installation, drilling installation, accommodation installation, as well as any vessels and dives plant used for diving programs to be operated during any activity authorized by the Board

5.2 ISSUANCE OF CERTIFICATES OF FITNESS

Subject to sections 5.3, 5.5 and section 5.6, a Certifying Authority may issue a certificate of fitness in respect of the installations and vessels referred to in subsection (1), if the Certifying Authority;

- a. determines that, in relation to the production or drill site or region in which the particular installation or vessel is to be operated, the installation or vessel:
 - i. is designed, constructed, transported, and installed or established, and commissioned in accordance with
 - A. Part 6;
 - B. Those sections of Part 7 listed in Schedule 1 (TBD)
 - C. The provisions of the relevant Occupational Health and Safety Regulations listed in Schedule 2 (TBD);
 - D. The provisions of the relevant Framework Regulations and Occupational Health and Safety Regulations listed in schedule 3 to these Regulations, if the installation or vessel includes a dependent diving system;
 - ii. is fit for the purpose for which it is to be used and can be operated safely without polluting the environment, and
 - iii. will continue to meet the requirements of subparagraphs (i) and (ii) for the period of validity that is endorsed on the certificate of fitness if the installation or vessel is maintained in accordance with the inspection, maintenance and weight control programs submitted to and approved by the Certifying Authority under subsection (5); and
- b. carries out the scope of work in respect of which the certificate of fitness is issued.

5.3 SUBSTITUTIONS

For the purposes of subparagraph 5.2(a)(i), the Certifying Authority may substitute, for any equipment, methods, measure or standard required by any Regulations referred to in that subparagraph, equipment, methods, measures or standards the use of which is authorized by the Chief Safety Officer or Chief Conservation Officer, as applicable under section 16 of the *Canada Oil and Gas Operations Act* (COGOA). (or equivalent sections in the Accord Acts-205.069 for Can-NL Act and 210.07 for Can-NS Act)

5.4 LIMITATIONS

The Certifying Authority shall endorse on any certificate of fitness it issues details of every limitation on the operation of the installation or vessel that is necessary to ensure that the installation or vessel meets the requirements of paragraph 5.2(a).

5.5 CONDITIONS FOR CERTIFICATION

The Certifying Authority shall not issue a certificate of fitness unless, for the purpose of enabling the Certifying Authority to determine whether the installation or vessel meets the requirements of paragraph 5.2(a) and to carry out the scope of work referred to in paragraph 5.2(b),

- a. the person applying for the certificate
 - i. provides the Certifying Authority with all the information required by the Certifying Authority;
 - ii. carries out or assists the Certifying Authority to carry out every inspection, test or survey required by the Certifying Authority; and
 - iii. submits to the Certifying Authority an inspection and monitoring program, a maintenance program and a weight control program for approval; and
- b. if the programs are adequate to ensure and maintain the integrity of the installation, the Certifying Authority approves the programs referred to in subparagraph (a)(iii).

5.6 CONFLICT OF INTEREST

(1) The Certifying Authority shall not issue a certificate of fitness in respect of an installation or a vessel if the Certifying Authority has been involved, other than as a Certifying Authority or a classification body, in the design, construction or, installation or commissioning of the installation or vessel.

(2) When considering a change of Certifying Authority as per 5.13, a Certifying Authority is not in contravention of subsection (1) if a certificate of fitness has already been issued by another Certifying Authority who was not involved, other than as a Certifying Authority or classification body, in the design, construction, transportation, installation and/or commissioning of the installation or vessel or any of their systems.

(3) Once all facility systems have been commissioned and a Certificate of Fitness issued for the facility, then if there is a change in Certifying Authority, the incoming Certifying Authority would not be considered in a conflict of interest even if they or a subsidiary had been involved in the design, construction, installation or commissioning of the installation or vessel or their systems. The incoming Certifying Authority or its subsidiaries cannot, however, be involved in the design, construction, installation or commissioning of any pending or future modifications or upgrades to the installation or vessel or their systems.

5.7 CERTIFICATION PLAN

Prior to the submission of the scope of work by the Certifying Authority, the operator (and owner of the installation or vessel, if the operator is not the owner) shall submit a documented certification plan to the Chief Safety Officer for approval that demonstrates how initial and ongoing regulatory compliance will be achieved with Part 6 of the Framework Regulations, those sections of Part 7 of the Framework Regulations listed in Schedule 1, those sections of the Part III.1 regulations (Accord Act areas) or OGOSH (COGOA area) that are listed in

Schedule 2 , and any requirements in Schedule 3 if the installation or vessel is to perform diving operations, including:

- a. A description of the installations, vessels, facilities, equipment and systems to be certified;
- b. A comprehensive list of all Safety Critical Elements to the installations, vessels and facilities;
- c. A list of codes and standards that will be applied to installations, vessels, facilities, equipment and systems that are to be certified, and considering the entire lifecycle (inclusive of the design, construction, transportation, installation, commissioning, operation, maintenance and decommissioning etc.) of the project, and in the event no codes or standards are applicable, any studies and analysis that demonstrate the appropriate measures put in place will be adequate to reduce risks to as low as reasonably practicable;
- d. Any other measures undertaken to reduce risks to as low as reasonably practicable that fall within the scope of work of the Certifying Authority.

Note: Schedules 1, 2 and 3 referenced in this section will be finalized in the draft framework regulations. The elements covered under those three schedules will remain similar to the elements currently referenced under the existing Certificate of Fitness Regulations.

5.8 SUBMISSION OF THE SCOPE OF WORK

The Certifying Authority shall, for the purposes of issuing a certificate of fitness in respect of an offshore installation or vessel, submit a scope of work, based on the approved certification plan in s. 5.7, to the Chief Safety Officer for approval.

5.9 APPROVAL OF THE SCOPE OF WORK

The Chief Safety Officer shall approve a scope of work where the Chief Safety Officer determines that the scope of work

- a. is sufficiently detailed to permit the Certifying Authority to determine whether the installation or vessel meets the requirements of paragraph 5.2(a); and
- b. provides the means for determining whether
 - i. the environmental criteria for the region or site and the loads assumed for the installation or vessel are correct;
 - ii. the safety critical elements defined in the certification plan for the installation or vessel are complete;
 - iii. in respect of an offshore production installation, the concept safety analysis required by s. 6.2 meets the requirements of that section;
 - iv. in respect of a new installation or vessel, the installation has been constructed in accordance with a quality assurance program referred to in s. 6.1.
 - v. the operations manual meets the requirements of s. 6.24;
 - vi. the construction and installation of the vessel or the installation has been carried out in accordance with the design specifications established in Part 6, in those sections of Part 7 listed in Schedule 1, in those sections of the OHS regulations listed in Schedule 2 (e.g. OHS reg sections to be verified against), and for diving vessels and plants, in those sections of Framework or OHS regulations listed in Schedule 3;
 - vii. the materials used in the construction and installation of the vessel or installation meet the design specifications set out in Parts 6 and 7; and

- viii. the structures, facilities, equipment and systems critical to safety, and to the protection of the natural environment, are in place and functioning appropriately;
- c. has clearly articulated performance standards and related Certifying Authority methods for verification to the performance standards and for ongoing fit for purpose determination; and
- d. is sufficiently detailed in describing the type, extent and frequency of reporting that is acceptable to the Chief Safety Officer for ongoing monitoring of the certification process being undertaken by the Certifying Authority in support of s. 5.13 and any reporting requirements of these regulations.

5.10 VERIFICATION AND RE-CERTIFICATION

(1) The Certifying Authority shall specify, in the scope of work, the verification program to be undertaken by the Certifying Authority, including a schedule of activities to be conducted by the Certifying Authority to confirm compliance with certificate conditions, and verify the ongoing validity of the Certificate of Fitness until its expiration date.

(2) The scope of work will also specify the work to be undertaken prior to renewing any certificate of fitness.

5.11 CERTIFICATION PERIOD

(1) If the Certifying Authority determines that, when the installation or vessel is maintained in accordance with the programs submitted to it under subparagraph 5.5(a)(iii), the installation or vessel will meet the requirements of paragraph 5.2(a) for a period of at least five years, the Certifying Authority shall endorse on the certificate of fitness an expiration date that is five years after the date of issuance.

(2) If the period of time referred to in subsection (1) is less than five years, the Certifying Authority shall endorse on the certificate of fitness an expiration date that is the number of years or months in that lesser period after the date of issuance.

(3) A certificate of fitness shall expire on the expiration date that is endorsed on it.

5.12 APPLICABLE SITE OR REGION

1) The Certifying Authority shall endorse on the certificate of fitness a description of the site or region in which the installation or vessel is to be operated.

(2) A certificate of fitness is valid for the operation of the installation or vessel at the site or in the region that is endorsed on it.

5.13 CERTIFICATE NO LONGER VALID

(1) Subject to subsections (2) and (3), a certificate of fitness ceases to be valid where

- a. the Certifying Authority or the Chief Safety Officer determines
 - i. that any of the information submitted under subsection 5.5 was incorrect and that the certificate of fitness would not have been issued if that information had been correct,
 - ii. that the installation or vessel no longer meets the requirements of paragraph 5.2(a),
- or

- iii. that the installation or vessel has not been inspected, monitored and maintained in accordance with any limitation endorsed on the certificate of fitness; or
- b. the Chief Safety Officer determines that the Certifying Authority has failed to carry out the scope of work relating to the installation or vessel in respect of which the certificate of fitness was issued.

(2) At least 30 days before a determination is made pursuant to subsection (1), notice, in writing, that a determination is going to be made shall be given

- a. in the case of a determination by the Certifying Authority, by the Certifying Authority to the Chief Safety Officer and the person to whom the certificate of fitness in respect of which the determination is to be made has been issued; and
- b. in the case of a determination by the Chief Safety Officer, by the Chief Safety Officer to the Certifying Authority and the person referred to in paragraph (a).

(3) Before making a determination pursuant to subsection (1), the Certifying Authority or the Chief Safety Officer, as the case may be, shall consider any information in relation to that determination that is provided by any person notified pursuant to subsection (2).

5.14 CHANGE IN CERTIFYING AUTHORITY

(1) Where a person to whom a certificate of fitness has been issued intends to change the Certifying Authority in respect of an installation or vessel, the person shall

- a. notify the Chief Safety Officer as soon as possible after that person determines that they will be changing the Certifying Authority;
- b. develop and submit to the Chief Safety Officer a detailed transition plan outlining all of the activities to be completed before transitioning from the outgoing Certifying Authority to the incoming Certifying Authority prior to the commencement of transition activities and must demonstrate that there will not be any gaps, delays or negative impacts on the extent and quality of the verification activities as a result of the transition from one Certifying Authority to another; and
- c. submit for approval to the Chief Safety Officer a new Scope of Work for the incoming Certifying Authority prior to the commencement of transition activities

(2) There will only be one active Certificate of Fitness, and therefore only one Certifying Authority of record, at any given time. Therefore, there must be a defined point in time where the incoming Certifying Authority takes over as the Certifying Authority of record at which time their Certificate of Fitness is now the one of record and the outgoing Certifying Authority's Certificate of Fitness is no longer valid.

(3) The operator shall not propose a change to occur until the initial Certificate of Fitness has been issued by the Certifying Authority involved as the Certifying Authority for the design, construction, transportation, installation or establishment and commissioning of the systems necessary to undertake all of the activities for which it has been designed, unless the initial Certifying Authority is not capable of completing the initial scope of work.

5.15 REVALIDATION

(1) The scope of work must be revalidated at the same frequency as the Certificate of Fitness renewal.

(2) Further, the Chief Safety Officer can trigger a review of the scope of work under the following circumstances, should these circumstances impact the scope of work:

- a. changes to the regulations have been made since the scope of work was last approved/revalidated;
- b. new information that results from a major accident event in any jurisdiction has been brought to light;
- c. changes have been made in any of the codes or standards on which the certification is based; and
- d. a change in a phase of the **lifecycle of the installation or vessel** is taking place.

DNV GL Comment: Suggest expanding further on the highlighted text (Sec. 5.15 (2)(d)) above in such a way that it clearly identifies the different operating and transit phases that may be applicable such as the following:

- *Change of Operating phase to 'Life Extension' or "change of function" (E.g. Changing from Drilling to Production)*
- *Any temp phases which may not be in CA's Scope of Work such as Marine Warranty*

5.16 REPORTING AND RECORDS

- (1) The Certifying Authority shall include in the scope of work the following reporting requirements:
 - a. Certifying Authorities to provide the Boards any reports associated with the Certifying Authority's work on the initial issuance and ongoing verification of the fitness for purpose of the installation or vessel; and
 - b. Certifying Authority to provide to the Boards any formal communication from the Certifying Authority to the operator or the owner of the installation or vessel confirming that elements are fit for purpose or indicating non-compliance or limitations.
- (2) The Certifying Authority shall provide annual reports to Ministers (with cc to the Boards), that include:
 - a. a summary of the activities the certifying authority has undertaken across Canada related to its responsibilities as a Certifying Authority; and
 - b. an update of its technical capabilities and experience.
- (3) The Certifying Authority must immediately notify the Minister (with cc to the Boards) of any changes to its organizational structure.
- (4) The Certifying Authority shall provide monthly reports to Boards providing a description of activities carried out for the purposes of the issuance or maintenance of each Certificate of Fitness it is responsible for.
- (5) Upon the request of the Board, the Certifying Authority shall disclose any information or report obtained or generated in carrying out the functions necessary to issue or maintain the certificate of fitness.
- (6) The Certifying Authority shall provide such information and assistance as required for the conduct of an audit of its certification activities pursuant to the Act upon request.
- (7) The Certifying Authority shall maintain records and drawings for every activity carried out in respect of the issuance and maintenance of a certificate of fitness.

PART 6 – INSTALLATION ANALYSIS, DESIGN, CONSTRUCTION AND MAINTENANCE

6.1 QUALITY ASSURANCE PROGRAM

- (1) The operator shall ensure that every installation is designed, constructed, installed, commissioned, inspected, maintained, decommissioned and abandoned in accordance with a comprehensive, established, documented and implemented process based quality assurance program to ensure that the installation is and remains fit for purpose and meets specified regulatory requirements.
- (2) The quality assurance program shall be based on the principles of client focus, leadership, engagement of people, process approach, improvement, evidence based decision making and relationship management in which risk based processes are used in formulating the program requirements.
- (3) The quality assurance program shall assign senior management to have overall accountability for the implementation and effectiveness of the program through:
 - a. establishing and communicating the policy;
 - b. ensuring appropriate resources and infrastructure are in place for the effective operation and control of all processes;
 - c. ensuring that responsibilities, authorities and competencies for relevant roles are assigned, understood and complied with;
 - d. establishing processes for reporting on the performance of the system and ensuring the integrity of the system is maintained when changes are planned and implemented;
 - e. ensuring the system is subject to regular schedule of Internal audits with any corrective actions being adequately addressed to closure; and
 - f. ongoing Management review at prescribed intervals.
- (4) The quality assurance program shall have a continuous improvement cycle in which all processes are planned and documented with established quality objectives at relevant functions and levels, implemented in accordance with the established plans, monitored, measured, evaluated and records maintained for the effectiveness in meeting the established objectives, and modified as necessary to improve overall performance.

6.2 CONCEPT SAFETY ANALYSIS

- (1) Every operator shall, at the time the operator applies for a development plan approval, submit to the Chief Safety Officer a comprehensive concept safety analysis of the development concept that considers all activities associated with each phase in the life cycle of the development, [including the construction, installation, operation, decommissioning and abandonment phases], as well as all installations, facilities, equipment and systems that are proposed as part of the development concept.
- (2) The Concept Safety Analysis shall:
 - a. Identify all hazards having the potential to cause a major accidental event;
 - b. Include a detailed and systematic assessment of the unmitigated risks associated with each of those hazards, including the likelihood and consequences of each potential major accidental event;

- c. Define target levels of safety for the risk to life and the risk of damage to the environment that are to be achieved for all activities within each phase of the life-cycle of the installation, facilities, equipment and systems;
- d. Identify all underlying assumptions and control measures that are to be implemented to reduce those risks to a level that is as low as reasonably practicable;
- e. Specify any Canadian or international codes or standards that have been applied or will be applied as part of the design and control measures;
- f. Demonstrate that the selected codes or standards referred to in subsection (2)(e) are suitable and appropriate to the intended use and operating location; and,

DNV GL Comment: Sec. 6.2 (2)(f) - Selection of appropriate codes and standards typically falls under a validation scheme to ensure that they are suitable for the intended application. Consider rewording or removal of the above highlighted text as they are not typically applicable or relevant to Concept Safety Analysis. They are part of a “design” basis for the project.

- g. Provide a determination of the effects of any potential additional risks resulting from the implementation of the proposed control measures.

(3) The operator shall ensure that the design assumptions and all control measures identified in the Concept Safety Analysis are included in the Safety Plan, Environmental Protection Plan and Contingency Plan, as appropriate, submitted with the authorization application.

(4) Target levels of safety noted in paragraph 2) c) must be approved by the Chief Safety Officer at the time the operator applies for a development plan approval.

*DNV GL Comment: Sec. 6.2 (4) - In order to approve ALARP, acceptable risk levels should be identified and approved ahead of time. It is suggested to develop a **critierion** around how to achieve the required ‘target levels of safety’ and further clearly define the risk levels to personnel, facility and the environment.*

Further guidance on ALARP principles and acceptable safety levels can be covered in a “guideline document”

(5) The target levels of safety referred to in subsection (2) c) shall be based on assessments that are

- a. quantitative, where it can be demonstrated that input data are available in the quantity and of the quality necessary to demonstrate the reliability of the results; and
- b. qualitative, where quantitative assessment methods are inappropriate or not suitable.

(5) The operator shall include in the Concept Safety Analysis a definition of the situations and conditions, including changes in design basis physical and environmental operating conditions and limits, and of the changes in operating procedures and practices that would necessitate an update of the concept safety analysis.

(6) The operator shall review, re-validate, maintain and update the Concept Safety Analysis as often as necessary, and, in all cases, at a minimum interval of every five (5) years, throughout the life of the development to account for changes in the installation(s) and design basis physical and environmental operating conditions and limits that may affect its validity and to verify the ongoing suitability of the control measures to maintain risk to a level as low as reasonably practicable.

DNV GL Comment: Sec. 6.2 (6) - Suggest additional clarity on the required time intervals for Concept Safety Analysis (CSA) updates. During a project development of 4-5 years' period, we have seen significant evolution and changes to the concept from what was originally planned in the initial stages. Hence, it is recommended to update the CSA; if there are significant changes to the concept from what was originally considered.

6.3 INNOVATIONS

(1) The operator shall ensure that any new proposed technology has been independently verified, through a systematic and comprehensive technology qualification process, to be safe and fit for purpose for its intended application.

DNV GL Comment: Sec. 6.3 (1) - Technology Qualification (TQ) process becomes an integral part of the "Fit For Purpose" Assessment. Therefore, it will be part of CA's work and must be carried out prior to certification for safety critical systems or systems and components; failure of which may otherwise introduce unacceptable risks.

(2) Any proposal to apply design methods, materials, joining techniques, construction techniques, or other technologies that have not previously been used in comparable situations shall be proven through:

- a. engineering studies, prototypes or model tests, or a combination thereof, to demonstrate the adequacy of the method, material or technique; and
- b. implementation of a performance monitoring and inspection program that is designed to permit the determination of the effectiveness of the method, material or technique.

