

Summary of Recommended Actions or Approaches for selected Safety Management System Elements

Safety Element

Recommended Actions or Approaches

<p><i>Continuous Improvement</i></p>	<ul style="list-style-type: none"> ➤ Regulators must continuously improve supervision by reviewing the regulatory system for clarity and effectiveness. They must also regularly evaluate and seek to improve the effectiveness of their influence; ➤ Ensure continuous improvement is accomplished through: <ul style="list-style-type: none"> • Periodic regulatory reviews and follow-up changes or clarifications; • The application of risk-based regulation, focusing on critical operations, known hazards, and results of safety performance evaluations of the operator; • Application of safety management system principles throughout the life-cycle of operation from leasing/licensing to monitoring and ultimately decommissioning; • Monitoring environmental and safety performance; • Conducting audits that examine company safety meeting records, maintenance logs, operator follow-up to known deficiencies, results of company internal audits, employee questionnaires, etc.; • Open and frequent communication with the operator about how to improve their performance when deficiencies are identified; • Both regular (and random) inspections; • Meaningful enforcement actions. ➤ Continuous improvement in offshore performance should be seen as a collaborative activity requiring cooperation and actions by both industry and regulators.
<p><i>Risk/Hazards Analysis</i></p>	<ul style="list-style-type: none"> ➤ Require operators to assess risk in offshore Arctic areas on an ongoing basis. Factors include: <ul style="list-style-type: none"> ○ Geology in the well including shallow gas, permafrost and methane hydrates; ○ Weather, sea, ice; ○ Improvement in the management of change. ➤ Require the operator to regularly assess risk relevant to operating in Arctic conditions in order to inform the process of improving regulation and standards development as well as operator and industry guidance; ➤ Require the operator to assess risks associated with cold environment technological solutions to improve process safety performance <u>before</u> a breakdown or accident happens. ➤ Consider the use of a risk-based approach to regulation of Arctic operations such as Continuous Improvement Cycle or Risk-Based Life Cycle (RBLC) approach that prioritizes regulatory supervision according to risk. This should be carried through the full operation and life cycle of activities and should link the degree of regulatory supervision to critical operations and to a company’s performance history.

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	<ul style="list-style-type: none"> ➤ Employ Risk Management/Operational Controls by: <ul style="list-style-type: none"> • requiring monitoring of risk and risk margins especially those worsened by Arctic conditions (e.g. permafrost, ice and icing, cold, remoteness from infrastructure, etc.); • requiring improvement of barrier management; • requiring improvement in situational awareness (e.g. weather, ice, sea conditions); • requiring additional direct monitoring and control instrumentation to replace indirect measures; • requiring real-time operations centers for all wells being drilled in the offshore Arctic; • having government regulators involved in real-time monitoring at critical points in the operations—such as negative pressure tests and during other critical procedures. Ensure the regulator is knowledgeable and trained in the operations being monitored. • considering the use of the multi-lingual ISO 31,000 High Level Risk Management Guidelines for common terminology and communications; • requiring integrated risk assessment and analysis for the whole spectrum of the operation. ➤ Safety Margin Management should be used as a proactive approach to ensure margins of safety are established in the design phase. Have the operator: <ul style="list-style-type: none"> • define the safety envelope; • clearly establish proven practice; • assess uncertainties and adjust levels of safety margins; • factor in the differences in exploration and production operations and geology and Arctic ice type/conditions.
Management of Change	<ul style="list-style-type: none"> ➤ Regulators and operators must constantly seek to improve their approach to the Management of Change -- through hazard identification, risk analysis/assessment, and management processes and tools aimed at better handling of any changes to the drilling plan during the operational phase ➤ Regulators should require the operator to undertake a rigorous assessment of risks (using a risk assessment matrix or other suitable methodology) for each critical procedure or operation in the Arctic offshore. Among other factors, these assessments should take into account the full range of relevant Arctic multipliers.
Training and Competence for the Arctic	<ul style="list-style-type: none"> ➤ Require operators to demonstrate that all personnel (including all contractors and subcontractors) have the required and appropriate training and competency for operations in Arctic waters; ➤ Competency requirements for regulatory staff should include both technical and non-technical skills and knowledge. These should include those related to disciplines

