AWO-Coast Guard Regional Quality Steering Committee
Alaska Towing Vessel Ice and Cold Weather Operation Guidelines

I. **Introduction.** The goal of these Guidelines is to provide for safe towing vessel operation and the protection of the polar environment by addressing risks present in waters designated as Polar by the IMO Polar Code. **The Guidelines are meant to be informed by individual towing vessel operators' operational risk assessment and the operational profile of the vessel and voyage.**

A. Geographic Scope. These Guidelines are intended to provide voyage planning and risk mitigation guidance for towing vessel operations occurring within the geographic area covered by the IMO Polar Code, specifically areas north of 60° N latitude.

B. Sources of hazards. These Guidelines consider hazards which may lead to elevated levels of risk due to increased probability of occurrence, more severe consequences, or both:

1. Ice, as it may affect hull structure, stability characteristics, machinery systems, navigation, the outdoor working environment, maintenance and emergency preparedness tasks and malfunction of safety equipment and systems;
2. experiencing topside icing, with potential reduction of stability and equipment functionality;
3. low temperature, as it affects the working environment and human performance, maintenance and emergency preparedness tasks, material properties and equipment efficiency, survival time and performance of safety equipment and systems;
4. extended periods of darkness or daylight as it may affect navigation and human performance;
5. high latitude, as it affects navigation systems, communication systems and the quality of ice imagery information;
6. remoteness and possible lack of accurate and complete hydrographic data and information, reduced availability of navigational aids and seamarks with increased potential for groundings compounded by remoteness, limited readily deployable SAR facilities, delays in emergency response and limited communications capability, with the potential to affect incident response;
7. potential lack of crew experience in polar operations, with potential for human error;
8. potential lack of suitable emergency response equipment, with the potential for limiting the effectiveness of mitigation measures;
9. rapidly changing and severe weather conditions, with the potential for escalation of incidents; and
10. the environment with respect to sensitivity to harmful substances and other environmental impacts and its need for longer restoration.

C. Operational assessment. In order to establish procedures or operational limitations, an assessment of the towing vessel and its equipment should be carried out, taking into consideration the following:

1. the anticipated range of operating and environmental conditions, such as:
    a. operation in low air temperature;
    b. operation in ice;
    c. operation in high latitude;
    d. potential for abandonment onto ice or land;
2. other hazards, as listed in section I.A of the Introduction, as applicable; and
3. additional hazards, if identified.

II. **Operations Manual.** The goal of this section is to provide the owner, operator, master and crew with sufficient information regarding the towing vessel's operational capabilities and limitations in order to support their decision-making process.

A. Functionality. Towing vessels operating in waters designated as Polar by the IMO Polar Code should carry

an Operations Manual (the "Manual) that meets the following functional requirements:

1. The Manual should include information on the vessel-specific capabilities and limitations in relation to the assessment required under paragraph I.B.
2. The Manual should include or refer to specific procedures to be followed in normal operations and in order to avoid encountering conditions that exceed the vessel's capabilities.
3. The Manual should include or refer to specific procedures to be followed in the event of incidents in polar waters.
4. The Manual should include or refer to specific procedures to be followed in the event that conditions are encountered which exceed the vessel's specific capabilities and limitations.

B. Recommendations.

1. The Manual should be carried on board the vessel.
2. The Manual should contain, where applicable, the methodology used to determine capabilities and limitations in ice.

The Manual should include risk-based procedures for the following:

3. voyage planning to avoid ice and/or temperatures that exceed the vessel's design capabilities or limitations;
4. arrangements for receiving forecasts of the environmental conditions;
5. means of addressing any limitations of the hydrographic, meteorological and navigational information available;
6. operation of equipment required under other sections of these Guidelines;
7. implementation of special measures to maintain equipment and system functionality under low temperatures, topside icing and the presence of sea ice, as applicable;
8. contacting emergency response providers for salvage, search and rescue (SAR), spill response, etc., as applicable;
9. maintaining life support and vessel integrity in the event of prolonged entrapment by ice;
10. encountering ice and/or temperatures which exceed the vessel's design capabilities or limitations; and
11. monitoring and maintaining safety during operations in ice, as applicable, including any requirements for escort operations or icebreaker assistance.