6.4 PHYSICAL AND ENVIRONMENTAL CONDITIONS

(1) The Operator shall ensure that every installation or pipeline is designed to withstand or avoid, without loss of overall structural integrity or main safety function, all foreseeable site-specific physical and environmental conditions, or any foreseeable combination of physical and environmental conditions at its intended location.

(2) The Operator shall ensure that comprehensive and reliable environmental design criteria are systematically determined for every offshore installation or pipeline based on representative regional and site-specific data and statistical analysis and modeling of physical, oceanographic, meteorological, ice, geotechnical and seismic conditions and hazards, including:

- a. Oceanographic conditions, including waves and sea states, currents, tides, ice drifts, marine growth, water depth, bathymetry, variations in sea level and any potential submerged or partially submerged navigational and other hazards;
- b. Meteorological conditions, including wind speed and prevailing direction, air and sea temperature, precipitation, number of daylight hours, and variations in visibility, and;
- c. Geotechnical conditions, including seismic hazards, slope stability, sea floor and sediment characteristics, scour, erosion, subsidence, gas hydrates, shallow gas and permafrost conditions, if applicable and other geohazards;
- d. Ice conditions, including icebergs, sea ice, ice flow direction, ice scouring, strudel scouring, and any other associated ice features, as appropriate; and
- e. Any other naturally occurring phenomena that may affect or pose a hazard to the installation.

(3) The Operator shall ensure that every installation operating in a marine environment where ice could be expected is designed to withstand or avoid foreseeable ice conditions taking into consideration:

- a. Measures to manage, minimize or avoid ice loads on the installation;
- b. Measures to protect marine riser, offloading and other sub-sea systems; and,
- c. For mobile installations and vessels,
 - i. Measures to protect or prevent damage to propulsion or positioning systems; and,
 - ii. Measures to ensure safe transit through ice-infested waters.
- d. Measures to prevent or manage loads associated with ice and snow accumulation on the installation's structural components; and
- e. Measures to ensure that ice conditions would not adversely impact the functionality of safety and environmentally critical systems and related devices.

DNV GL Comment: It is our opinion that 6.4 (3)(e) is a principal statement with significant importance for installations operating in an environment where ice is expected. Such a functional requirement should rather be given more value by the way it's stated and/or placed in the regulations, and not mixed as a part of certain specific prescriptive statements.

Also, since the sub-bullets under Sec. 6.4 (3) (a, b, c, d, e) may not cover all specific and important aspects related to operations in ice environment, they may be better used as examples only, thereby allowing means to include additional required measures. Suggest rephrasing Sec. 6.4 (3) as given below in quotes.

“The Operator shall ensure that every installation operating in a marine environment where ice could be expected is designed to withstand or avoid foreseeable ice conditions. Adequate measures are to be taken to ensure that foreseeable ice conditions would not adversely impact the functionality of safety and environmentally critical systems and related devices. **Examples** of some of the measures are as follows:

- Measures to manage, minimize or avoid ice loads on the installation;
- Measures to protect marine riser, offloading and other sub-sea systems; and,
- For mobile installations and vessels,
 - iii. Measures to protect or prevent damage to propulsion or positioning systems; and,
 - iv. Measures to ensure safe transit through ice-infested waters.
- Measures to prevent or manage loads associated with ice and snow accumulation on the installation's structural components”
- Measures to avoid freezing of various safety critical systems such as fire fighting systems, etc.
- Other additional measures”

(4). Based on the results of analysis and tests described in s. 6.5, the Operator shall identify and record the limiting physical and environmental conditions under which the installation or pipeline can safely operate and under which it can survive and shall ensure:

- a. All physical and environmental conditions that could pose a hazard to the installation or pipeline are documented and communicated to operating personnel;
- b. Safe operating environmental limitations are defined, communicated and included in operating procedures; and

- c. Measures to detect, avoid, prevent, reduce and manage physical and environmental hazards are developed and implemented in operations and/or incorporated into the design of the installation where required.

COGOA Only (Additional onshore section):

(5) The Operator shall ensure that comprehensive and reliable environmental design criteria are systematically determined for every onshore installation or pipeline based on representative regional and site-specific data and statistical analysis and modeling of land and inland water physical, meteorological, ice, geotechnical and seismic conditions and hazards, including:

- a. land and inland water conditions including currents, ice, terrain and shoreline features, and any potential submerged or partially submerged navigational and other hazards;
- b. Meteorological conditions including wind speed and prevailing direction, temperature, precipitation, ice, number of daylight hours, and reduced visibility;
- c. operating seasonal limitations;
- d. geotechnical conditions, including seismic hazards, slope stability, soil and sediment characteristics, subsidence, gas hydrates, and permafrost conditions, if applicable;
- e. inland ice conditions, including ice flow directions, ice scouring, and any other associated ice features, as appropriate; and,
- f. other naturally occurring phenomena.

(5)/(6) Design for cold climate operation, when identified as an environmental condition in the analysis required above, shall include suitable means to reduce safety and environmental risks associated with cold climate operations to as low as reasonably practicable, including but not limited to, materials selection, housings, windbreaks, insulation, heat tracing and other means or measures designed to:

- a. ensure reliable function of all safety and environmental protection related equipment and systems, including systems and equipment needed to operate in the event of an emergency;
- b. prevent fluids from freezing or having property changes where this would affect safety, the operability of the installation or lead to environmental damage;
- c. reliably prevent snow and ice accretion from occurring where any accretion endangers safety and the environment,
- d. reliably remove snow and ice accretion where it occurs and accumulation endangers safety and the environment, including redundant capabilities;
- e. permit drilling and production operations and inspection and maintenance activities to be conducted safely;
- f. ensure all electrical cabling in open or unheated spaces, [irrespective of system] shall maintain its properties under cold-climate conditions and is protected from mechanical damage from impact or damage.

DNV GL Comment: Suggest rephrasing Sec. 6.4 (5)/(6) in such a way that the design for cold climate operation should include all the applicable operability and reliability functions to ensure that the risk to the installation is maintained at an ALARP level. By providing this functional requirement at a high level, some of the operability and reliability functions as given in sub-bullets Sec. 6.4 (5)/(6) (a, b, c, d, e, f) may be listed as examples only; thereby allowing further means for additional provisions. Refer comment above to Section 6.4(3).

6.5 STRUCTURAL DESIGN, TESTS AND ANALYSIS

(1) The operator shall ensure that every installation or pipeline is designed to reduce risks to as low as reasonably practicable.

*DNV GL Comment: Sec. 6.5 (1) – As mentioned in some of the previous sections, in order to approve ALARP, risk levels should be identified and approved ahead of time. It is suggested to develop a **critterion** around how to achieve the required ‘target levels of safety’ and further clearly define the risk levels to personnel, facility and the environment.*

(2) The operator shall ensure an installation or pipeline, including its structural components, skids, modules and other structures (installed) is designed for its intended use and location, taking into account: the nature of the activities on and around the installation or pipeline and associated hazards; and material properties or dimensions that may vary in time due to environmental condition effects such as corrosion or variable ambient or operating temperatures.

(3) The design of an installation or pipeline, including structural components, skids, modules and other structures (installed), shall include such analyses, model tests, numeric modelling and site investigations as are necessary to determine the behaviour of the installation or pipeline, and of the soils that support the installation or pipeline or their anchoring systems, under all foreseeable construction, transportation, installation, and operating conditions and loads during design service life.

(4) In particular, installations and pipelines and their structural components skids, modules and other structures (installed) shall be designed [and demonstrated through the model tests as noted above] to ensure that:

- a. they will withstand extreme loads liable to occur during their construction and anticipated use;
- b. they will perform as intended under all expected normal loads during their operation;
- c. they will not fail under repeated loads;
- d. consequent damage is not disproportionate to the cause, and that local damage does not lead to progressive or complete loss of integrity of the structure;
- e. in the event of all foreseeable damage to the installation or pipeline it will retain sufficient integrity for the necessary time to enable action to be taken to safeguard the safety of persons on or near it;
- f. for offshore installations
 - i. floating structures incorporate sufficient damaged stability and reserve of buoyancy such that credible scenarios of unintended flooding do not result in loss of the structure; and
 - ii. station keeping systems of floating structures incorporate sufficient redundancy such that the structure can withstand the loss of a station keeping component.

(5) The operator shall ensure that, with reference to (4) (d) and (e), the design of every installation includes consideration of all credible accidental loading scenarios, including vessel collision and helicopter impact.

DNV GL Comment: With respect to structural components, skids and modules, suggest expanding the requirement in Sec. 6.5 (2) & (4) to further include failure modes, applicable factor of safety or design margins, inspectability, etc. to ensure that the design and operation of the installation effectively meets the required intent OR include references to CA rules in general or applicable recognized International standards.

6.6 FIRE, EXPLOSION AND HAZARDOUS GAS RISK ASSESSMENT

(1) The operator shall ensure that a methodical and comprehensive fire and explosion risk assessment, as well as a hazardous gas containment and risk assessment are carried out for every installation to:

- a. identify the types, sources, likelihood and unmitigated consequences of fires and explosions that could occur at the facility; and
- b. identify:
 - i. where practicable, design measures to eliminate identified, fire, gas and explosion hazards; and
 - ii. where hazards cannot be eliminated through design measures, then identify all necessary control measures, including but not limited to prevention, detection and mitigation measures, to reduce the risk arising from identified fire, gas and explosion hazards to as low as reasonably practicable.

(2) The assessments shall consider:

- a. accidental scenarios determined through a formal evaluation of fire, blast and evacuation, including assessment of potential fire loadings and blast pressures based on the specific hazards associated with the general layout of the installation, production and process activities, well operations, and operational constraints, and the duration and type of fire or explosion event, including but not limited to consideration of:
 - i. hydrocarbon fires (including: single or multi-phase gas jet fires, diffusive gas cloud fires, blow outs, Boiling Liquid Expanding Vapour Cloud Explosions (BLEVEs); liquid spray fires; liquid pool fires; LNG fires);
 - ii. fires on the sea; and
 - iii. combustion of other combustible substances such as diesel fuel, hydraulic fluids, lubricants, cable insulation, methanol, mono and tri ethylene glycols;
- b. suitable means of detecting:
 - i. explosive or toxic gas releases from identified possible sources; and
 - ii. outbreaks of fire, in the event that such releases occur;
- c. suitable means of isolating and safely storing hazardous substances, such as fuel, explosives and chemicals; and
- d. safe means of evacuation, escape and rescue as it relates to identified fire and explosions hazards; and
- e. suitable levels of emergency shut down of the installation systems upon detection of b).

6.7 PASSIVE FIRE AND BLAST PROTECTION

(1) The operator shall ensure that every installation is equipped with sufficient passive fire and blast protection and barriers, that are designed, certified, arranged, installed and maintained, to reduce the effects of fire and blast to safety of personnel, the installation and the environment to a level that is as low as reasonably practicable, and to:

- a. prevent escalation of fire and explosion events from one area to adjacent areas;
- b. ensure the integrity of temporary safe refuge(s) and associated facilities for communication, command, monitoring, control and evacuation for the time necessary, as determined in accordance with 7.37;
- c. protect personnel from fire (heat and smoke) for sufficient time to enable escape to temporary safe refuge;
- d. protect safety critical systems and equipment including any equipment that is to remain active in the event of an emergency or the failure or malfunction of which would cause increase risk to safety or the environment; and

- e. maintain structural integrity for the required period of time [per 6.5 (4)(e)].
- (2) The operator shall ensure that passive fire and blast protection and division arrangements are designed to protect against and mitigate foreseeable accidental events and loads identified in the fire, explosion and hazardous gas risk assessment required under 6.6.
- (3) At a minimum, the operator shall ensure that:
- a. the following areas shall be separated from other areas by divisions that are designed equipped, installed and maintained to prevent the passage of smoke and flame, and to limit the unexposed face to an average temperature increase of 139 °C and a maximum temperature rise of 180°C above the initial temperature following 120 minutes of exposure to a hydrocarbon fire:
 - i. external bulkheads of the Temporary Safe Refuge, accommodations, evacuation embarkation points excluding helidecks, and control rooms that are facing production or well heads; and
 - ii. the bulkheads that segregate the well head and production process areas from other areas of the installation; and
 - b. in respect to passive fire and blast protection, the offshore installation shall comply with the appropriate rules of a classification society as if it were an offshore installation to which those rules applied.

DNV GL Comment: Sec. 6.7 (3)(a) appears to be specifically stating the requirement for a H-120 barrier, whereas Sec. 6.7 (3)(b) is referencing to Classification Society Rules for Passive Fire & Blast Protection. Suggest rephrasing the above to either only include reference to Classification Society Rules / IMO MODU Code for this Section or provide specific requirements for all others such as A-class, B-class, and few other H-class divisions too.

Also, requirement on "General arrangement and layout of equipment" defining the segregation by separation / distance appears to be missing.

(4) Fire and blast divisions shall be designed, built, installed, equipped and maintained for their required levels of protection.

(5) The operator shall ensure that penetrations and openings in fire and blast divisions will be precluded where practicable but where penetrations and openings are necessary, they will be suitably equipped to maintain the overall fire and blast integrity of the division, including the means of operating closing devices outside the space being protected, where such devices require manual activation.

(6) Design of passive fire protection systems shall consider inspectability and maintainability of the passive fire protection systems as well as the divisions, structures and equipment they are intended to protect.

(7) The design of passive fire protection systems shall not consider the cooling effect from active fire-fighting equipment.

6.8 PREVENTION AND MITIGATION OF MAJOR ACCIDENTS

(1) The operator shall ensure that the **reliability of every system**, the failure of which could cause or contribute substantially to a major accident event or the purpose of which is to prevent or limit the effects of a major accident event, is demonstrated through formal and appropriate risk and

reliability analysis techniques to identify required redundancies and measures to protect that system from failure.

DNV GL Comment: Suggest including “reliability and availability of every system” in Sec. 6.8 (1) above. Further clarification could be provided by stating the common industry terminology of “RAM Analysis” to identify redundancies and measures to protect the critical system from failure and ensuring availability at all times.

(2)The operator shall ensure that the results of the analysis in (1) are reflected in the design of installations, systems and equipment, and in associated operating and maintenance manuals.

6.9 OFFSHORE PIPELINES

(1) The operator of a pipeline shall develop a pipeline integrity management program that anticipates, prevents, manages and mitigates conditions that could adversely affect safety or the environment during the design, construction, operation, maintenance or abandonment of a pipeline.

(2) The operator shall ensure that all offshore pipelines are designed, constructed, installed, operated, and maintained in accordance with **CAN/CSA-Z662-15** Oil and gas pipeline systems.

DNV GL Comment: Sec. 6.9 (2) – DNV-OS-F101 together with multiple Recommended Practices (RPs) from DNV could provide comprehensive requirements for O&G subsea offshore pipeline systems and is widely accepted around the world. In addition to the above referenced standard, suggest considering reference to DNV-OS-F101 for design, construction, installation, operation and maintenance of offshore pipelines.

6.10 MATERIALS FOR INSTALLATIONS AND PIPELINES

The operator shall ensure the initial and continued structural integrity of an installation or pipeline by using materials that are:

- a. suitable for their intended use and location, taking into account material properties or dimensions that may vary over time, or in response to environmental condition effects [including, but not limited to, repetitive loading, corrosion (including deterioration due to incompatibilities of joined materials), effects from accidental events (including fire, explosions or dropped objects), or distortions or deformations imposed during construction;
- b. non-combustible, where practicable; and
- c. selected to ensure their behaviour, in the event of fire or explosion, will not increase the probability that fire or explosion will impact areas beyond its point of origin, and that they will not increase exposure of personnel to toxic fumes or smoke.

6.11 CLASSIFICATION

The operator shall ensure that every installation that is a floating platform shall be classed by a classification society.

6.12 AIR GAP AND FREEBOARD

Air gap:

The operator shall ensure that every offshore installation (i.e. bottom founded, column stabilized) has sufficient air gap to operate safely and without incidents under the maximum anticipated environmental load conditions.

Freeboard:

The operator shall ensure that every offshore installation [i.e. if and when it is floating, in service or in transit] has sufficient freeboard to operate safely and without incident under the maximum anticipated environmental load conditions.

Definition of air gap:

The clearance between the highest water or ice surface that occurs during the extreme environmental conditions and the lowest exposed part not designed to withstand wave or ice impingement.

Definition of freeboard:

The distance measured vertically downward between the top of the hull and the mean water surface at a given draft (ice or green water)

6.13 MOTION RESPONSE AND STABILITY OF MOBILE OFFSHORE PLATFORMS

(1) The operator shall ensure the stability and safe operability of every floating platform (under intact and damaged conditions) relative to all motions and loads to which it is anticipated to be subjected, including by:

- a. determining the stability and motion response characteristics using analytical methods or model tests, or a combination thereof;
- b. determining the critical maximum loads and motions the platform is capable of withstanding;
- c. monitoring all loads that could affect motions, stability and inclination of the platform; and
- d. ensuring that all equipment are properly sea-fastened to preclude their unintended movement.

(2) The operator shall ensure that stability characteristics of every floating platform are determined and maintained in accordance with the relevant requirements of the International Maritime Organization MODU Code or Intact Stability Code as appropriate/ applicable and as amended from time to time.

(3) The operator shall undertake a gap analysis between the requirements in the current version of the MODU code and the version that was used for the design and construction of the platform. Any gaps must be risk assessed and mitigations implemented as required by the risk assessment.

DNV GL Comment: Requirement in Sec. 6.13 (3) to undertake a gap analysis appears to be high-level. Suggest providing further clarification with respect to applicability of MODU Code and involvement by a Certifying Authority (CA) for Production platforms.

Implementation of these requirements from MODU Code can be influenced also by other authorities such as Flag state and therefore will need clear distinction on approach w.r.t to Inside and Outside Canada Flag.

Assume this gap analysis and agreed approach is included as a part of the Scope of Work which CA will oversee for implementation?

Note:

“The administration” in the codes and standards can be understood to mean the Boards and not the flag state. Where a standard says “should” or “may”, any deviations to the specified requirement must be approved by the relevant Board.

(4) An inclining test is required to be conducted during every 5-year classification society survey for every column-stabilized mobile offshore platform, except where there is no significant discrepancy between weight records and the results of the second test, in which case subsequent tests need only be carried out during every alternate 5-year survey.

6.14 SPECIAL CONSIDERATIONS FOR SELF-ELEVATING MOBILE PLATFORMS

(1) The operator shall ensure the stability and safe operability of every installation that is a self-elevating mobile platform and that:

- a. a site specific assessment of stability and seabed restraint will be carried out for each operating location;
- b. their structures are designed to withstand all anticipated static and dynamic loads imposed in all modes of operation including transit, installation and retrieval, and elevated conditions;
- c. they are equipped with systems to actively monitor the following:
 - i. hull inclination;
 - ii. leg penetration;
 - iii. leg loads; and
 - iv. rack phase differential (where applicable to the design).

(2) Jacking mechanisms for installations that are self-elevating mobile platforms shall be designed so that a single failure of any component does not cause an uncontrolled descent of the platform.

(3) The operator shall ensure that operations on an installation that is a self-elevating mobile platform [once the rig is jacked and operational] are suspended, and all wells associated with the installation are brought to a safe shut in condition, should any of the following occur:

- a. Hull inclination (longitudinal or transverse) and/or rack phase differential exceeds allowable limits;
- b. Unexplained changes occur in the load of any of the installation’s legs;
- c. Leg penetration increases; or
- d. Any other event that threatens the stability of the installation.