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	<p>such as human factors, management systems, system safety, and safety culture;</p> <ul style="list-style-type: none"> ➤ Regulators should ensure and verify that operators conduct both scheduled and unscheduled safety drills.
<p><i>Accountability and Responsibility</i></p>	<ul style="list-style-type: none"> ➤ Regulators should hold the operator accountable for developing a comprehensive Safety Management System and a robust and identifiable safety culture. ➤ Regulators should observe and validate the operator’s safety management system and safety culture and gauge opportunities for improvement. ➤ Regulators should hold the operator responsible for contractor safety training, competence and certification and have the operator demonstrate an effective process for managing them. ➤ Regulators should require the operator to designate who is responsible at all times for critical decision-making processes and ensure those designated sign all associated safety management systems and safety culture documents. ➤ Regulators should regularly track existing and emerging risks in the industry. ➤ Arctic countries should train government auditors to ensure competency and confirm adequate and appropriate supervision is undertaken.
<p><i>Operating Procedures and Work Processes</i></p>	<ul style="list-style-type: none"> ➤ Regulators must ensure that the operator’s proposed procedures are included in integrated plans and safety scenarios. The regulator must review these to assess whether they are appropriate for the region, season and activity, and are adequate for the proposed operations. ➤ Regulators should pay careful attention to any proposed modifications by the operator to account for Arctic conditions or changes expected during Arctic operations. Regulators should also ensure the risks of these changes are properly considered, analyzed and mitigations are identified. ➤ The regulator should monitor all critical operations, through onsite inspection, daily reports, and through real-time-operations centers, to ensure procedures are safe, protect the marine environment, conform to the safety management plan, and meet any regulatory requirements. ➤ The regulator must assess the overall effectiveness of the operator’s safety procedures through regular inspections, monitoring, and the review of accident/near-miss and incident reports in order to identify both non-compliance and opportunities for improvement. ➤ Regulators should have more technical training on safety procedures and practices and be given full access to all safety and environmental performance data.

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<p><i>Quality Assurance and Mechanical Integrity</i></p>	<ul style="list-style-type: none"> ➤ Regulators should conduct regular inspections and audits of equipment and maintenance records, and meeting minutes, etc. in order to verify that critical equipment is being monitored and maintained and ensure that all components are certified by the manufacturer and properly used by the operator.
<p><i>Documentation & Reporting</i></p>	<ul style="list-style-type: none"> ➤ All data should be submitted or shared regularly within the company, between operators and with the authorities. ➤ Operators should be encouraged to make public their safety plans, contingency plans, emergency response plans, and environmental protection plans. ➤ In addition to regular operational reports, regulators should require reports on internal audits, near-miss incidents and other safety or environmental non-compliance. ➤ Data, methodologies, analyses, and trends should be shared between operators and regulators and, where appropriate, be made publically available.
<p><i>Communications</i></p>	<ul style="list-style-type: none"> ➤ Regulators should review communications plans, methods and facilities thoroughly and ensure that the operator has adequate and redundant communications capability effective in the area of operation. ➤ Regulators should ensure that the safety management system establishes and implements clear lines of communication between all players including shore-based personnel, contractors and regulators. Any deviations in communication protocols (or “short-cuts”) proposed during emergencies or interruption periods should be recorded and understood.