(4) The operator shall ensure that operations remain suspended until such time as the cause has been investigated and the change in condition is understood and has been rectified.

6.15 STATION KEEPING

Mooring Requirements

(1) The operator shall ensure every mooring system for a floating platform is designed to maintain the platform’s position and orientation within prescribed limits and is suitable for its intended use and location, taking into account changes to the condition of the mooring system and operating environment over time.

(2) The design of every mooring system shall include sufficient analysis and model testing to ensure:

- a. safety;
- b. protection of the environment;
- c. stability and serviceability of the floating structure;
- d. sufficient redundancy to enable the installation to maintain position with the loss of a single mooring component, or, for thruster assisted mooring systems, the loss of the most effective thruster or a single failure in the power or control system;
- e. the installation is capable of moving from its position to avoid accidental events for which it is not designed;
- f. for thruster assisted moorings, survivability of the platform in the event of power blackout in extreme weather conditions;
- g. serviceability of the topsides equipment;
- h. integrity and serviceability of drilling, production, export or other types of risers;
- i. safe access to and clearances with respect to nearby subsea or surface installations, support vessels, and evacuation systems; and
- j. any other special positioning requirement.

DNV GL Comment: Sec. 6.15 (2) (g) – Further consideration should be given as to how and why “serviceability of the topsides equipment” (as highlighted above) is considered within the design and analysis of mooring system?

(3) Every floating platform must have systems and processes to actively detect loss of station keeping or failure of any mooring system component/station keeping component. Mooring line tensions shall be monitored and maintained within design parameters.

(4) The operator shall ensure that suitable arrangements are in place to monitor and maintain the integrity of a mooring system throughout its design service life.

(5) Inspection and maintenance procedures shall be developed, implemented and documented to ensure continued integrity to fulfill original design expectations, and shall include:

- a. planned maintenance and inspection of the system;
- b. periodic assessment of its condition;
- c. assessment of damage or suspected damage; and
- d. arrangements for timely repair and/or change-out in the event of damage or deterioration.

Dynamic Positioning Requirements:

(6) The operator shall ensure that every dynamic positioning system on an installation is capable of reliably maintaining the platform’s position and orientation within prescribed limits to ensure safety, protection of the environment and integrity of operations and property.

(7) The design of every dynamic positioning system shall:

- a. be carried out with sufficient numerical analysis and model testing to ensure position reference and directional control can be maintained within specified tolerances to satisfy design operational requirements under all expected environmental and external [e.g. from risers and mooring lines] loads at its intended location;
- b. include a failure modes and effects analysis to ensure sufficient segregation and redundancy of safety critical systems and components to maintain position in the event of (credible scenarios of) equipment failure, fire or flooding;

- c. withstand loss of all dynamic positioning system components in any one watertight compartment or fire subdivision, from fire or flooding; and
- d. include systems to monitor critical system operability and integrity parameters, and to provide alerts for critical system faults.

(8) Every dynamic positioning system shall be maintained to ensure continued reliability and integrity to design specification.

(9) The operator shall ensure that the Emergency Disconnect System is initiated should the excursion limits be exceeded.

6.16 DISCONNECTABLE MOORING SYSTEM

(1) The operator shall ensure that the mooring disconnection system included on an installation that is a floating platform to satisfy the requirements of 6.15(2)(e) (to limit exposure to foreseeable design situations that would exceed specified mooring system or structural design limits) is designed to ensure disconnection can be accomplished in a controlled manner without:

- a. impairing the safety of personnel on board the installation or a neighbouring infrastructure;
- b. creating undue risk to the environment; and
- c. risk of drift off.

(2) Every disconnectable mooring system shall be designed and maintained to ensure that the combined risk of exposure to design situations that would exceed structural or mooring system design limits, and risk of failure to safely disconnect are as low as reasonably practicable, and, within approved **target levels of safety**.

*DNV GL Comment: Sec. 6.16 (2) - As mentioned in some of the previous sections, in order to approve ALARP, risk levels should be identified and approved ahead of time. It is suggested to develop a **criterion** around how to achieve the required 'target levels of safety' and further clearly define the risk levels to personnel, facility and the environment. It is also suggested that 'target levels of safety' should not be used to set design margins for systems and equipment. Design margins/factors should be set as per requirements of the codes and standards.*

(3) Notwithstanding (2), the design of every disconnectable mooring system shall include a primary system and at least one back up system to achieve disconnection, both of which can be operated from a local and remote location.

(4) Every floating platform that has a disconnectable mooring system for the purposes of (1) shall be:

- a. capable of safely manoeuvring away under its own power; and
- b. capable of maintaining safe position and heading while disconnected.

(5) The operator shall ensure that clear criteria and procedures are established for disconnect for all credible risk scenarios in accordance with 6.15(2)(e), [and that procedures are implemented (by qualified personnel) to monitor environmental conditions to forecast and provide alerts for worsening conditions that may require disconnection.

(6) The operator shall ensure that every disconnectable mooring system is capable of (and has been demonstrated to be capable of):

- a. planned disconnection, which allows ample time for depressurizing and flushing of flowlines and for start-up of production after the platform has been reconnected;
- b. emergency disconnection, which allows sufficient time to safely shut in wells and subsea assets; and
- c. safe reconnection to be carried out in an orderly sequence and within pre-determined environmental limits.

(7) The operator shall ensure that the disconnect capability is demonstrated on a periodic basis for the installation it is being used.

6.17 BALLAST AND BILGE SYSTEMS

(1) The operator shall ensure that every floating platform is equipped with robust ballast and bilge systems to maintain necessary draught, stability and hull strength under all anticipated environmental and operating conditions, with capability to bring the platform to a safe condition from an unintended draught, trim or heel. The systems shall be designed to prevent unintended transfer of fluid within the system, to empty and fill all tanks within the system and to empty watertight spaces in an efficient manner.

(2) The operator shall ensure that the ballast and bilge systems of every floating platform are designed and maintained in accordance with the relevant requirements of the International Maritime Organization MODU Code or the Intact Stability Code as amended from time to time.

(3) No floating platform shall be considered to comply with this section until the ballast and bilge system has been assessed through a failure modes and effects analysis.

(4) Every column-stabilized mobile offshore platform shall be equipped with a secondary ballast control station equipped with:

(an effective means of communication with other spaces that contain equipment relating to the operation of the ballast system;

(b) a ballast pump control and status system;

(c) a ballast valve control and status system;

(d) a tank level indicating system;

(e) emergency lighting;

(f) heel and trim indicators; and

(g) a permanently mounted ballast schematic diagram.

DNV GL Comment: Noticed that the requirements from 6.17 (2) above are referring to MODU Code. However, the following are missing for the secondary ballast control station, such as:

- *Draught indicating system;*
- *Power availability indicating system (main and emergency);*
- *Ballast system hydraulic/pneumatic pressure-indicating system.*

*Including **only a portion of the text** from a required International Standard may cause confusion in terms of applicability of the specific Codes/Standards. In case of a required deviation, it is suggested to include the same by means of providing additional commentary such as 'Guidance Note'. Clear interpretation and/or exceptions are to be included in such cases where requirements from the referred Standards need a deviation.*

(5) The main and secondary ballast control stations shall be located above the waterline in the final condition of equilibrium after flooding when the platform is in a damaged condition.

6.18 WATERTIGHT INTEGRITY OF FLOATING PLATFORMS

- (1) The operator shall ensure that every floating platform is designed, built, equipped, monitored, operated and maintained to ensure its watertight integrity.
- (2) Every floating platform will be designed with sufficient watertight compartmentation to ensure preservation of reserve buoyancy and damage stability under all foreseeable environmental, operating and accidental conditions.
- (3) Freeboard, watertight compartmentation, and arrangement and specification of watertight and weathertight appliances shall be determined in accordance with class and relevant requirements of the International Maritime Organization, including the IMO MODU Code, Intact Stability Code and the International Convention on Load Lines, as amended from time to time.
- (4) The Operator shall ensure that the arrangement and specification of watertight and weathertight appliances includes all necessary safety features to reduce risk to personnel to as low as reasonably practicable.
- (5) Every floating platform shall be designed with systems and equipment that provide for operating, monitoring and alarm indication, both locally and at the ballast control stations, of the operational position of watertight doors and hatches, as well as detection and alarm indications of water ingress into watertight protected spaces that are not designed to have accumulation of fluid.
- (6) The operator shall ensure that for every floating installation that is flagged outside Canada, a list of all flag state administration decisions and exemptions from IMO code requirements are identified and that a risk assessment be conducted to identify areas that require mitigating measures to reduce risks to as low as reasonably practicable. The list, analysis and proposed action plan shall be submitted to the Chief Safety Officer prior to an authorization being issued.

*DNV GL Comment: Sec. 6.18 (6) – As mentioned in some of the previous sections, in order to approve ALARP, risk levels should be identified and approved ahead of time. It is suggested to develop a **critierion** (sample input can be provided) around how to achieve the required 'target levels of safety' and further clearly define the risk levels to personnel, facility and the environment.*

6.19 CLASSIFICATION AND ACCESS TO HAZARDOUS LOCATIONS

- (1) The operator shall ensure that every offshore platform is divided into different areas according to the type of activities that will be carried out and according to the associated hazards; and that higher risk areas are segregated from lower risk areas, and from areas containing important safety functions.
- (2) The operator shall ensure that hazard identification and risk assessments are carried out for each area to identify hazardous areas in which an explosive atmosphere may occur.
- (3) Hazardous areas identified in (2) shall be classified according to a comprehensive and documented classification system including design and selection of systems and equipment to manage ignition sources and prevent fire and explosion.

(4) The operator shall ensure that direct access between hazardous and non-hazardous areas and between hazardous areas of different classification are avoided where practicable and minimized where necessary.

(5) Where such openings are necessary, they shall be designed to prevent uncontrolled (atmospheric) communication between the areas.

(6) The operator shall ensure that mechanical and electrical piping systems on every offshore installation are designed to preclude direct communications between hazardous and non-hazardous areas and between hazardous areas of different classifications.

6.20 VENTILATION OF HAZARDOUS AND NON-HAZARDOUS LOCATIONS

(1) The operator shall ensure that every enclosed hazardous area on an offshore installation is ventilated:

- a. to allow the replacement of air at a rate sufficient to prevent toxic, flammable or explosive accumulations in the enclosed area;
- b. so all air entering the enclosed area is from a non-hazardous location;
- c. to prevent the exhausted air from that area from increasing the hazard level in an existing hazardous location or from creating a hazard in an otherwise non-hazardous location; and
- d. so the ventilation system for every non-hazardous location is separate from the ventilation system for every hazardous areas.

DNV GL Comment: Sec. 6.20 (1) (a) appears like all enclosed hazardous area shall be ventilated in a way to be considered safe by dilution. No further information provided with respect to fire dampers open/close indications, self closing doors, redundant power supply, non-spark material properties for the fans, etc. Suggest requiring relevant safety studies to address the above along with required dilution rates, without which it may be difficult to ensure adequacy of ventilation in the applicable areas.

Also, noted that the “sufficient rate” is not defined. It is suggested to include a prescriptive number (Ref. MODU/Sec. 6.4 - 12 air changes per hour) as a minimum per International Standards and further suggest additional risk assessment as needed for the design basis.

(2) The operator shall ensure that, where a mechanical ventilation system is used for the purpose of subsection (1), the air in the enclosed hazardous area shall be maintained at a pressure that is lower than the pressure of each adjacent hazardous area that is **classified as less hazardous**.

DNV GL Comment: Suggest adding “classified as less hazardous or unclassified (safe area)” to the above highlighted text in Sec. 6.20 (2).

(3) All air let out of an enclosed hazardous area shall be let into an outdoor area that would be classified as the same as or less hazardous than the enclosed hazardous area if it did not receive the air from the enclosed hazardous area.

(4) A differential pressure gauge shall be installed to monitor any loss of ventilation pressure differential required by subsection (1) and/or (2) or maintained under section 6.19, and to activate audible and visual alarms at the appropriate control point after a suitable period of delay not exceeding 30 seconds if a loss occurs.

(5) Without limiting the generality of (2), the control station and all accommodation areas (or any area which is intended to operate in an emergency shutdown) on an installation shall additionally:

- a. be maintained at a positive overpressure relative to atmospheric pressure; and
- b. have airlock arrangements on all external doors.

DNV GL Comment: Suggest maintaining generic word per 6.19 (5) since the word/concept of airlock hasn't been previously identified in the regulation. See DNV GL Comment to Sec. 6.20 (1)(a).

(6) The power for a mechanical ventilation system provided in accommodation areas, working areas, flammable liquid storage areas and other hazardous locations of an installation shall be capable of being shut off from the control station and from a position that is outside the area being served by the ventilation system and that will remain accessible during any fire that may occur within the area being ventilated.

(7) The main inlets and outlets of all ventilation systems shall be capable of being closed from a position that is outside the area being served by the ventilation system and that will remain accessible during any fire that may occur within the area being ventilated.

(8) The operator shall ensure that every ventilation system serving for non-hazardous areas on installations is equipped with emergency or contingency measures in the event of a mechanical ventilation failure or gas detection, including:

- a. audible and visual alarms;
- b. automated means of isolation to prevent gas from entering the non-hazardous area; and
- c. the ability to remotely seal the area (including inlets and outlets of all ventilation systems) from the control station and from a position outside the area being served by the ventilation system which will remain accessible during any fire that may occur within the area being ventilated.

6.21 GENERAL ELECTRICAL STANDARDS

(1) All electric motors, lighting fixtures, electrical wiring and other electrical equipment on the installation shall be designed, selected, installed, maintained and operated to ensure safety and reliability under all foreseeable physical, environmental, and operating conditions to which they will be exposed.

(2) The operator shall ensure that every electrical system is designed with safeguards and other protection so as to avoid in the first instance, and to alert and mitigate in the second instance, abnormal conditions and faults that can result in danger for the personnel and the facility.

DNV GL Comment: Suggest restructuring the above highlighted text (Sec. 6.21 (2)) as follows to avoid confusion and represent the clear intent such as the that the design and safeguards should not fail at any given time. If such a situation occurs, it is important to ensure that the mitigating actions function as required to avoid further escalation of the hazardous condition.

“The operator shall ensure that every electrical system is designed with safeguards and other protection so as to:

1) **avoid** any abnormal conditions and faults that can result in danger for the personnel and the facility.

2) **alert and mitigate** abnormal conditions and faults that can result in danger for the personnel and the facility.”

(3) The operator shall ensure that where a primary or secondary distribution system for power, heating or lighting, with no connection to earth, is used on an offshore installation, a device capable of continuously monitoring the insulation level to earth and of giving an audible or visual indication of abnormally low insulation values shall be provided.

DNV GL Comment: Section 6.21 (3) appears to be very generic. In case of comparison of this with Classification Society rules, the requirement for insulation monitoring mainly depends on the type of the earthing system used. The requirement for alarm / automatic disconnection may vary depending on whether it is low voltage or high voltage, etc. Suggest to provide further clarification and/or interpretation in similar lines as typically given in Classification Society Rules.

(4) The operator shall ensure that the primary source of electrical power on every offshore installation:

- a. includes at least two power plants, not including emergency power plants;
- b. is capable of supporting all normal operations without recourse to the emergency source of electrical power required by s. 7.36; and
- c. if one of the power plants is out of operation, is capable of supporting all operations except drilling and production operations.

DNV GL Comment: Requirement stated under Sec. 6.21 (4) appears to be a specific prescriptive requirement. Instead, suggest including a high-level significant functional requirement that will ensure continuous availability of power generation and distribution system. Such a statement along with examples including power requirements to essential and emergency users, redundancy options, etc. will be of greater value with respect to satisfying the principles of ALARP. Similar approach suggested in a comment made to Sec. 6.4 (3).

(5) The operator shall ensure that primary circuits from the power plant serving an installation can be shut down from two separate locations or control points, including one being located at the power plant.

6.22 DESIGN FOR REMOVAL OF FIXED OFFSHORE INSTALLATIONS

The design of an installation shall consider the removal of the installation at end of life unless the abandonment of the installation or an alternative use for the installation has been approved by the Board through the development plan. The design, including any modifications through the lifecycle of the facility, must include measures that are necessary to facilitate the installation's removal from the site in a way that minimizes safety hazards, as well as adverse effects on navigation and other uses of the sea, as well as on the marine environment during and after the removal.

6.23 OFFSHORE TRANSPORTATION AND INSTALLATION OF FACILITIES (INSTALLATIONS)

(1) The Operator shall ensure that the transporting and positioning of an offshore installation are:

- a. completed in a manner that protects the safety of the installation, personnel and the environment;

- b. completed in a manner that causes the least possible encumbrance and danger to other activities in the vicinity;
 - c. monitored by a Marine Warranty Surveyor; and,
 - d. in the case of a self-elevating unit, completed with the legs secured in a manner acceptable to the classification society.
- (2) The operator shall further ensure that, prior to all transit moves
- a. a risk assessment is completed that considers:
 - i. personnel requirements;
 - ii. towing vessels, towing arrangements and associated equipment;
 - iii. processes and measures to be implemented to ensure the safety of the installation, personnel and the environment;
 - iv. weather conditions, weather forecasts, and other physical environmental factors that may affect the safety of the installation, personnel or the environment; and
 - v. contingency plans, in the event of adverse environmental conditions or any other foreseeable event during transit; and
 - b. a transit plan has been established and has taken into account any requirements of the class society and marine warranty surveyor.

6.24 ASSET INTEGRITY

(1) The operator shall ensure that all installations, facilities, equipment and systems are tested, inspected, maintained and operated to ensure safety and environmental protection and prevent waste under the maximum load and operating conditions that may be foreseeable during any operation and continues to perform in accordance with the original design standards.

(2) The operator shall ensure that winterization of all installations, facilities, equipment and systems is confirmed, in place and operable prior to conducting operations in cold climate as per s. 6.4.

(3) The operator shall ensure that a non-destructive examination of critical joints and structural members of an installation at an interval to ensure continued safe operation of the installation and in any case, at least once in every five-year period.

(4) The operator shall design and implement a monitoring, testing, inspection, and maintenance program that

- a. is designed to achieve the objectives established under paragraph (1)
- b. is based on identified failure modes and mechanisms and their causes in relation to safety critical elements;
- c. includes inspection and monitoring activities that occur at a frequency and in a manner to ensure any potential failures determined in accordance with sub-paragraph (b) are anticipated, managed and mitigated and that any safety critical elements are repaired or replaced in a timely manner to ensure safety critical elements functionality and reliability are maintained;
- d. is delivered by qualified persons
- e. includes specific predictive and preventive maintenance programs for each safety critical element that:
 - i. includes a maximum specified time period for comprehensive inspection of the equipment or system;
 - ii. considers the recommendations of the original equipment manufacturer and relevant industry standards or best practices;

- iii. for rotating equipment, includes partial or complete dismantling and inspection at a frequency necessary to maintain its condition, functionality, availability, reliability and performance in accordance with the original design standards;
- iv. for any low running hour equipment [e.g. emergency generators, essential generators, fire pumps], includes a time based maintenance regime; and
- v. includes a spare parts management program whereby the critical spare parts necessary are available on the installation to ensure the continued functionality, availability, reliability and performance of the equipment or system to its original design standards.

(5) The operator shall ensure that records of maintenance, tests and inspections are kept.

(6) The operator shall ensure that a preservation program is in place to ensure the integrity of any out of service equipment being stored is maintained and the equipment is confirmed fit for purpose prior to being brought back in to service.

(7) The preventative maintenance and inspection program outlined in (3) shall consider the condition of the out of service equipment at the time it is being brought back into service.

(8) The operator shall develop and implement a weight control program for every offshore installation to ensure that weights and centres of gravity are maintained safely within design limits.

6.25 INSTALLATIONS OPERATION

Every operator of an offshore installation shall at all times operate the installation in accordance with limitations imposed by the certificate of fitness and in accordance with the operations manual.

6.26 OPERATIONS MANUAL

(1) Subject to subsection (2), every operator shall prepare, adhere to and maintain, in respect of every installation, an operations manual that defines the operational characteristics, procedures, capabilities and limitations of an installation and associated essential [and safety critical] systems, and which contains the following data:

- a. general description and particulars of the installation;
- b. chain of command and general responsibilities during all normal operations and emergency operations;
- c. limiting design data for each mode of operation;
- d. a description of inherent limitations on the operation of the installation and its equipment for each approved mode of operation, including physical and environmental conditions at the site where the installation will be installed and the effect of those conditions on the installation
- e. listing of and reference to procedures necessary to ensure safe operations within inherent limitations;
- f. criteria and triggers that would require planned precautions and actions to be taken to safeguard personnel, the installation and the environment in the event pre-determined thresholds for safe operation of the installation in all modes of operation are exceeded or forecasted to be exceeded, and a listing of or reference to procedures that detail the precautions and actions to be taken;

- g. characteristics of foundation and bottom penetration, or anchoring arrangement, and provisions to monitor integrity of foundations, mooring and anchoring arrangements;
- h. criteria for minimum penetration and/or maximum scour for foundation and anchoring arrangements;
- i. criteria for weather or oceanographic events that trigger post-event inspections of subsea structural elements (**note: this includes anchors**)
- j. for an installation that is a mobile offshore platform, such information and instruction as is necessary to accurately (alternative to accurately: “unambiguously”?) and rapidly determine and manage the loading, ballasting and stability of the platform within approved criteria for intact and damaged stability under varying conditions of service, including:
 - i. the location, type and weights of permanent ballast installed on the installation;
 - ii. hydrostatic curves, or equivalent data;
 - iii. a capacity plan showing the capacities and the centers of gravity of tanks and bulk material stowage spaces;
 - iv. tank sounding tables or curves showing capacities, the centres of gravity in graduated intervals and the free surface data of each tank;
 - v. stability information in the form of maximum KG versus draught curve, or other suitable parameters, based upon compliance with the required intact and damaged stability criteria;
 - vi. lightship data based on the results of an inclining experiment, and updated values of the center of gravity following any deadweight surveys; and
 - vii. representative examples of loading conditions for each approved mode of operation, together with the means for evaluation of other loading conditions;
- k. general arrangement plans showing watertight and weathertight boundaries;
- l. the location and type of watertight and weathertight closures, vents, air pipes, etc, and the location of downflooding points;
- m. a permissible deck loading plan, with information concerning variable load limits and preloading;
- n. details of audible and visible signals and alarms used in general alarm, public address and fire and gas alarm systems, and any color coding system(s) used for the safety of personnel on the installation;
- o. information on corrosion protection systems used and any requirements for the safety and maintenance of the systems;
- p. drawings that show/include:
 - i. general arrangements of the deck structure, accommodation areas, temporary safe refuge, helideck and equipment contained on the topside facilities, and sufficient details as are needed to permit verification and management of integrity of hulls, mooring components, critical primary and support structures, foundation elements, jacking systems, risers and conductors;
 - ii. arrangement of hazardous areas and equipment;
 - iii. fire control and evacuation plan, including:
 - A. locations of escape routes, fixed fire extinguishing systems and lifesaving appliances; and
 - B. arrangements of fire and blast divisions and associated equipment, such as fire dampers;
 - iv. arrangement of ballast and bilge systems, and sufficient and clear operating instructions to ensure:
 - A. necessary draught, stability and hull strength can be accurately maintained under all anticipated environmental and operating conditions; and

- B. the platform can be returned to a safe condition from an unintended draught, trim or heel; and
 - v. arrangement and location of all openings that could affect the stability of the platform and their means of closure;
- q. the operating and maintenance requirements for all the lifesaving appliances on the installation;
- r. identification of the helicopter(s) used for the design of the helicopter deck, and the maximum helicopter weight and wheel centres, and maximum size of the helicopter for which the helicopter deck on the installation has been designed, including the extent of the obstacle-free approach zone for the helicopter;
- s. special arrangements or facilities for the inspection and maintenance of the installation, any equipment or plant, and any crude oil storage facilities on or in the installation;
- t. special precautions or instructions to be followed when repairs or alterations to the installation are to be carried out;
- u. any unique operational or emergency requirements covering safety critical features of the installation, including the shutdown systems and reference to relevant procedures;
- v. a description of any equipment for elevating and lowering the installation and of any special types of joints, including details of their purpose, proper operation and maintenance;
- w. details of the air gap or freeboard, and of the means of ensuring that requirements determined in accordance with 6.12 are met;
- x. station keeping systems and limiting conditions of operation, including the environmental loads the anchors can sustain to keep the installation moored in place, including the estimated holding power/capacity of the anchors in relation to the soil at the drill site or production site;
- y. for an installation that is a floating platform, a description of the station keeping capabilities and operating limits, and all procedures for addressing a failure of any safety critical station keeping component or excursion outside of defined limits;
- z. details of the number of persons to be accommodated during normal operations;
- aa. description and limitations of any onboard computer (or computer based control system(s)) used in operations such as ballasting, anchoring, dynamic positioning and in trim and stability calculations;
- bb. plan of towing arrangements if any and limiting conditions;
- cc. brief particulars of all the equipment on the installation, including flow sheets (process flow diagrams) and instructions for the installation, operation and maintenance of the equipment;
- dd. description of the main and emergency power systems and limiting conditions of operation;
- ee. the procedure for preparing, and the description and format for, periodic reports concerning the integrity of the installation;
- ff. a procedure for notifying the Chief Safety Officer and the Certifying Authority of any situation or event described in section 7.1; and
- gg. information and operating limits necessary to ensure safe operation of subsea production systems.

6.27 DIVING VESSELS AND DIVE PLANTS

(1) The operator shall ensure that all vessels used for diving programs are classed by a classification society and shall meet SOLAS requirements.

(2) The operator shall ensure that, for all vessels used for diving programs, the dynamic positioning system will have sufficient redundancy to protect divers during dive operations.

Note: Additional specific policy intentions respecting diving vessels and dive plants are to be developed in the coming months and presented at a future consultation session later in 2017.

PART 7 – SYSTEMS AND EQUIPMENT DESIGN, OPERATION AND MAINTENANCE

7.1 REPAIR, REPLACEMENT AND MODIFICATION OF INSTALLATIONS

- (1) The operator of an offshore installation shall notify the Certifying Authority, for matters within their scope of work, and the Chief Safety Officer immediately if the operator notices any deterioration of the installation or equipment, or of any well, that could impair the safety of the installation or damage the environment.
- (2) The operator shall ensure that any defect in the installation, equipment, pipeline, vessel and support craft that may be a hazard to safety or the environment is rectified without delay.
- (3) If it is not possible to rectify the defect without delay, the operator shall ensure that it is rectified as soon as the circumstances permit and that mitigation measures are put in place to minimize the hazards while the defect is being rectified.
- (4) Subject to subsection (5), no holder of a certificate of fitness in respect of an offshore installation shall make any repair, replacement or modification to safety critical elements, or bring on board an installation any equipment, that would change the design, performance or integrity of safety critical elements, without notification to the Chief Safety Officer and the Certifying Authority.
- (5) In an emergency, the operator of an offshore installation may repair or modify the installation when the manager of the installation considers that the delay required to comply with subsection (4) would endanger personnel or the environment.
- (6) Where an operator makes a repair or modification to an installation pursuant to subsection (5), the operator shall immediately notify the Chief Safety Officer and the Certifying Authority.

7.2 FACILITIES FOR INSPECTION AND MAINTENANCE

The operator shall ensure that every installation is designed and equipped to be accessible, and provided with clear markings and identifications of areas to be inspected, in a manner that allows safe and effective:

- a. monitoring, maintenance and inspection of the installation or pipeline; and
- b. in the case of an installation not intended to be periodically dry docked, on-location inspection of the hull and other underwater appurtenances.

7.3 PIPING SYSTEMS

- (1) This Part does not apply to:
 - a. a heating boiler that has a heating surface of 3 m² or less;
 - b. a pressure vessel that has a capacity of 40 L or less;
 - c. pressure systems that are installed for use at one atmosphere of pressure or less or less;
 - d. a pressure vessel that has an internal diameter of 152 mm or less;
 - e. a pressure vessel that has an internal diameter of 610 mm or less and that is used for the storage of hot water;
 - f. a pressure vessel that has an internal diameter of 610 mm or less and that is connected to a water pumping system containing air that is compressed to serve as a cushion;

- g. a refrigeration plant that has a capacity of 18 kW or less of refrigeration;
- h. domestic water and plumbing systems

Design

DNV GL Comment: Noted from Sec. 7.3 (2) that the design of boilers and pressure systems consider minimizing the risk of hazards, however suggest to include the use of recognized codes and standards for the design and fabrication of such equipment. (E.g: ASME, CSA B51 or Other applicable ones). Although the intent of the Regulations appears to be inclined towards Risk-Based approach which apply for systems design; individual equipment and component design and fabrication should continue to follow applicable design codes and standards. Also, refer to a similar comment made to Sec. 6.5 (2) & (4).

(2) The operator shall ensure that boilers and pressure systems are designed to minimise the risk of hazards to personnel and property by establishing the following barriers:

- a. preventing an abnormal condition from causing an undesirable event;
- b. preventing an undesirable event from causing a release of hydrocarbons;
- c. safely dispersing or disposing of hydrocarbon liquids releases;
- d. preventing formation of explosive mixtures;
- e. preventing ignition of flammable liquids or gases and vapours released; and
- f. limiting exposure of personnel to fire hazards.

(3) The operator shall ensure all boilers and pressure systems, including components, used on an installation are designed, constructed, installed, tested, inspected, operated and maintained to ensure they will safely withstand all foreseeable combinations of loads, forces, pressures, temperatures and fluids and substances to which they may be exposed during design service life.

(4) The operator shall ensure that the design of boilers and pressure systems and components equipment shall:

- a. utilize comprehensive methods which are known to incorporate adequate safety margins and shall include such analyses and numeric modeling as are necessary to determine their behavior and failure modes under all foreseeable operating conditions, and shall consider:
 - i. internal and external pressure;
 - ii. ambient and operating temperatures;
 - iii. static pressure and mass of contents in operating and test conditions;
 - iv. foreseeable dynamic loading, reaction forces and moments resulting from, but not limited to, supports, attachments, and piping;
 - v. structural and mechanical integrity threats including but not limited to corrosion, erosion, and fatigue, and any other threats that may be identified through risk analysis;
 - vi. changes in contained fluids and substances over time [e.g. H₂S], including decomposition of unstable fluids and substances;
- b. eliminate or reduce hazards as far as reasonably practicable and, where hazards cannot be eliminated, include protection measures to ensure safety, with consideration of:
 - i. closures and openings, including measures to indicate closure status and prevention of opening or physical access whilst pressure differential exists;
 - ii. containment of hazardous substances, including dangerous discharge of pressure relief blow-off;
 - iii. surface temperature; and

- iv. decomposition of unstable fluids;
- c. include provisions to monitor and to reliably protect against exceeding safe limits of pressure, temperature and fluid levels;
- d. include provisions to permit all examinations of critical pressure components necessary to ensure ongoing integrity;
- e. include means for draining and venting, to permit safe cleaning, inspection and maintenance, and to avoid harmful effects such as water hammer, vacuum collapse, corrosion and uncontrolled chemical reactions, at all stages of operation, including pressure testing;
- f. include provisions to prevent escalation of foreseeable external accidental events; [e.g. fire, dropped objects, etc.] and
- g. include provisions to limit and mitigate effects of any loss of containment [e.g. containment of fluids and drainage to safe location].

(5) The operator shall ensure that materials used for the manufacture of boilers and pressure systems and components are:

- a. suitable for their intended application and location under all foreseeable operating and abnormal conditions and in any foreseeable emergency event, taking into account material properties or dimensions that may vary over time [e.g. creep, corrosion, erosion], or distortions or deformations imposed during construction and handling [e.g. transportation, installation]; and
- b. compatible with their operating environment and chemically resistant to contained fluids, as may change over time, during design service life.

(6) The operator shall ensure that the design of every boiler and pressure system and component shall be verified to be fit for purpose by the Certifying Authority.

Construction, Testing and Installation

(7) The operator shall ensure that every boiler and pressure system, including components used on an installation shall be constructed, installed and commissioned by a qualified person, and shall include such inspections and tests [including non destructive evaluation and proof tests] as are necessary to ensure integrity of pressure components, joining and assemblies, and compliance with approved designs.

Use, Operation, Repair, Alteration and Maintenance

(8) The operator shall ensure that a boiler or pressure system or component will not be used unless it has been inspected and tested by an authorized inspector and verified by the Certifying Authority to be fit for purpose and in accordance with the approved design:

- a. after installation; and
- b. after any welding, alteration or repair is carried out on it.

(9) The operator shall ensure that every boiler or pressure system used on an installation must be operated within safe operating envelope, maintained and repaired by a qualified person, in accordance with operating procedures.

(10) The operator shall ensure that Operating procedures shall be established and must inform users of operating hazards [that could not be eliminated in design] and indicate whether it is necessary to take appropriate special measures to reduce risks at the time of installation and/or use.

(11) The operator shall ensure that Repairs and alterations shall not be made to a pressure-retaining component of a boiler or pressure system without the prior approval of the Certifying Authority.

(12) A person must not alter, interfere with or render inoperative any boiler or pressure system fitting except for the purpose of adjusting or testing the fitting.

Inspections

(13) The operator shall ensure that every boiler or pressure system in use on an offshore installation must be inspected by a qualified person under a monitoring, testing, inspection, and maintenance program developed in accordance with 6.24, and as frequently as is necessary to ensure that the boiler, pressure vessel or piping system is safe for its intended use.

Records

(14) The operator shall ensure that a register of all boilers and pressure systems and components is maintained, including accurate records of:

- a. design calculations, drawings and specifications, including evidence of design approval by an authorized inspector;
- b. design code or standard applied;
- c. operating limits including pressure and temperature ratings;
- d. manufacturer's data report, including:
 - i. documented evidence that construction, testing and installation have been carried out in accordance with the approved design under a suitable quality assurance program accredited by an authorized inspector;
 - ii. approved welding, brazing and non-destructive examination procedures, test records and the results of welder qualification tests against the procedures;
 - iii. records of qualification for qualified persons involved in manufacture, inspection and testing, and welder qualification records; and
 - iv. materials traceability records;
- e. a record of each inspection carried out under 7.3 (6) and (13), which must be completed and signed by the inspector or qualified person who carried out the inspection and must include:
 - i. the date of the inspection;
 - ii. the identification and location of the boiler or pressure system that was inspected;
 - iii. the range of safe operating pressure and temperature at which the boiler or pressure vessel may be operated,
 - iv. a declaration as to whether the boiler or pressure system meets the standards against which it was designed and constructed;
 - v. a declaration as to whether, in the opinion of the inspector or qualified person who carried out the inspection, the boiler, pressure vessel or piping system is safe for its intended use;
 - vi. if appropriate in the opinion of the inspector or qualified person who carried out the inspection, recommendations regarding the need for amendments to the monitoring, testing, inspection and maintenance program established under 7.3 (13)
 - vii. any other observation that the inspector or qualified person who carried out the inspection considers relevant to the safety of employees; and
- f. a record of each repair or alteration made to the boiler or pressure systems.

Marking

(15) The operator shall ensure that every boiler or pressure system shall be uniquely identified and marked with sufficient information acceptable to the authority having jurisdiction to permit safe installation and operation and reference to relevant records of design, construction, inspection, testing, maintenance and repair.

Certification

(15) All operating procedures in 7.3 (10) and records noted in 7.3 (14) shall be verified to the satisfaction of the Certifying Authority, at a frequency described in the approved scope of work of the Certifying Authority to allow for the ongoing determination of the fitness for purpose of every boiler or pressure system.

Proposed Definitions (included in the Definitions Annex)

“Pressure Systems (and components)”: means piping, vessels, safety components and pressure components; where applicable, pressure components include elements attached to pressurized parts, such as flanges, nozzles, couplings, supports, lifting lugs, safety valves, gages, and similar

“Authorized Inspector” means a suitably qualified person, including the Certifying Authority or another person approved by the authority having jurisdiction to inspect process vessels and pressure piping systems.

7.4 MECHANICAL EQUIPMENT

- (1) The operator shall ensure that all mechanical equipment on an installation:
 - a. is fit for its intended function and will operate, and be operated, safely and reliably under all foreseeable environmental and operating conditions, including with consideration for the manufacturer’s instructions; and
 - b. is designed, selected, located, installed, commissioned, protected, inspected, operated and maintained to ensure that risks to safety, and to the environment are identified and reduced to a level that is as low as reasonably practicable.

- (2) The operator shall ensure that means to prevent safety and environmental hazards are undertaken and selected based on a risk assessment that considers the following:
 - a. loss of containment of hazardous substances;
 - b. overspeeding and loss of restraint of high energy machine elements;
 - c. extreme surface temperatures and moving parts;
 - d. loss of control and integrity, or escalation, following foreseeable accidental events; and
 - e. ignition of potentially explosive atmospheres in hazardous areas from sparks, flames and excessive heat.

- (3) The operator shall ensure that every internal combustion engines and turbine is:
 - a. suitably equipped to prevent ignition, and hazardous area rated and certified for its area of operation and with:
 - i. combustion air supplied from a nonhazardous area; and
 - ii. exhaust discharged to a non-hazardous area; and
 - b. equipped with safety devices, including manual shut off and automatic fuel shut off, to prevent catastrophic damage from overspeeding, high exhaust temperature, high cooling water temperature, low lubricating oil pressure, or other foreseeable hazards to safe operation, except where automatic shut-off will increase risk to safety and the environment.

(4) The operator shall ensure that mechanical equipment critical to emergency response, including but not limited to, emergency generators and fire pumps, are not subject to (2)(b), but must have automatic overspeed shut off protection.

(5) The operator shall ensure that controls and manual shut offs shall be located so they remain protected and accessible for safe operation in the event of foreseeable accidental damage and events should the associated equipment become inaccessible as a result of the damage or events.

(6) The operator shall ensure that mechanical equipment that is essential to the safety and propulsion of a floating or mobile platform will continue to operate safely and reliably at full rated power under static and dynamic angles of inclination specified by the IMO MODU Code and Classification Society Rules.

(7) The operator shall ensure that operating limits are determined for each mechanical equipment and included in the operations manual, and that clear instructions are available for reference.

(8) The operator shall ensure that basic operating instructions for every internal combustion engine shall give details of stop, start and emergency procedures and be permanently attached to the engine.

7.5 CORROSION MANAGEMENT

(1) The operator shall ensure all process vessels, piping, valves, fittings and structural elements that are part of an installation or pipeline, the failure of which as a result of corrosion would cause a safety or environmental hazard, are designed, operated, monitored and maintained to prevent and manage corrosion over the life-cycle of the installation or pipeline to prevent their failure.