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OTHER ELEMENTS	
<i>Safety Culture</i>	<ul style="list-style-type: none"> ➤ Regulators must define and communicate expectations regarding positive safety culture and require operators to establish (and implement) their safety culture; ➤ Encourage (or require) regulated companies to create a shared understanding (within and across partners/contractors) of exactly what constitutes positive safety culture in Arctic offshore activities; ➤ Require operators to define how they will instill and deliver the positive safety culture in its workforce; ➤ Require operator to designate a responsible and accountable person (preferably the CEO) for their safety culture; ➤ Define and communicate indicators of a poor or degrading culture as a threat to safety and require operators to establish (and monitor) indicators of positive safety culture; ➤ Regulators should share indicators of safety culture through some inter-governmental/industry forum; ➤ Require operators to have a verifiable process to improve safety culture through constant monitoring and assessment and the use of leading indicators, such as described in the Safety Culture workshop (PAME, 2013b, p. 47 – see also Appendix F to this report). ➤ Conduct audits on a risk-based prioritization schedule and use the results to address improvement opportunities in the safety management system and safety culture; ➤ Consider providing financial incentives (for good behavior) and disincentives (for bad behavior):

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	<ul style="list-style-type: none"> - View the safety and environmental record of the whole company as an indicator of performance; - Tie safety and environmental performance to lease or license qualifications; - Enact `whistle-blower` provisions and personnel protection guarantees; <p>➤ Operators and regulators should always experience “Chronic Unease” to avoid complacency.</p>
Regulations	<ul style="list-style-type: none"> ➤ Although prescriptive regulations may be appropriate and effective for some elements of the safety systems, Arctic countries should consider expanding, where appropriate, more performance-based regulatory systems. ➤ Arctic countries must ensure that regulators are properly trained in techniques and practices of a performance-based regime, and that such a system is adequately funded and staffed.
Standards and Best Practices	<ul style="list-style-type: none"> ➤ Industry and regulators must work together to initiate, implement, monitor, and continuously improve safety management systems and safety culture in Arctic offshore oil and gas operations. ➤ Regulators should stay actively involved in international initiatives for developing standards for Arctic offshore oil and gas activities. ➤ Arctic states should promote international standards and promote or establish an Arctic Offshore Regulators Forum to address and share knowledge of offshore Arctic-relevant issues, for example, standardizing and reporting incident and near-miss incidents.
Incident and Near-Miss Reporting	<ul style="list-style-type: none"> ➤ Define near misses, such as body-to-body incident definitions, well kicks, etc., possibly through the International Regulation Forum (IRF) as part of the Common International Incident Reporting Requirements or possibly through the International Organization for Standardization (ISO). ➤ Require mandatory reporting and analysis of near-miss and incident data to identify trends before an accident happens. ➤ Make near-miss and incident trend data and hazards data analyses publically available. And find a way around the “proprietary” nature of some information on near-misses and incidents such as the use of anonymous or confidential reporting and release of de-identified data or analyses of data. ➤ Standardize analytical methods to better allow comparing of trends through coordination among regulators, industry and academia and in government regulator forums.

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	<ul style="list-style-type: none"> ➤ Consider developing, or encouraging the development of a worldwide near-miss and incident database to ensure that lessons learned are communicated to all. Consider as a model, a combination of aviation’s ASAP¹ and ASRS².
<p><i>Measuring Occupational Health and Safety</i></p>	<ul style="list-style-type: none"> ➤ Regulators should ensure that operators are assessing the performance of the processes and systems that control major risk by using indicators of systems safety. This is done by using leading indicators and near-miss incidents, incidents encountered but controlled, hazards, review of company records, meetings with the operator, worker surveys, etc., to assess and improve the operator’s systems safety performance and safety culture. ➤ To establish and maintain systems safety integrity, regulators should promote safety by ensuring the operator demonstrates reviewable safety and vigilance initiatives in its planning and operations, from the well-design through to well-completion. ➤ Regulators should ensure that communication and lines-of-authority between the operator and contractors/sub-contractors are clearly established, such as by using Bridging Documents or other certified agreements or arrangements, and hold the operator responsible for their contractor’s safety performance and safety culture.

¹ National Aeronautics and Space Administration’s Aviation Safety Action Program (ASAP) <http://asrs.arc.nasa.gov/>

² the Federal Aviation Administration’s Aviation Safety Reporting System (ASRS) <http://www.faa.gov/about/initiatives/asap/>