(2) The operator shall establish and implement a comprehensive corrosion management program to manage risk of critical failures from corrosion related degradation, to ensure the ongoing integrity of safety critical systems.

(3) The corrosion management program shall include:

- a. identification of all safety critical elements that are susceptible to degradation by corrosion, and the failure of which could cause a hazard to safety or the environment;
- b. such analysis as is needed to determine corrosion degradation mechanisms, limits and failure modes, taking into consideration foreseeable operating and environmental conditions and chemical exposures;
- c. measures to prevent corrosion, as far as is reasonably practicable, and to mitigate or protect against the effects of corrosion;
- d. inspection and monitoring of corrosion and of corrosion protection and prevention systems;
- e. collection and analysis of baseline and ongoing data to monitor the corrosion behaviour and determine the effectiveness of corrosion management program and protection systems;
- f. ongoing assessment of inspection, maintenance and repair schedules as per section 6.24 based on the data and analysis in e);
- g. timely preventative maintenance of corrosion protection and prevention systems

- h. timely maintenance and repair of safety critical elements, based on the ongoing data and analysis collected, and in accordance with 6.24 prior to reaching acceptable limits established in b;
- i. analysis for continual improvement of the corrosion management program based on the data and analysis set out in e) above.

7.6 CONTROL SYSTEMS

(1) The operator shall ensure that, where practicable and required to minimize risks to safety, control systems shall be designed so that:

- a. the controlled equipment cannot be inadvertently activated;

DNV GL Comment: Suggest rephrasing the above highlighted text in Sec. 7.6 (1) (a) to “Risk of inadvertent activation is minimized”. It is nearly impossible to prevent inadvertent operation, so suggest leaving some opening or discussions and interpretations.

- b. an effective basic diagnostic capability is incorporated;
- c. operator controls are designed taking into consideration simultaneous operation from multiple stations; and
- d. human factors are taken into consideration.

(2) The operator shall ensure that control systems shall be designed, where practicable, so that the controlled equipment does not create a safety hazard where the system fails or is shut down.

DNV GL Comment: Consider using the typical industry terminology of “fail safe” in Sec. 7.6 (2) to the operation of control systems for ease of interpretation.

(3) The operator shall ensure that equipment operated by a new or altered control system shall not be used until that control system has been thoroughly checked and tested to verify that it functions in the intended manner.

(4) The operator shall ensure that there is up-to-date documentation that is readily available that describes the design, installation, operation and maintenance of the control systems.

(5) The operator shall ensure that control system hardware is protected from circumstances that could adversely affect the performance of the system, including mechanical damage, vibration, extreme temperatures or humidity level, high electromagnetic field levels and power disturbances.

(6) The operator shall ensure any wireless remote control system shall incorporate:

- a. error checking to prevent the controlled equipment from responding to corrupt data; and
- b. identification coding methods to prevent a transmitter other than the designated transmitter from operating the equipment.

DNV GL Comment: One of the significant consideration for operation of functions using wireless data is to have alternative means of control within an acceptable period of time, which is not addressed above in Sec. 7.6 (6). Suggest addition of the following for alternate means of control such as required by Classification Societies.

“Functions that are required to provide essential services dependent on wireless data communication links shall have an alternative means of control that can be brought in action within an acceptable period of time.”

7.7 INTEGRATED SOFTWARE DEPENDENT SYSTEMS

(1) The operator shall ensure the initial and ongoing availability, reliability, maintenance, safety and security of all integrated software dependent systems, the failure or malfunction of which would cause a hazard to safety or the environment.

(2) The operator shall ensure that safety critical software shall be designed, commissioned and maintained by qualified personnel and demonstrated to be safe, reliable, maintainable, and fit for purpose through a formal and comprehensive testing and validation program that shall consider:

- a. all foreseeable operating and emergency conditions; and
- b. systems complexity, dependencies and interactions between integrated systems, failure modes, and level of risk associated with malfunction or failure.

(3) The operator shall ensure that a comprehensive software management system (including processes and procedures) is developed and implemented to ensure that any changes made to any customizable features of critical software are not undertaken without thorough assessment, testing and approvals and to ensure the software continues to operate as intended and without increasing hazards to safety or the environment.

7.8 MONITORING SYSTEMS

(1) The operator shall ensure that:

- a. operations such as processing, transportation, storage, injection, re-injection and handling of oil and gas and other produced fluids on the installations are effectively monitored to prevent incidents and waste;
- b. all alarms, safety, monitoring, warning and control systems associated with those operations are managed to prevent incidents and waste;
- c. all appropriate persons are informed when the applicable alarm, safety, monitoring, warning or control systems associated with those operations are taken out of service, and when those systems are returned to service; and
- d. when such alarm, safety, monitoring, warning or control system are taken out of service, or found to be impaired, the related operations are either suspended until the system is brought back into service or appropriate measures are implemented to offset the risk while the system is not available.

(2) The operator shall develop and implement a monitoring program for the physical environment during any work or activity to ensure:

- a. sufficient data on the physical environment is collected and maintained to support hazard identification and risk analysis;
- b. appropriate mitigation measures may be initiated in a timely manner to address identified risks to safety or the environment; and
- c. contingency plans may be initiated in a timely manner to protect the health and safety of all personnel, the integrity of the installation, and to minimize potential environmental impacts.

(3) The operator shall ensure that the installation or operations site is sufficiently equipped, and is supported by the additional use of external measures and equipment, to enable observing, measuring and recording of physical environmental conditions as required by (2).

(4) The operator shall make all physical and environmental data monitored under this section which are of significance to safety in carrying out petroleum activities, publicly available.

7.9 COMMUNICATION SYSTEMS

(1) The operator shall ensure every installation and operational site is equipped with communication systems:

- a. capable of communicating continuously:
 - i. with externally-based emergency response teams;
 - ii. with all personnel on the installation, on the site or in transit, as appropriate;
 - iii. with all support craft;
 - iv. if offshore, between the installation or site and:
 - A. onshore facilities, including the ability to transmit written data;
 - B. nearby vessels and aircraft; and
 - C. other nearby installations; and
- b. designed and protected to enable operation in an emergency.

(2) The operator of a staffed installation shall ensure that the radio communication systems comply with the *Ship Station Radio Regulations* and the *Ship Station Technical Regulations*, as if the installation were a ship to which those Regulations apply.

(3) The operator shall ensure that each installation complies with the *VHF Radiotelephone Practices and Procedures Regulations*, as if the installation were a ship to which those Regulations apply.

7.10 GENERAL ALARMS

(1) The operator shall ensure that every installation is equipped with a general alarm system that is capable of alerting personnel to any hazardous conditions other than fire or gas that might:

- a. endanger personnel;
- b. endanger the installation; or
- c. be harmful to the environment.

(2) The operator shall ensure that every general alarm system referred to in subsection (1) shall be:

- a. operational and in operation at all times other than when the system is being inspected, maintained or repaired;
- b. where applicable, flagged as being subject to inspection, maintenance or repair; and
- c. designed in such a manner as to prevent tampering.

(3) Where a general alarm system for an installation is being inspected, maintained or repaired, the operator of the installation shall ensure that the functions that the system performs are performed manually.

7.11 GAS RELEASE SYSTEMS

- (1) The operator shall ensure every installation that includes process tanks, process vessels and piping has a gas release system that enables the safe and controlled release of pressure and is designed to:
- a. reduce pressure in the entire process system in a timeframe that ensures a safe release of pressure as quickly as possible;
 - b. release gas without posing a hazard to personnel or equipment;
 - c. minimize the effect on the environment;
 - d. be activated from the main control centre; and
 - e. be activated from control stations that are located and spaced so that they remain protected and accessible for safe operation in the event of foreseeable accidental damage and events and in accordance with a risk management analysis.
- (2) The operator shall ensure any flaring system and its associated equipment are designed
- a. to ensure a continuous flame using an automatic igniter system, including redundant ignition capabilities;
 - b. to withstand the radiated heat at the maximum flaring rate;
 - c. to prevent flashback; and
 - d. to withstand all loads to which it may be subjected.
- (3) In addition, the operator shall ensure every gas release system shall be designed and located, taking into account the amount of combustibles to be released, the prevailing winds, the location of other equipment and facilities, including rigs, the dependent personnel accommodation, the air intake system, embarkation points, muster areas, the helicopter approaches and other factors affecting the safe, normal flaring or emergency release of the combustible liquid, gases or vapours, so that when the system is operating it will not damage the installation, other installations, the land or other platforms in the vicinity used for the exploration or exploitation of resources, or injure any person.
- (4) The operator shall ensure that every gas release system shall be designed and installed taking into account the limits set out in the applicable *Occupational Health and Safety Regulations* regarding maximum noise and thermal radiation on areas where personnel may be located.
- (5) Any vent that is used to release gas to the atmosphere without combustion shall be located and designed to minimize the risk of accidental ignition of the gas.

7.12 HELICOPTER FACILITIES AND OPERATIONS

- (1) The operator shall ensure every helicopter deck that is part of an installation is designed and equipped to prevent incidents or damage from the use of helicopters or aircraft, including:
- a. an obstacle-free take-off and approach that is appropriately oriented relative to prevailing winds;
 - b. ability to withstand the static and dynamic functional loads imposed by helicopters;
 - c. ability to accommodate expected helicopter sizes;
 - d. emergency response and fire-fighting equipment so that helicopter emergencies can be responded to safely and effectively;
 - e. fuel storage tanks located safely and protected against damage, impact and fire;
 - f. conspicuous markings and signage;
 - g. suitable lighting for reduced visibility conditions;
 - h. suitable communication and meteorological equipment to enable safe helicopter operations; and

- i. ready and safe access to the helicopter deck and helicopters, notably from the temporary safe refuge and the accommodations.

(2) The operator shall ensure that the helicopter deck and associated operations and maintenance shall conform to the requirements of *CAP 437 Standards for Offshore Helicopter Landing Areas* as published by the UK Civil Aviation Authority.

7.13 CRANES AND HANDLING DEVICES

- (1) The operator shall ensure every crane or other handling device on an installation is designed, constructed, operated and maintained, to the extent that is reasonably practicable:
- a. with necessary safety devices and features to ensure safe operations;
 - b. within pre-defined safe operating limits;
 - c. so that if there is a failure of any part of the material handling equipment, it will not result in loss of control of the equipment, or create a safety or environmental hazard; and
 - d. based on the conditions under which it is to be used, including consideration of movements of:
 - i. supply vessels relative to the installation; and
 - ii. on a floating platform, the platform itself.
- (2) The operator shall ensure that cranes or other handling devices are operated, tested, maintained and inspected by competent and trained personnel taking into consideration the recommendations of the original equipment manufacturer and relevant industry standards or best practices.
- (3) The operator shall ensure that every crane has emergency slewing and lowering capability.
- (4) The operator shall ensure that every crane and other material handling equipment shall be uniquely identified and marked with sufficient information to permit safe operation and reference to relevant records of design, construction, inspection, testing, maintenance and repair.
- (5) Before a materials handling equipment is placed in service, a qualified person shall inspect, proof test and certify in writing the rated capacity of a materials handling equipment in accordance with criteria established by the manufacturer or applicable design or safety standard where:
- a. the equipment is new;
 - b. the rated capacity of the equipment cannot be determined;
 - c. the continued safe use of the equipment cannot be assured due to its age or history;
 - d. repairs or modifications have been made to load carrying components;
 - e. modifications have been made which affect the rated capacity;
 - f. the materials handling equipment has been in contact with an electric arc or current; or
 - g. in any case, at a period interval that will ensure continued safe operations.
- (6) The operator must ensure that every crane must:
- a. have posted inside the crane control cab load capacity charts that specify the boom angle and safe working load for each block and for each operating mode (static, dynamic and personnel lifting), as required; and
 - b. be equipped with:
 - i. a safe load indicating system, inclusive of load and moment measuring devices which is programmed for the different operating modes;
 - ii. boom and block travel limiting devices; and

- iii. a load measuring device that has been calibrated, at minimum, according to manufacturer's specifications;
- iv. a device to indicate the boom angle where the rated capacity is affected by the boom angle;
- v. a device to indicate the boom extension or load radius where the rated capacity of the equipment is affected by boom extension or load radius;
- vi. an anemometer; and
- vii. emergency stop capabilities.

(7) The operator shall ensure that all crane hooks must be equipped with positively engaged safety latches or equivalent that will prevent a load from falling out of the hook under all operating conditions.

(8) A person must not move a crane in the vicinity of a helicopter deck when a helicopter is landing or taking off.

7.14 NAVIGATION AIDS

The operator shall ensure that every offshore installation shall be equipped with the navigation lights and sound signal systems that are required by the *Collision Regulations*, as if the offshore installation were a Canadian vessel.

7.15 DRILLING FLUIDS SYSTEM

The operator shall ensure that:

- a. the drilling fluid system and associated monitoring equipment is designed, installed, operated and maintained to provide an effective barrier against formation pressure, to ensure safe drilling operations, to prevent pollution and to allow for proper well evaluation;
- b. the indicators and alarms associated with the monitoring equipment are strategically located on the drilling rig to alert onsite personnel; and
- c. continuous monitoring is provided by dedicated personnel at the location and remote from the driller's station through/via an independent monitoring system of parameters critical to the safety of the drilling operations or critical to the detection of a gain or loss of drilling fluid while connected to the well and taking returns to the installation.

7.16 WELL CONTROL

(1) The operator shall ensure that adequate procedures, materials and equipment are in place and utilized throughout the life of the well to prevent the loss of well control.

(2) The operator shall ensure that, during all well operations, reliably operating well control equipment is installed to control kicks, prevent blow-outs and safely carry out all well operations.

(3) Where the conductor and/or surface hole is drilled riserless, the operator shall ensure that measures necessary to mitigate the risk of shallow hazards shall be implemented.

(4) Prior to drilling out the surface casing shoe and any operation thereafter, the operator shall ensure that at least two independent and tested well barrier envelopes are in place.

DNV GL Comment: Sec. 7.16 (4) - Please note that definition for “Well barrier envelope” appears to be missing. An envelope shall consist of well barrier elements and no common failure modes shall exist between the well barrier elements or envelopes. Also, suggest adding guidance on criteria to test barrier envelopes. Reference to API RP 96 could be provided for further details.

(5) If there is a failure in either of the two defined well barrier envelopes the operator shall ensure that no other well operations take place other than those intended to restore or replace the barrier envelopes. In the event of a replaced barrier envelope the operator shall ensure that every effort is made to restore the barriers to the originally approved well design in a timely manner.

(6) The operator shall ensure that, except when drilling under-balanced, one of the two barriers to be maintained is the drilling fluid column.

DNV GL Comment: Further clarification to be provided if Sec. 7.16 (6) is applicable to the case of MPD (Managed Pressure Drilling). In case of MPD, surface back pressure is applied to.

(7) The operator shall ensure that pressure control equipment associated with well operations is installed and pressure-tested on installation **and as often as necessary** to ensure its continued safe operation.

DNV GL Comment: Sec. 7.16 (7) - The statements read to ensure that pressure control equipment is installed and pressure tested on installation and as often as necessary. Suggest clarifying how “necessary” is defined by adding relation to critical well activity and modify the above highlighted text as follows...

“and prior to any critical well activity such as drilling through casing shoe, pumping cement, fracking etc.”

Also, all critical PCE should have certificate of fitness to expected ratings as per well environment (pressure, temperature, fluids etc.)

(8) If well control is lost or if safety, environmental protection or resource conservation is at risk, the operator shall ensure that any action necessary to rectify the situation is taken without delay.

DNV GL Comment: Sec. 7.16 (8) could be further enhanced by providing requirement for an Emergency Response Plan (ERP). It is critical that an operator has an approved ERP in place. In GoM, BSEE requires worst case scenario to be submitted as part of APD. Suggest to add the following:

“An emergency response plan which shall include worst case scenario should be in place prior to any well operations. The operator shall ensure all resources required to implement ERP are readily available. An I3P can be utilized to verify the ERP prior to regulator submission”.

7.17 CASING AND CEMENTING

(1) The operator shall ensure that, for the life of the well, the casing is designed so that

- a. the well can be drilled safely, the targeted formations evaluated and or developed and waste prevented;

- b. the maximum anticipated conditions, forces and stresses that may be placed upon them are withstood;
- c. the integrity of gas hydrate and permafrost zones — and, in the case of an onshore well, potable water zones — is protected;
- d. that wellhead design fatigue is understood through appropriate analysis and the well is operated so as not to exceed the wellhead design fatigue life; and
- e. if the annulus is to be utilized for production or injection operations that as part of the design process **a barrier analysis is conducted** to confirm that two barrier envelopes will be maintained even in the event of a casing impairment.

DNV GL Comment: “Barrier analysis” mentioned in Sec. 7.17 (1)(e) should be verified via CA OR 3rd party.

(2) The operator shall ensure that the casing is installed at a depth that provides for adequate kick tolerances and well control operations that provide for safe, constant bottom hole pressure.

(3) The operator shall ensure that, for the life of the well, the cement slurry is designed, installed and verified so that:

- a. the movement of formation fluids is prevented and, where required for safety, resource evaluation or prevention of waste, the isolation of the oil, gas and water zones is ensured;
- b. support for the casing is provided;
- c. corrosion of the casing over the cemented interval is retarded;
- d. the integrity of gas hydrate and permafrost zones — and, in the case of an onshore well, potable water zones — is protected; and
- e. **if the annulus is to be used for production or injection operations, or if the cement is a common critical barrier element in the primary and secondary barrier envelopes, the cement placement is verified by pressure testing and logging.**

DNV GL Comment: For guidance on isolation for potential flow zones and their barrier testing requirements as given in Sec. 7.17 (3)(e), suggest to add guidance/reference to the following International Standards:

- *API STD 65-2 2nd Edition, December 1, 2010 Isolating Potential Flow Zones During Well Construction*
- *API RP 65 For Cementing shallow water flow zones in Deepwater wells*

Cement design and slurry analysis

(4) The operator shall ensure that the cement design has been subjected to a comprehensive suite of lab testing and pre-job quality control as per the design to ensure that the design will provide the expected isolation and can be placed effectively, including contingencies for upset conditions that could occur during the cement job.

Waiting on Cement Time

(5) After the cementing of any casing or casing liner and before drilling out the casing shoe, the operator shall ensure that the cement has reached the minimum compressive strength sufficient to support the casing and provide zonal isolation.

Casing Pressure Testing

(6) After installing and cementing the casing and before drilling out the casing shoe, the operator shall ensure that the casing is pressure-tested to the value required to confirm its integrity for maximum anticipated operating pressure over the life of the well.

DNV GL Comment: Sec. 7.17 (6) - Sustained Casing Pressure can lead to Casing Failure which is an important well barrier. Add section on Casing Pressure Management (CPM). This section could cover requirements for CPM, monitoring, diagnostic testing, actions in case of negative results etc. For requirements for casing pressure management, following text and reference could be included:

“After installation of wellhead, the operator must ensure the casing pressure management. The requirements can be incorporated by reference of API RP 90 (for offshore wells) and or API RP 90-2 (for onshore wells)”

7.18 FORMATION LEAK-OFF OR INTEGRITY TESTING

The operator shall ensure that

- a. a formation leak-off test or a formation integrity test is conducted before drilling more than 10 m of new formation below the shoe of any casing other than the conductor casing;
- b. a formation leak-off test or a formation integrity test is conducted before drilling more than 10 m of new formation when sidetracking through casing;
- c. the formation leak-off test or the formation integrity test is conducted to a pressure that allows for safe drilling to the next planned casing depth and to verify the adequacy of the cement at the shoe prior to drilling ahead; and
- d. a record is retained of each formation leak-off test or formation integrity test and the results included in the daily well operations drilling report referred to in section 14.12 and in the well history report referred to in section 14.18.

7.19 WELL COMPLETION

(1) An operator that completes a well shall ensure that:

- a. it is completed, tested and produced in a safe manner and allows for maximum recovery; and does not cause waste or pollution for the life of the well;
- b. except in the case of commingled production, each completion interval is isolated from any other porous or permeable interval penetrated by the well;
- c. if applicable, the production of sand, carbonate or other solids is controlled and does not create a safety hazard or cause waste;
- d. each packer is set as close as practical to the top of the completion interval and that the pressure testing of the packer to a differential pressure is greater than the maximum differential pressure anticipated under the production or injection conditions;
- e. if practical, any mechanical well condition that may have an adverse effect on production of oil and gas from, or the injection of fluids into, the well is corrected;
- f. the injection or production profile of the well is improved, or the completion interval of the well is changed, if it is necessary to do so to prevent waste;
- g. if different pressure and inflow characteristics of two or more pools might adversely affect the recovery from any of those pools, the well is operated as a single pool well or as a segregated multi-pool well;
- h. during completion operations and prior to the removal of pressure control equipment and handover for operations, all barrier elements are to be tested to the maximum pressure to which they are likely to be subjected, and where possible pressure testing is to be in the direction of flow;
- i. after commencement of operations of the well, dual well barrier envelopes that have been tested must be in place and if there is a failure in either of the two defined well

- barrier envelopes the operator shall ensure that no other well operations takes place other than those intended to restore or replace the barrier envelopes;
- j. in the event of a replaced well barrier envelope the operator shall ensure that every effort is made to restore the well barriers to the originally approved well design in a timely manner; and
 - k. following any workover or intervention, any affected barrier elements are pressure-tested.
- (2) The operator of a segregated multi-pool well shall ensure that:
- a. after the well is completed, segregation has been established within and outside the well casing and is confirmed; and
 - b. if there is reason to doubt that segregation is being maintained, a segregation test is conducted within a reasonable timeframe.

7.20 PRODUCTION TUBING

The operator shall ensure that the production tubing used in a well is designed and maintained for compatibility with the fluids to which it will be exposed and to withstand the maximum conditions, forces and stresses that may be placed on it and to maximize recovery from the pool.

7.21 SUBSURFACE SAFETY VALVE

- (1) The operator of an offshore development well that is completed shall ensure that the well is equipped with a fail-safe surface controlled subsurface safety valve that is designed, installed, operated, tested, and maintained to prevent uncontrolled well flow when it is activated.
- (2) If a completed well is located where permafrost is present in unconsolidated sediments, the operator shall ensure that a subsurface safety valve is installed in the tubing below the base of the permafrost.

7.22 MARINE RISER

- (1) The operator shall ensure that every marine riser is, throughout the duration of the well operation, capable of:
- a. furnishing access to the well;
 - b. isolating the well-bore from the sea;
 - c. withstanding the differential pressure of the drilling fluid relative to the sea;
 - d. withstanding the maximum anticipated loads; and
 - e. permitting the drilling fluid to be returned to the installation.
- (2) The operator shall ensure that every marine riser is supported in a manner that effectively compensates for the forces caused by the motion of the installation, the drilling fluid or the water column.
- (3) The operator shall ensure that riser analysis and weakpoint analysis when required is completed and submitted to the Certifying Authority for acceptance.

7.23 WELL, WELL HEAD AND TREE EQUIPMENT

- (1) The operator shall ensure that
 - a. the components of an installation and well tubulars, trees and wellheads are operated in accordance with good engineering practices; and
 - b. any part of an installation that may be exposed to a sour environment is designed, constructed and maintained to operate safely in that environment.
- (2) The operator shall ensure that the wellhead and tree equipment, including valves, are designed and maintained to operate safely and efficiently under the maximum load conditions anticipated during the life of the well.

7.24 FORMATION FLOW TEST EQUIPMENT

- (1) The operator shall ensure that:
 - a. the equipment used in a formation flow test is designed to safely control well pressure, properly evaluate the formation and prevent pollution;
 - b. the rated working pressure of formation flow test equipment upstream of and including the well testing manifold exceeds the maximum anticipated shut-in pressure; and
 - c. the equipment downstream of the well testing manifold is sufficiently protected against overpressure.
- (2) The operator of an offshore well or a well in a sour environment well shall ensure that the formation flow test equipment includes a down-hole safety valve that permits closure of the test string above the packer for development wells.
- (3) In the case of a flow test program for an exploration or delineation well, a downhole safety valve is required unless it can be demonstrated and approved as part of the well testing program application process that the alternative arrangement provides an equivalent or lower level of risk than using a downhole safety valve.
- (4) The operator shall ensure that any formation flow test equipment used in testing an offshore well that is drilled with a floating drilling unit has a subsea test tree that includes:
 - a. a valve that may be operated from the surface and automatically closes when required to prevent uncontrolled well flow; and
 - b. a release system that permits the test string to be hydraulically or mechanically disconnected within or below the blow-out preventers.

7.25 DRILLING AND WELL OPERATING PRACTICES

The operator shall ensure that adequate equipment, procedures and personnel are in place to recognize and control normal and abnormal conditions, to allow for safe, controlled well operations and production operations and to prevent pollution.

DNV GL Comment: Suggest also including a requirement for a Risk-based Framework to Sec. 7.25 as follows:

“A risk based framework for real time support to decision making during drilling operations should be in place to allow for safe well operations.”

7.26 WELL VERIFICATION SCHEME

- (1) The operator must establish a well verification scheme, commensurate with the risk criticality ranking for the well, such that the design ensures well integrity for the life of the well, is in keeping with the regulations and reflects industry best practices.
- (2) The verification scheme shall also be applied to any changes made to the design that occur during the construction or ongoing operation of the well.
- (3) The verification must be undertaken by a **qualified person** who is not involved with the original design and that is separate from the business unit responsible for the original design.

DNV GL Comment: Noted that the above highlighted text “qualified person” is undefined. Also, given the scope of work involved in well verification scheme and to ensure independence, this should be a Regulator approved vendor/entity. Suggest change to “Regulator approved vendor/entity” instead of ‘qualified person’ in Sec. 7.26 (3).

7.27 REFERENCE FOR WELL DEPTH

The operator shall ensure that any depth in a well is measured from a single reference point, which is either the kelly bushing or the rotary table of the drilling rig.

7.28 DIRECTIONAL AND DEVIATION SURVEYS

The operator shall ensure that:

- a. directional and deviation surveys are taken at intervals that allow the position of the well-bore to be accurately known during drilling operations;
- b. directional and deviation surveys are adequate to accurately manage the wellbore in respect to identified geohazards, to intersect the geological targets for the well, and to be able to intersect the well bore in the event a relief well is required; and
- c. except in the case of a relief well, a well is drilled in a manner that ensures compliance with wellbore collision avoidance practices and procedures and that does not intersect an existing well.

7.29 SUBSEA PRODUCTION SYSTEMS

- (1) The operator shall ensure that all subsea production systems are designed, built, installed, commissioned, tested, operated, inspected, monitored and maintained to reduce risks to safety and to the environment to as low as reasonably practicable under all foreseeable environmental and operating conditions, for all modes of operation.
- (2) The operator shall ensure that the design of subsea production systems shall ensure:
 - a. the effect of a single failure cannot develop into a situation that may cause a major accidental event;
 - b. barriers in each conduit capable of carrying fluids are sufficiently redundant, reliable and arranged to:
 - i. prevent uncontrolled flow of well fluids;
 - ii. minimize the release of conduit inventory in the event of unintended release; and
 - iii. permit testing of the barrier integrity without increasing risk to safety or the environment;
 - c. subsea facilities and pipeline systems can withstand and are sufficiently protected from mechanical damage caused by other activity [including from dropped objects, drilling and well intervention, as well as activities such as trawling and anchor drags];

- d. subsea facilities are arranged to permit safe accessibility for operation, maintenance, inspection and testing during design service life;
- e. foreseeable threats to safety and the environment can be identified in sufficient time to enable the system to avoid the threats or be brought to a safe state to prevent escalation;
- f. production risers are sufficiently protected or designed to withstand or safely avoid all foreseeable hazards and environmental loads for the site, [including but not limited to ice loads, motion of the installation and excursion limits], but excluding icebergs;
- g. the ability to support the blowout preventer during drilling and the tree and any workover or intervention pressure control equipment after completion;
- h. that the subsea production system supports and seals connections to the well, offshore pipelines, other subsea production systems or other installations; and
- i. that in the event of a loss of control or communication, the subsea production system is designed to revert to a failsafe state.

(3) The operator shall ensure that, where risers are designed to disconnect to avoid foreseeable hazards, riser fluids shall be able to be safely isolated or displaced by water.

(4) The operator shall ensure that no subsea production system shall be considered to comply with this section until it has been assessed through a failure modes and effects analysis.

(5) The operator shall ensure that, when a riser has been disconnected, its integrity shall be demonstrated through testing once reconnected, before being brought back into service.

(6) The operator shall ensure that, if the installation is designed to leave station under the pre-determined environmental operating limits, the riser will be designed to disconnect, and will meet the requirements of s. 6.16 that speaks to disconnectable mooring systems.

(7) The operator shall ensure that subsea production systems will only be controlled by one facility at any given time.

DNV GL Comment: Suggest to add a section on Decommissioning which is currently missing.

7.30 FIRE AND GAS DETECTION

(1) The operator shall ensure that every installation is equipped with a fire and gas detection system that is designed, selected, installed, tested and maintained to:

- a. provide continuous, reliable automatic monitoring functions to alert personnel to the presence and location of hazardous fire and flammable and toxic gas conditions; and
- b. enable control actions to be initiated manually or automatically in order to prevent escalation of abnormal conditions into major accident events.

(2) The operator shall ensure that every fire and gas detection system is designed, arranged, including location, number, and types of detectors, tested and maintained such that:

- a. they are based on the Fire, Explosion and Hazardous Gas Risk Assessment in 6.6 and that they will ensure that any such fire, explosive or toxic gas accumulation, or other foreseeable abnormal conditions related to hazards identified in the Assessment will be detected;
- b. upon detection of such hazards the system shall activate automatically, and be capable of being activated manually in suitable locations, an alarm system that includes distinct audible and visual alarms at the main control center and in areas where personnel are

- normally present, to enable response that is appropriate to the nature and level of the hazard or event;
- c. as far as practicable, the system is functionally and physically independent of other systems;
 - d. system components, including fire and gas detection devices are selected and located to ensure:
 - i. reliable and early detection, taking into account response characteristics, redundancy and performance under foreseeable conditions for which detection is required;
 - ii. they are demonstrated to be suitable for detection of foreseeable types of fire or gas in their area of operation; and
 - iii. they include [health status] features to indicate their failure or malfunction (i.e. self-monitoring features);
 - e. flammable or toxic gas (including smoke) will be detected in air intakes of mechanically ventilated non-hazardous areas;
 - f. inspection and testing of field devices, system internal functions and executive outputs can be carried out without impeding system functionality;
 - g. in the event of failure of the normal power source, the system will switch over to an emergency source of electrical power to ensure uninterrupted operation of the system for the duration required to restore main power or to safely evacuate personnel and an audible and visual indication will be provided at the control center;
 - h. the system and its components are suitably protected from mechanical, fire and environmental damage to remain capable of fulfilling their intended functions under foreseeable operating and environmental conditions [under which they must operate];
 - i. all necessary information is continuously provided at the control center and other strategic locations to permit personnel to manage emergency situations;
 - j. means to manually initiate fire and gas alarm shall be available at the office of the manager of the installation, at the control center, at every control station and other defined locations throughout the facility identified in the Fire, Explosion and Hazardous Gas Risk Assessment required under 6.6; and
 - k. the system can be reset when conditions are confirmed to be returned to a safe state.

DNV GL Comment: Sec. 7.30

1. Should the system be considered for redundancy? If the F&G system is an operator station in an integrated system, a back-up means of operation / user interface is required which shall be independent of the normal user interface and it's communication networks which is typically achieved by provision of a CAAP (Critical Alarm and Action Panel).

2. Suggest including voting logic to avoid unwanted alarms / actions without reducing the ability of the system to respond to a real-time incident.

7.31 IGNITION PREVENTION

- (1) The operator shall ensure that materials and equipment on an installation are arranged, at all times, to prevent ignition of combustible and explosive fluids, and that measures are taken:
- a. to prevent fire and explosion, including measures to prevent uncontrolled release or accumulation of combustible or explosive substances; and
 - b. to prevent the ignition of such substances and atmospheres.

(2) All mechanical and electrical equipment located in a hazardous area identified in accordance with 6.19(2) shall be suitably designed, rated, protected, ventilated and maintained for safe operation in their intended location.

(3) All equipment that is not suitably rated for use in a hazardous area shall be operated only at a safe distance from any potential source of combustible or explosive fluids and shall be equipped with automatic and manual means of deactivation in the event of gas detection (deactivation includes shut off and de-energize).

(4) Any equipment that is to remain active in the event of an emergency associated with gas release is to be suitably rated for operation as if it was located in a **hazardous area**.

DNV GL Comment: Highlighted text in Sec. 7.31 (4) appears to be very generic. Suggest to make it more specific by including "hazardous area Zone 2".

(5) The operator shall ensure that hot work is only carried out under a permit to work system that has pre-determined safe distances from sources of ignitable and explosive fluids and other risk mitigation measures identified through risk analysis to prevent ignition.

(6) The operator shall ensure that the requirements in this section are supported by comprehensive risk assessments specific to the installation.

(7) The operator shall ensure that cargo tank internal atmospheres are maintained below the lower explosive limits and that such systems will be designed, equipped with sufficient barriers, alarms and redundancy to:

- a. prevent risks to safety during all modes of cargo operations; and
- b. ensure that personnel are made aware when such systems become impaired.

7.32 EMERGENCY SHUTDOWN AND BLOWDOWN

(1) The operator shall ensure that every installation has an emergency shutdown system that is capable of shutting down, isolating and depressurizing all potential sources of ignition and sources of flammable liquids or gases, and that is designed, installed, tested and maintained:

- a. to prevent escalation of abnormal conditions into major accident events; and
- b. to limit the extent and duration of any major accident events which may foreseeably occur.

(2) The operator shall ensure that the emergency shutdown system design shall be based on a formal risk assessment and analysis, and that shutdown logic shall include a hierarchy of shutdown levels, action sequences and timelines that are appropriate to the degree of risk posed by identified hazards, and shall consider:

- a. automated and manual activation to ensure effective shutdown
- b. isolation of hydrocarbon and flammable fluid inventories, including but not limited to, reservoirs, wells, production systems, and pipelines from sources of ignition;
- c. shutdown of electrical, mechanical and other equipment and systems, to bring them to a predefined safe state, unless suitably rated and designed to remain operational at those predefined safe states;
- d. sizing and segregation of hydrocarbon inventory to limit the quantity of material released on loss of containment;
- e. emergency depressurization and disposal of hydrocarbon inventory to a safe location (which cannot include cold venting).

- f. control of subsurface, subsea and pipeline safety valve(s);
 - g. essential systems and timelines that are necessary to support safe escape, shelter and evacuation of personnel, or to maintain the integrity of the installation;
 - h. selective shutdown of ventilation systems required by s. 6.20, except the fans necessary for supplying combustion air to engines required to operate during emergency situations unless gas has been detected in the intake to engines; and
 - i. any activation of fixed fire suppression systems required under 7.33.
- (3) The operator shall ensure that emergency shutdown systems:
- a. are designed, arranged and maintained to have a high degree of reliability and, as far as practicable, to be functionally and physically independent of other systems such that they will not adversely affect or be adversely affected by the operation of other safety critical systems or essential emergency systems that are required to remain live during an event;
 - b. are suitably protected from mechanical, fire, explosion and environmental damage, and capable of fulfilling their intended functions under all operating and environmental conditions under which they must operate; and
 - c. remain capable of fulfilling critical shutdown functions during testing and maintenance that may affect the operation of the emergency response system.
- (4) The operator shall ensure that emergency shutdown systems are arranged and maintained such that:
- a. emergency shutdown initiation activates audible and visual alarms in the control center and at locations outside the central control room such that all personnel are alerted;
 - b. system status is continually monitored in the control center, including, where applicable, status, extent and duration of any overriding commands;
 - c. adequate information is continuously provided at the control center to ensure emergency response personnel have the necessary information to manage the emergency, including but not limited to:
 - i. emergency shutdown level initiation and source of initiation;
 - ii. emergency shutdown effects which have failed to be executed upon emergency shutdown activation; and
 - iii. status, including failure, of emergency shutdown system components;
 - d. the activation of a manual emergency shutdown activation point will initiate the installation's general alarm;
 - e. emergency shutdown can be initiated from multiple manual activation stations that are:
 - i. well marked;
 - ii. protected against unintentional activation and degradation from environmental conditions under which they would be operating; and
 - iii. located at strategic positions which provide a high likelihood of being able to be activated in emergency conditions, with at least one located outside hazardous areas;
 - f. manual activation points for highest level or complete shutdown of the installation are provided at the control center, and at other suitable locations including, but not limited to, the helicopter deck and emergency evacuation stations;
 - g. where a hydraulic or pneumatic accumulator is used to operate any part of the emergency system, the accumulator shall:
 - i. be located as close as is practicable to the part that it is designed to operate, except where that part is part of a subsea production system;
 - ii. have capacity for a sufficient number of operations to ensure shutdown can be reliably achieved; and

- iii. notwithstanding ii), in the event of a failure of the accumulator, the shutdown valves shall revert to a fail-safe mode;
- h. the system contains facilities for testing of both input/output devices and internal functions in order to ensure the functionality of the complete system;
- i. in the event of failure of the normal power source, uninterrupted operation of the system shall be assured until the normal power source is restored or all emergency shutdown operations have been completed;
- j. systems or equipment are to revert to a fail-safe or least hazardous condition if failure of the emergency shutdown system or any critical function or component will increase risk;
- k. where two or more installations or facilities are connected, or where temporary equipment is on an installation:
 - i. emergency shutdown systems shall be linked such that emergency shutdown signals can be transmitted to any of the connected installations or systems, and vice versa; and
 - ii. consideration shall be given to command sequence and priority between the connected systems;
- l. temporary equipment on an installation shall be integrated into the emergency shutdown system of the installation;
- m. once activated, it will not be possible to override or reset the emergency shutdown system until such time as the events that triggered the system are returned to a safe state and the equipment is locally confirmed to be safe for operations; and
- n. overriding commands and functions cannot be inadvertently engaged.

(5) Where the override capabilities exist for the purposes of maintenance and testing, they are applied for the shortest amount of time as possible with as few as possible simultaneously applied, managed through the established permit to work system, and in any case, do not impair the emergency shutdown function.

(6) In the case of a production installation, on activation of the emergency shutdown system, the surface-controlled subsurface safety valve shall close in not more than two minutes after the tree safety valve has closed, except where a longer delay is justified by the mechanical or production characteristics of the well.

DNV GL Comments (for ESD and Blowdown): Sec. 7.32

1. Suggest to include recommendation or requirements to separate the functionality associated with the operation of safety and control systems. As per Classification Society Rules, it is required for the Safety systems to be able to carry out all safety functions independently from the control systems.

2. Suggest to include requirements about the hierarchical operation and initiation of the Emergency Shutdown System such as the following text given below in quotes, to ensure that a logical manner of shutdown is executed to provide efficient safeguards in case of an emergency and minimize escalation of further hazard.

“The operator shall ensure that emergency shutdown systems shall be executed in a predetermined logical manner. The shutdown system shall normally be designed in a hierarchical manner where higher level shutdown automatically initiate lower level shutdowns.”

3. If the ESD system is an operator station in an integrated system, a back-up means of operation / user interface is required which shall be independent of the normal user interface

and its communication networks which is typically achieved by provision of a CAAP (Critical Alarm and Action Panel).

7.33 FIRE PROTECTION SYSTEMS AND EQUIPMENT

(1) The operator shall ensure that all safe and reasonable measures are taken at every installation and operations site to control and extinguish or control fires as appropriate and to minimize any danger to safety or the environment that results or may be reasonably expected to result from the fire.

(2) The operator shall ensure every installation is equipped with protection systems and equipment that are designed, inspected, maintained, tested, and operated, to be capable of controlling and extinguishing fires on the installation, of operating effectively and of minimizing dangers and hazards to personnel (related to the use of the systems), and that include appropriate redundancies to ensure the system is operable in case of the failure of one of its components; including:

- a. automated fixed fire suppression systems with capability for manual activation outside the space being protected;
- b. fixed monitors and foam systems; and
- c. manual firefighting systems and equipment.

(3) The design and selection of fire protection systems and equipment, including suppression agents is appropriate for its intended use based on the Fire, Explosion and Hazardous Gas Risk Assessment required in 6.6.

(4) The operator shall ensure that the systems and equipment are protected to ensure they remain functional in all operating conditions.

(5) The operator shall ensure that all accommodation areas and any enclosed space on an installation where there is a risk of fire are outfitted with a fixed fire suppression system.

(6) The operator shall ensure that at least two dedicated and independently driven fire pumps will service a dedicated firewater ring main and each fire pump shall also be equipped with at least two independent starting arrangements.

DNV GL Comment: In addition to Sec. 7.33 (6), it is also suggested to add that the arrangement of the pumps and sources of power should be such as to ensure that any accidental event in any one space of the installation will not put both the required pumps out of operation such as required by Classification Society Rules.

(7) Firewater pumps, piping and associated valves shall be designed and **placed** such that a sufficient supply of firewater is ensured to any area on the facility, including if a segment of the ring main firewater piping is damaged.

DNV GL Comment: Suggest including that the location of the fire pumps as given in Sec. 7.33 (7) shall be stated to be far from spaces that contain equipment used for storing and processing petroleum. Depending on the location of the fire pumps, applicable remote control requirements for activation shall also be included.

(8) The firewater system must be able to run continuously for a minimum of 18 hours.

(9) The number and position of the hydrants and/or fire hose reels shall be such that at least two jets of water, not emanating from the same location, may reach any part of the installation normally accessible.

(10) Audible and visible alarms will be activated at the control center upon activation of any of the fixed fire suppression systems, or upon a loss of any firewater pressure.

(11) For unstaffed installations, sections (5) to (9) do not apply.

7.34 TEMPORARY AND PORTABLE EQUIPMENT

(1) The operator shall ensure that any temporary or portable equipment used on an installation is suitable and fit for its intended use and in compliance with these regulations.

(2) Before any temporary or portable equipment is installed or taken into service on an installation, a systematic assessment shall be carried out of the equipment and its integration to determine its impact on existing safety critical elements and the concept safety analysis.

(3) The operator shall identify and implement procedures and arrangements necessary to manage temporary equipment to reduce risk to as low as reasonably practicable and without compromising target levels of safety.

(4) Temporary or mobile equipment that is or affects a safety critical element shall be verified by the Certifying Authority, considering initial suitability, safe placement and hook-up, and continuing suitability (as necessary) [in the context of the Concept Safety Analysis and the Certificate of Fitness.]

7.35 EMERGENCY ELECTRICAL POWER AND SYSTEMS

(1) The operator shall ensure every installation is equipped with an independent emergency source of electrical power that is designed, arranged, installed and maintained to ensure reliable and robust emergency power to systems that must remain functional to ensure safety and/or integrity of the installation in the event of a main power failure.

(2) The systems that must be provided emergency power are the following:

- a. all lights referred to in subsection (3);
- b. all gas detection and alarm systems;
- c. all fire detection and alarm systems;
- d. all firefighting systems except any fire pump that is driven by a liquid fuelled combustion engine;
- e. the general alarm system and all internal communication systems;
- f. the emergency shut-down system referred to in s. 7.32;
- g. all lifesaving systems;
- h. all navigation lights, sound signal systems and illuminated markings, that are required by section 7.14;
- i. all radio communication equipment necessary to comply with the contingency plan;
- j. on an installation that is a mobile platform, the main ballast control system, one ballast pump for each individual ballast system and one bilge pump for each individual bilge system;
- k. on a column-stabilized mobile platform, the secondary ballast control system;

- l. all equipment necessary to secure the production or drilling operations in progress at any one time in a safe manner, including a well disconnect system;
- m. if a pumping system is required under paragraph (l), one pump that is not driven by an internal combustion engine that has sufficient capacity to kill any well on the installation;
- n. any blow-out prevention system; and
- o. any staffed diving equipment dependent on an electrical supply.

(3) Every installation shall be equipped with lights supplied by the emergency source of power described in subsection (1), in the following locations:

- a. every embarkation station on deck and over sides;
- b. every escape route and area containing escape route markings;
- c. all service corridors and corridors in accommodation areas, and all stairways, exits and personnel lift cars;
- d. all machinery spaces and main generating stations;
- e. the control center and all control stations;
- f. all spaces from which the drilling and production operations are controlled and at which controls of machinery essential for the performance of those operations and devices for the emergency shut-down of the power plant are located;
- g. the stowage positions for firefighting equipment;
- h. each sprinkler pump and fire pump and each ballast and bilge pump, referred to in paragraph (1)(j), and the starting position for each pump;
- i. every helicopter landing deck and every obstacle marker on that deck; and
- j. the radio room.

(4) Where the emergency source of electrical power required by subsection (2) is a mechanically driven generator, the installation shall be provided with:

- a. a transitional source of electrical power, unless the generator will automatically start and supply the power required by subsection (2) in less than 45 seconds from the time the primary source of electrical power fails; and
- b. a self-contained battery system designed to supply sufficient power, automatically on failure or shutdown of both the primary and the emergency sources of electrical power, to operate, for a period of at least one hour the equipment described in subparagraphs (i) and (ii) and, for a period of at least four days, the equipment described in subparagraph (iii):
 - i. the lights located in every emergency exit route, at every escape route, in every machinery space, the control center and every emergency assembly room and at every launching station of the lifesaving system;
 - ii. the internal communication system and the general alarm system; and
 - iii. the navigation lights, sound signal systems and illuminated markings referred to in section 7.14.

(5) The operator shall ensure that emergency power systems are designed and maintained such that:

- a. systems requiring electrical power to fulfil their functions and, where required, to allow the installation to be safely shut down and evacuated following loss of main power shall have a secure power supply of sufficient capacity and duration for effective management of the installation and the emergency situation while main power generation is unavailable, including:
 - i. reduction of risks to as low as reasonably practicable;

- ii. essential systems and lighting, and timelines that are necessary to support emergency response, safe escape, refuge and evacuation of personnel, or to maintain the integrity of the installation;
- iii. supply loads and duration for systems that may have to be operated simultaneously during emergency situations;
- iv. starting currents and the transitory nature of loads;
- v. for floating offshore platforms, systems required to maintain the marine and stability of the platform; and
- vi. systems required to bring and maintain the well to a safe and secured state;
- b. sufficient redundancy to allow maintenance of the emergency power system without compromising the ability to power the essential systems;
- c. sufficient redundancy to ensure a high degree of reliability and, as far as practicable, to be functionally and physically independent of other systems;
- d. they are suitably arranged and protected from mechanical, fire and other accidental and environmental damage, to ensure they are capable of fulfilling their intended functions under foreseeable operating and environmental conditions under which they must operate, including static and dynamic angles of inclination according to 7.4(6);
- e. mechanical driven emergency power generators shall have redundant means of being started and have dedicated source of fuel; and
- f. emergency sources of power are readily and safely accessible.

DNV GL Comment: Sec. 7.35

1. In addition to the list as given in Sec. 7.35 (2), suggest including “water tight doors and hatches” for the systems that typically must be provided emergency power.

2. In addition to the list given in Sec. 7.35 (3), suggest including “Cargo Pump Room” for the areas typically equipped with lights supplied by the emergency source of power.

3. The requirement for transitional source of power is mandatory as per Classification Society rules and it is considered as part of the main Class requirements. Also, there are additional equipment that are to be supplied from transitional source which are more than what is mentioned in 7.35 (4)(b) - i, ii and iii above.

7.36 EVACUATION AND ESCAPE

(1) The operator shall ensure that every installation has adequate and effective facilities and best technology practicable for safe and controlled emergency response during accidental events, including:

- a. routes and other necessary equipment and devices which allow personnel to escape from the immediate effects of a hazardous event to a place of temporary refuge;
- b. provision of temporary refuge for the time required for incident assessment and controlled evacuation;
- c. arrangements to permit the rescue of injured personnel; and
- d. arrangements for safe evacuation of all personnel from the installation.

(2) The operator shall ensure that safe, direct, protected and unobstructed exits, access, and escape routes are provided from all areas of the offshore installation, that are intended to be regularly occupied by personnel, to temporary refuge, muster areas and embarkation or evacuation points.

(3) The operator shall ensure that all areas intended to be regularly occupied by personnel are provided with at least two exits and escape routes, separated as widely as practicable such that at least one exit and the connected escape route will be passable during an accidental event.

(4) The operator shall ensure that primary escape routes are provided on both sides of the offshore installation.

(5) The operator shall ensure that all escape routes from the accommodation areas and temporary safe refuge to the evacuation and embarkation stations, as well as those stations, are provided with fire protection for sufficient period of time, and suitably marked and illuminated, to allow for the safe evacuation of personnel, and in any case for a minimum of at least two hours.

(6) Escape routes shall be of suitable size to enable efficient movement of the maximum number of personnel who may require using them, and for unrestricted manoeuvring of fire-fighting equipment and use of stretchers.

(7) The operator shall ensure that every offshore installation is equipped with temporary safe refuge that, in an emergency response event, including an uncontrolled incident, will:

- a. protect personnel from fire, explosion, and associated hazards, including but not limited to gas and smoke, during the period of time for which they may need to remain on the installation;
- b. enable safe evacuation
- c. provide sufficient space, signage, lighting and arrangements to accommodate the maximum number of persons that could be located in the temporary safe refuge prior to evacuation; and
- d. provide sufficient facilities for communication, command, monitoring and control of any major incident until personnel have been evacuated or the situation has been brought under control.

(8) In particular, the operator shall ensure every accommodation installation, temporary safe refuge, the main control centre, dependent personnel accommodations, and any area required to remain safe for human occupation in an emergency at every installation are

- a. designed to prevent ingress of hazardous or toxic substances, and
- b. located and designed to enable occupation for a sufficient period of time following onset of an emergency to implement emergency procedures and evacuate personnel.

DNV GL Comment: Suggest including a note to Sec. 7.36 (8) that "all regularly manned areas of the installation should be equipped with emergency lighting, which is supplied from the emergency source of power".

(9) The operator shall implement measures to validate the temporary safe refuge performance on a regularly defined basis (usually defined in safety plan).

7.37 LIFESAVING EQUIPMENT FOR OFFSHORE INSTALLATIONS

DNV GL Comment: Section 7.37 is currently appearing to be very brief. Suggest including requirements for other Life Saving Appliances such as the following as typically required by International Standards.

- *Lifejackets*

- *Immersion suits*
- *Lifebuoys*
- *Rescue boats*
- *Breathing Apparatus*
- *Two-way radio*

(1) The operator shall ensure every offshore installation is designed for and equipped with sufficient lifesaving equipment, survival craft and launching facilities to enable safe evacuation of all personnel, and that are:

- a. designed and installed based on reasonable expectations of the loads to be encountered during the life span of the operations; and
- b. include sufficient redundancy to ensure availability in any foreseeable emergency situation.

(2) The operator shall ensure that copies of the plan showing the position of all lifesaving appliances are posted on every installation, including in the control center and in each accommodation area and work area.

(3) The operator shall ensure that each installation should carry lifeboats installed in at least two widely separated locations on different sides or ends of the unit.

(4) The arrangement of the lifeboats should provide sufficient capacity to accommodate the total number of persons on board if:

- a. all the lifeboats in any one location are lost or rendered unusable; or
- b. all the lifeboats on any one side, any one end, or any one corner of the unit are lost or rendered unusable.

(5) In addition, each installation should carry liferafts suitable for the operating height from which they will be deployed, of such aggregate capacity as will accommodate the total number of persons on board.

(6) The operator shall ensure that lifeboats meet the requirements for Class I lifeboats as set out in Schedule V.1 and are equipped with Class A equipment as described in Schedule II to the *Life Saving Equipment Regulations*, as if the installation were a Class I ship to which those Regulations apply.

(7) The operator shall ensure that liferafts meet the requirements set out in Schedule XIII and are equipped with Class A equipment as described in Schedule I to the *Life Saving Equipment Regulations*, as if the liferafts and lifeboats were in waters and on vessels to which those Regulations apply.

(8) The operator shall ensure that the launching devices for the lifeboats and liferafts meet the requirements for launching devices set out in Schedule IX to the *Life Saving Equipment Regulations*, as if the launching devices were located in waters to which those Regulations apply.

(9) The operator shall ensure that evacuation systems and equipment sizing and capacity is suitable for the demographics of the workforce in the operating region.

(10) The operator shall implement measures to demonstrate functionality and performance of all evacuation systems and equipment on a regularly defined basis (usually defined in safety plan).

(11) The operator shall ensure that emergency locator equipment are installed as required by the *Life Saving Equipment Regulations* and *Ship Station Radio Regulations*.

PART 8 – GEOSCIENCE, GEOTECHNICAL AND ENVIRONMENTAL OPERATIONS

8.1 GEOSCIENCE, GEOTECHNICAL AND ENVIRONMENTAL OPERATIONS

- (1) An operator conducting a geoscience, geotechnical or environmental operation shall ensure
- a. all equipment and materials that are used during the operation are handled, operated, inspected, tested and maintained to ensure safety and environmental protection, taking into consideration the manufacturer's instructions and any safety standards available;
 - b. all equipment is regularly inspected and any defective components are promptly repaired or replaced with components that comply with the manufacturer's instructions;
 - c. the installation, operation and maintenance is performed by qualified and competent personnel;
 - d. all energy sources are:
 - i. kept free from any substance that could create a hazard;
 - ii. operated in a manner that prevents accidental activation of the energy source;
 - e. in the case of an electrical or electromagnetic energy source, the energy source is equipped with circuit breakers on the charging and discharging circuits, and cables that are adequately insulated and grounded to prevent current leakage and electrical shock;
 - f. where a seismic or electrical energy source is used, all such operations must be completed in a manner that eliminates all potential safety risks to divers and that minimum distances required to ensure safety of divers have been identified and followed; and
 - g. for onshore operations, **(Note: Onshore COGOA only)**
 - i. work conducted close to a survey monument does not cause damage or displacement;
 - ii. particular care is taken to protect the environment when in proximity to lakes, streams or rivers;
 - iii. where an electrical energy source is used, all electrodes on the land surface are clearly flagged or cordoned off to prevent unauthorized access;
 - iv. charges are loaded into a shot-hole and detonated using safe equipment, tools and procedures;
 - v. shot holes loaded with explosives are properly flagged;
 - vi. shot hole drilling procedures address the possibility of encountering flowing water and shallow gas and, if encountered, remedial action is taken without delay to minimize danger and potential damage to near-surface aquifers and the land surface;
 - vii. all persons are protected from the possibility of contact between electrical cord and overhead power lines;
 - viii. seismic energy sources or equipment do not cause detonation of another shot hole, damage or cratering;
 - ix. no attempt is made to remove a charge from a shot hole;
 - x. if a charge fails to detonate, actions are taken to prevent future access to the charge; and
 - xi. shot holes are plugged and other surface disturbances are remediated following conduct of a geophysical operation.

8.2 DAMAGE TO PROPERTY

Every operator shall take all reasonable safeguards against damage to property as a result of a geoscience, geotechnical or environmental operation.

8.3 TESTING OF ENERGY SOURCES

(1) The operator shall minimize energy source testing on the deck of a vessel or installation.

(2) Where an energy source is activated for testing purposes during a geoscience, geotechnical or environmental operation, the operator shall ensure that

- a. the person in charge of a vessel, platform or aircraft, or at the operations site, is advised that the test is being carried out;
- b. all persons aboard the vessel, platform or aircraft, or at the operations site, are adequately alerted and measures put in place to isolate them from exposure to any hazard;
- c. all equipment is properly secured; and
- d. the testing is carried out in a manner that does not create a hazard.

(3) The operator shall ensure that every operator conducting an offshore geoscience, geotechnical or environmental operation from a vessel or platform that any electrical or electromagnetic energy source are fully immersed in water when tested.

(4) The operator shall ensure that all primary vessels involved in a geoscience, geotechnical or environmental operation are classed by a Classification Society.

8.4 VESSEL CLASSIFICATION AND HELICOPTER DECK

If the geoscience, geotechnical or environmental program is proposing to transfer personal with helicopters, the helicopter deck should meet the requirements of CAP 437 for helicopter deck.

8.5 MARINE WARRANTEE SURVEYOR

The operator shall ensure that a Marine Warranty Surveyor has assessed and certified all seismic equipment packages that are installed temporarily on a vessel to conduct a seismic program.

8.6 EVACUATION SYSTEMS

The operator shall ensure that evacuation systems and equipment sizing and capacity on all vessels is suitable for the demographics of the workforce in the operating region.

8.7 TRAINING REQUIREMENTS

Note: Policy Intentions not finalized. To be presented with the final draft regulations prior to CG 1.

PART 9 – SUPPORT OPERATIONS

9.1 SUPPORT CRAFT AND SAFETY ZONE

- (1) The operator shall ensure that all support craft are designed, constructed, operated and maintained to provide the necessary support functions and operate safely in the foreseeable physical environmental conditions prevailing in the area in which they operate.
- (2) The operator of an installation on which persons are normally present shall ensure that at least one support craft is
 - a. available at a distance that is not greater than that required for a return time of twenty minutes;
 - b. available in the immediate vicinity [close proximity] of the installation and fully ready [prepared to conduct] to undertake rescue and recovery operations, whenever a helicopter is landing or taking off, or personnel are working over the side, or otherwise exposed to the risk of falling in the water, and
 - c. suitably equipped to supply the necessary emergency services including rescue and first aid treatment for all personnel on the installation in the event of an emergency.
- (3) The operator shall ensure that, for any vessels undertaking diving, construction, or geoscience, geotechnical or environmental operations, a fast rescue craft is available and ready for deployment in the event of an emergency.
- (4) If the support craft exceeds the distance referred to in paragraph 9.2(1)(a), both the installation manager and the person in charge of the support craft shall log this fact and the reason why the distance or time was exceeded.
- (5) Under the direction of the installation manager, the support craft crew shall keep the craft in close proximity to the installation, maintain open communication channels with the installation and be prepared to conduct rescue operations during any activity or condition that presents an increased level of risk to safety.

9.3 SAFETY ZONE

- (1) For the purposes of this section, the safety zone around an offshore installation consists of the area within a line enclosing and drawn at a distance of 500 m from the outer edge of the installation or any component of the installations.
- (2) For a vessel engaged in a diving operation or a geoscience, geotechnical or environmental operation, the safety zone around the operation consists of the area within a line enclosing and drawn at a distance sufficient to ensure risks to safety, the environment and property are minimized.
- (3) A support craft or an aircraft, vessel or vehicle associated with work or activity on the installation or an offshore operations site, shall not enter the safety zone without the consent of the installation manager or the person in charge of the operations site.
- (4) The operator shall take all reasonable measures to notify persons who are in charge of aircraft, vessels or vehicles of the safety zone boundaries, of the facilities within the safety zone and of any related potential hazards.

ANNEX 1 – WELL CONTAINMENT AND CONTROL

- (1) The operator must demonstrate in the Contingency Plan, and throughout the authorization period, as promptly as possible, and deploy as soon as the circumstances permit, measures to stop the flow from an uncontrolled well and to minimize spill duration and environmental effects, and must demonstrate the adequacy of those measures.
- (2) The operator must have access to and the ability to promptly deploy the Source Control and Containment Equipment.
- (3) The operator must submit a description of the source control and containment capabilities when submitting the Contingency Plan. The description must include:
- a. the type of subsea containment and capture equipment to be utilized in the event of a loss of well control;
 - b. the identification of suitable relief well rig arrangement;
 - c. details of the ownership of, and confirmation of any contractual arrangements for, the subsea containment and capture equipment and relief well rig, the arrangements for transport to, and mode of deployment at, the incident location;
 - d. the schedule and plan for the mobilization, deployment and operation of such equipment, including mitigation measures and actions to minimize deployment time and taking into consideration required regulatory approvals; and
 - e. the required support systems and equipment, such as vessels and remotely operated vehicles and necessary consumables (e.g. spare wellhead and casings and access to bulk additives required for a relief well).

NOTE: This policy intent will be integrated in the appropriate sections of the regulations.

ANNEX 2 – DEFINITIONS

“abandoned” means in relation to a well, means a well or part of a well that has been permanently plugged

“accidental event” means an unplanned or unexpected event or circumstance or series of events or circumstances that may lead to loss of life or damage to the environment

“accommodation area” means dependent personnel accommodation or an accommodation installation

"accommodation installation" means an installation that is used to accommodate persons at a production site, drill site or a dive site and that functions independently of a production installation, drilling installation or diving installation, and includes any associated dependent diving system

“Act” means the [insert appropriate Act -- COGOA or Accords Acts]

“artificial island” means a humanly constructed island to provide a site for the drilling for, or the production, storage, transportation, distribution, measurement, processing or handling of, oil or gas

"authorization" means an authorization issued by the Board under paragraph 5(1)(b) of the Act (COGOA, or equivalent sections under the Accord Acts);

“authorized inspector” means a suitably qualified person, including the Certifying Authority or another person approved by the authority having jurisdiction to inspect process vessels and pressure piping systems

“barrier” this term is not linked to “well barriers” and must be read as meaning what is defined in the dictionary

“(well) barrier envelope” means envelope of one or several well barrier elements preventing fluids from flowing unintentionally from the formation into the wellbore, into another formation or to the external environment

“(well) barrier element” means a physical element which in itself does not prevent flow but in combination with other well barrier elements forms a well barrier

“Board” means the [insert appropriate Board] established by section xx of the [insert appropriate Act]

“casing liner” means a casing that is suspended from a string of casing previously installed in a well and does not extend to the wellhead

“certificate of fitness” means a certificate issued by a Certifying Authority in accordance with Part 5 (of the Framework Regulations

“Certifying Authority” means, for the purposes of section X of the Act (insert appropriate Act references), the American Bureau of Shipping, Bureau Veritas, Det Norske Veritas (Canada) Ltd or Lloyd’s Register North America, Inc.

“classification society” means an independent organization whose purpose is to supervise the construction, ongoing maintenance and any modifications of an offshore installation in accordance with

the society's rules for classing offshore installations and includes those recognized by the International Association of Classification Societies

"commingled production" means production of oil and/or gas from more than one

- a. pool or zone through a common well without separate measurement of the production from each pool or zone, or
- b. well through a common pipeline without separate measurement of the production from each well - **Note: (b) applies to COGOA only**

"completed" in relation to a well, means a well that is prepared for production or injection operations

"completed" in relation to a geoscience, geotechnical or environmental program, means when the authorized activities have concluded

"completion interval" means a section within a well that is prepared to permit the

- a. production of fluids from the well;
- b. observation of the performance of the reservoir; or
- c. injection of fluids into the well

"conductor casing" means the casing that is installed in a well to facilitate drilling of the hole for the surface casing

"control centre" means a continuously crewed work area at which a control system is located that is critical to

- a. the operation of an installation or a pipeline, and
- b. safety and the prevention of waste and pollution

"control systems" means any systems, stations or panels used to monitor the status and control the operation of equipment used for or in support of drilling, production, processing and/or transportation of oil and gas, and includes control systems for the operation of an installation

"damaged condition" means, with respect to a floating platform, the condition of the floating platform after it has suffered damage to the extent determined in accordance with IMO MODU Code requirements or with the rules of a classification society

"decommissioning and abandonment" means the cessation of operations and the controlled process of plugging and abandoning all wells, retiring and removing from service all project related installations and associated facilities, materials and equipment as required by the regulations, the applicable authorization and any approved development plans

"dependent personnel accommodation" means personnel accommodation, other than an accommodation installation, that is associated with an installation and does not function independently of the installation

"design service life" means the assumed period for which a structure is used for its intended purpose with anticipated maintenance, but without substantial repair

"development concept" means the complete design concept selected by the operator that outlines how the operator intends to develop a pool or field or multiple pools or fields within the scope of a development plan, that outlines all activities associated with each phase in the life cycle of the

development and that identifies all of the required installations, facilities, equipment and systems to implement each stage in the lifecycle, and that highlights any unique feature

“development plan ” means the development plan that is approved by the Board in accordance with section X of the Act (insert appropriate reference for each Act)

“diving operation” means an activity involving one or more dives or ADS dives or both and the tasks associated with those dives or ADS dives, but does not include the use and operation of a remotely operated vehicle if the vehicle is not used in conjunction with a diver or an ADS

“diving system” means the plant or equipment used in or in connection with a diving operation, and includes the plant and equipment that are essential to a diver or to a pilot of a crewed submersible

"drilling base" means the stable foundation on which a drilling rig is installed, and includes the ground surface, an artificial island, an ice platform, a platform fixed to the seafloor and any other foundation specifically used for drilling operations

"drilling installation" means a drilling unit or a drilling rig and its associated drilling base, and may include an associated dependent diving system and dependent personnel accommodation

“drilling program” means the program for the drilling of one or more wells within a specified area and time using one or more drilling installations and includes any work or activity related to the program

"drilling rig" means a rig that consists of the complete suite of equipment used to conduct well operations, any associated dependent personnel accommodation and other associated equipment, including power, control and monitoring systems

"drilling unit" means a fixed or mobile platform or vessel used in any well operation and fitted with a drilling rig, and includes other facilities related to well operations and marine activities that are installed on a platform or vessel

"drill site" means a location where a drilling rig is or is proposed to be installed

“emergency response operations center” means the location or locations from which emergency management activities are coordinated

"environmental load" means a load imposed by climate, waves, currents, tides, wind, ice conditions, regional ice features such as sea ice and icebergs, snow, a seismic event or any other naturally occurring phenomenon, or by any combination of those phenomena

“environmental program” means a work or activity pertaining to the measurement or statistical evaluation of the physical, chemical and biological elements of the lands, oceans or coastal zones, including winds, waves, tides, currents, precipitation, ice cover and movement, icebergs, pollution effects, flora and fauna both onshore and offshore, human activity and habitation and any related matters

“environmental protection plan” means the environmental protection plan submitted to the Board under section 3.5

"explosive" has the same meaning as in section 2 of the *Explosives Act*

"floating platform" means a column-stabilized mobile offshore platform, a surface mobile offshore platform or a fixed floating platform such as tension leg platform or a SPAR

"flow allocation procedure" means the procedure to

- a. allocate total measured quantities of oil, gas and water produced from or injected into a pool or zone back to individual wells in a pool or zone where individual well production or injection is not measured separately; and
- b. allocate production to fields that are using a common storage or processing facility

"flow calculation procedure" means the procedure to be used to convert raw meter output to a measured quantity of oil, gas or water

"flowline" means any lines that are used to transport fluids from a well to a production facility or vice versa, and includes all gathering lines, but excludes offshore pipelines

"flow system" means the flow meters, auxiliary

equipment attached to the flow meters, fluid sampling devices, production test equipment and the master meter and meter prover used to measure and record the rate and volumes at which fluids are:

- a. produced from or injected into a pool;
- b. used as a fuel;
- c. used for artificial lift; or
- d. flared, vented or transferred from a production installation.

"formation flow test" means an operation

- a. to induce the flow of formation fluids to the surface of a well to procure reservoir fluid samples and determine reservoir flow characteristics; or
- b. to inject fluids into a formation to evaluate injectivity.

"functional load" means any construction and operating load, or a combination of both, other than an environmental or accidental load, imposed on installations, pipelines or any other vessels

"gas release system" means a system for controlled release of gas and combustible liquid from an installation, and includes a flare system, a pressure relief system, a depressurizing system and a cold vent system

"geological work or activity" means any work or activity involving the collection of physical materials and can include analysis of recovered materials or interpretation of well logs

"geophysical work or activity" means any work or activity involving the indirect measurement of physical properties of the earth (either over land not normally submerged or on or over ice or offshore) and can include any processing, analysis and/or interpretation of data obtained from such work or activity

"geoscientific program" means any program that involves any geological or geophysical work or activity.

"geotechnical program" means any work or activity undertaken to determine the physical properties of materials recovered from the seabed or shallow subsurface, to assess suitability for human-made structures

"hazardous area" hazardous area is an area on the installation (and drill site) where flammable mixtures are, or are likely to be, present in sufficient quantities and for sufficient periods of time such as

to require special precautions to be taken in the selection, installation and use of machinery and electrical equipment

“hazard” means a situation or event with the potential to cause human injury, damage to the environment, and/or damage to property

“human factors” means the scientific discipline concerned with the application of validated scientific research about people, their abilities, characteristics and limitations to the design of systems they use, environments in which they function and interact, and jobs they perform to optimize human well-being and overall system performance

“incident” means any event that caused or, under slightly different circumstances, would likely have caused harm to personnel, an unauthorized discharge or spill or an imminent threat to the safety of a installation, vessel or aircraft. It includes, but is not limited to events which may or may not have resulted in the following:

- a. fatality;
- b. missing person;
- c. serious injury;
- d. occupational illness;
- e. fire/explosion;
- f. collision;
- g. pollution;
- h. leak of hazardous substance;
- i. loss of well control;
- j. implementation of emergency response procedures;
- k. the impairment of any structure, facility, equipment or system critical to the safety of persons, an installation or or support craft;
- l. the impairment of any structure, facility, equipment or system critical to environmental protection; and
- m. imminent threat to the health or safety of a person, installation or support craft.

"installation" means a drilling installation, a production installation, or an accommodation installation

“integrated software dependent system” means is an integrated system for which the overall behaviour is dependent on the behaviour of its software components

“integrated system” means a set of elements which interact according to a design, where an element of a system can be another system, called a subsystem, which may be a controlling system or a controlled system and may include hardware, software and human interaction

“joining”, in relation to a pipe, means the joining of pipe and piping components performed after the pipe and component manufacturing processes

“loads” means functional loads, environmental loads, or accidental and abnormal loads, or a combination of such loads

“machinery space” means a space on an installation where equipment incorporating rotating or reciprocating mechanical equipment in the form of an internal combustion engine, a gas turbine, an electric motor, a generator, a pump or a compressor is located

“major accidental event” means an [accidental] event that has the potential to cause the loss of life to multiple individuals or uncontrolled pollution

"marine activities" means activities related to stability, station keeping and collision avoidance of floating platforms including mooring, dynamic positioning and ballasting

“marine riser” means the connection between a subsea blowout preventer and a surface drilling installation

“mobile offshore platform” means an offshore platform that is designed to operate in a floating or buoyant mode or that can be moved from place to place without major dismantling or modification, whether or not it has its own motive power

“multi-pool well” means a well that is completed in more than one pool

"non-combustible" in relation to material, means material that does not burn or give off flammable gases or vapours in sufficient quantity for self-ignition when heated to 750°C

"non-exclusive survey" means a geoscience, geotechnical or environmental program that is conducted to acquire data for the purpose of sale, in whole or in part, to the public

"offshore drill site" means a drill site within a water-covered area that is not an island, other than an artificial island or an ice platform

“offshore installation” means an installation that is located at an offshore production site or offshore drill site, and includes an accommodation installation and a diving installation

"offshore loading system" means the equipment and any associated platform or storage vessel located at an offshore production installation to load oil or gas on a transport vessel, and includes any equipment on the transport vessel that is associated with the loading system

"offshore production site" means a production site within a water-covered area that is not an island, other than an artificial island or an ice platform

“operating condition”, with respect to a mobile offshore platform, means the condition of operating at the operating draft

“operating draft”, with respect to a mobile offshore platform, means the vertical distance in metres from the moulded baseline to the assigned waterline, where the platform is operating under combined environmental and operational loads that are within the limits for which the platform was designed to operate

“operations manual” means the manual referred to in section 6.26.

"operator" means a person that holds an operating licence issued by the Board under paragraph X of the Act and has applied for or been granted an authorization under section X of the Act (insert appropriate references for each Act)

“passive fire protection” means a coating, cladding or free-standing system which, in the event of a fire, will provide thermal protection to restrict the rate at which heat is transmitted to the object or area being protected and that is impervious to oil absorption

“permafrost” means the thermal condition of the ground when its temperature remains at or below 0°C for more than one year

“physical and environmental conditions” means any physical, oceanographic, meteorological, ice, geotechnical and seismic conditions, that might affect a work or activity that is subject to an authorization

“offshore pipeline” means an offshore pipeline as defined in the CSA Z662 Oil and Gas Pipeline Systems

"platform" means a platform associated with an installation

“pollution” means the introduction into the environment of any substance or form of energy outside the limits established in the authorization

“pressure systems (and components)” means piping, vessels, safety components and pressure components; where applicable, pressure components include elements attached to pressurized parts, such as flanges, nozzles, couplings, supports, lifting lugs, safety valves, gages, and similar

"process vessel" means a heater, dehydrator, separator, treater or any other pressurized vessel used in the processing or treatment of produced gas or oil

“production facility” means equipment for the production of oil or gas located at a production site, including separation, treating and processing facilities, equipment and facilities used in support of production operations, landing areas, heliports, storage areas or tanks and dependent personnel accommodations, but not including any associated platform, artificial island, subsea production system, drilling equipment or diving system

"production installation" means a production facility and any associated platform, artificial island, subsea production system, offshore loading system, equipment for well operations or facilities related to marine activities and dependent diving systems

"production operation" means any operation related to the production of oil or gas from a pool or field

“production project” means an undertaking for the purpose of developing a production site on, or producing oil or gas from, a pool or field, and includes any work or activity related to the undertaking

“production riser” means the connection between subsea production assets and a floating production platform

"production site" means a location where a production installation is or is proposed to be installed

“proration test” means, in respect of a development well to which a development plan applies, a test conducted to measure the rates at which fluids are produced from the well for allocation purposes

“Qualified person” means in respect of a specified duty, a person who, because of their knowledge, training and experience, is qualified to perform that duty safely and properly

“recovery” means the recovery of oil and gas under foreseeable economic and operational conditions

“relief well” means a well drilled to assist in controlling a blow-out in an existing well

“repair” means any repair of an installation, system or equipment that is intended to return the installation, system or equipment to the original design specifications or any new approved designed specifications, or a repair that is temporary in nature that will provide a short term fit for purpose solution prior to make permanent repairs (and that does not increase risk to safety or to the environment)

“safety critical element” means any equipment or system (including computer programs and temporary or portable equipment) critical to the safety and integrity of the installation or critical to preventing pollution from the installation and includes any equipment or system

- a. that is intended to prevent or limit the effect of a hazard that would cause a major accident event; or
- b. any equipment or system, the failure of which could:
 - i. cause a hazard on the installation that would cause a major accident event; or
 - ii. contribute substantially to the effects of such a hazard on the installation.

“safety plan” means the safety plan submitted to the Board under section 3.4

"saturation dive" means a saturation dive as defined by the Occupational Health and Safety Regulations under the Accord Acts or under COGOA, by the existing Diving Regulations

“station keeping system” - system capable of limiting the excursions of a floating structure within prescribed limits

“seafloor” means the surface of all that portion of land under the sea

“shot-hole” means a hole drilled for the purpose of generating an acoustic signal

"shotpoint" means the surface location of a seismic energy source

“slick line” means a single steel cable used to run tools in a well

“source control and containment equipment” means the capping stack, a containment dome, and/or other subsea and surface devices, equipment and vessels and relief well rig whose collective purpose is to contain and control a spill source and minimize spill duration and environmental effects until well control has been regained

"subsea production system" means equipment and structures that are located on or below the seafloor for the production of oil or gas from, or for the injection of fluids into, a field under an offshore production site, and includes production risers, flow lines and associated production control systems that are located upstream of the isolation valve

“support craft” means a vessel, vehicle, aircraft, standby vessel or other craft used to provide transportation for or assistance to persons on the site where a work or activity is conducted

“surface casing” means the casing installed in a well to a sufficient depth, in a competent formation, to establish well control for the continuation of the drilling operations

“suspended”, in relation to a well or part of a well, means a well or part of a well in which drilling or production operations have temporarily ceased

“temporary and portable equipment” means equipment that is not a permanent part of the installation and which is intended to be removed after a finite period of time

“termination” in relation to a well, means the abandonment, completion or suspension of a well’s operations

“uncrewed offshore installation” means an offshore installation on which persons are not normally present and in those instances when persons are present on the installation, their presence is for the purpose of performing operational duties, maintenance or inspections that will not necessitate an overnight stay

“waste material” means any garbage, refuse, sewage or waste well fluids or any other useless material that is generated during the conduct of any work or activity under these Regulations, including used or surplus drilling fluid and drill cuttings and produced water

“watertight” means designed and constructed to withstand a static head of water without any leakage

“well approval” means the approval granted by the Board under section 3.7

“well-bore” means the hole drilled by a bit in order to make a well

“well control” means the control of the movement of fluids into or from a well

“well operation” means the operation of drilling, completion, recompletion, intervention, re-entry, workover, suspension or abandonment of a well

“wire line” means a line that contains a conductor wire and that is used to run survey instruments or other tools in a well

“workover” means an operation on a completed well that requires removal of the Christmas tree or the tubing

“zone” means any stratum or any sequence of strata and includes a zone that has been designated as such by the Board under section 1.2.

In these Regulations, “delineation well”, “development well” and “exploratory well” have the same meaning as in subsection 101(1) of the *Canada Petroleum Resources Act*. **Note – Accord Act versions will refer to the relevant subsections of the Accord Acts.**

COGOA only:

For the purpose of section 5.11 of the Act, “installation” means an onshore or offshore installation.

For the purpose of section 58.2 of the Act, an onshore or offshore installation is prescribed as an installation.