III. Watertight and Weathertight Integrity. The goal of this section is to provide measures to maintain watertight and weathertight integrity.

A. Functionality. All closing appliances and doors relevant to watertight and weathertight integrity of the vessel should be operable.

B. Recommendations. The following apply:

1. for vessels operating in areas and during periods where ice accretion is likely to occur, means should be provided to remove or prevent ice and snow accretion around hatches and doors;
2. if the hatches or doors are hydraulically operated, means should be provided to prevent freezing or excessive viscosity of liquids; and
3. watertight and weathertight doors, hatches and closing devices which are not within an habitable environment and require access while at sea should be designed to be operated by personnel wearing heavy winter clothing including thick mittens.

IV. **Machinery Installations.** The goal of this section is to ensure that, machinery installations are capable of delivering the required functionality necessary for safe operation of towing vessels.

A. **Functionality.** Machinery installations should provide functionality under the anticipated environmental conditions, taking into account:

1. ice accretion and/or snow accumulation;
2. ice ingestion from seawater;
3. freezing and increased viscosity of liquids;
4. seawater intake temperature;
5. protection of air supply lines to critical equipment from freezing condensation; and
6. snow ingestion.

In addition, for vessels intended to operate in low air temperatures, machinery installations should provide functionality under the anticipated environmental conditions, also taking into account:

7. cold and dense inlet air; and
8. loss of performance of battery or other stored energy device.

B. **Recommendations.** Taking into account the anticipated environmental conditions, the following apply:

1. machinery installations and associated equipment should be protected against the effect of ice accretion and/or snow accumulation, ice ingestion from sea water, freezing and increased viscosity of liquids, seawater intake temperature and snow ingestion;
2. working liquids should be maintained in a viscosity range that ensures operation of the machinery; and
3. seawater supplies for machinery systems should be designed to prevent ingestion of ice, or otherwise arranged to ensure functionality.

In addition, for vessels intended to operate in low air temperatures, the following apply:

4. exposed machinery and electrical installation and appliances should function at the expected environmental conditions;
5. means should be provided to ensure that combustion air for internal combustion engines driving essential machinery is maintained at a temperature in compliance with the criteria provided by the engine manufacturer; and
6. materials of exposed machinery and foundations should be approved by the U.S. Coast Guard, or a recognized organization accepted by it, taking into account standards acceptable to the Coast Guard or other standards offering an equivalent level of safety based on the expected environmental conditions.

V. **FIRE SAFETY/PROTECTION**. The goal of this section is to ensure that fire safety systems and appliances are effective and operable, and that means of escape remain available so that persons on board can safely and swiftly escape to the lifeboat and liferaft embarkation deck under the expected environmental conditions.

A. **Functionality.** The following functional elements are embodied in the recommendations of this section:

1. all components of fire safety systems and appliances if installed in exposed positions should be protected from ice accretion and snow accumulation;
2. local equipment and machinery controls should be arranged so as to avoid freezing, snow accumulation and ice accretion and their location to remain accessible at all time;
3. the design of fire safety systems and appliances should take into consideration the need for persons to wear bulky and cumbersome cold weather gear, where appropriate;
4. means should be provided to remove or prevent ice and snow accretion from accesses; and
5. extinguishing media should be suitable for intended operation.

In addition, for vessels intended to operate in low air temperature, the following apply:

6. all components of fire safety systems and appliances should be designed to ensure availability and

effectiveness under the anticipated environmental conditions; and

7. materials used in exposed fire safety systems should be suitable for operation under the anticipated environmental conditions.

B. **Recommendations.** The following apply:

1. isolating and pressure/vacuum valves in exposed locations should be protected from ice accretion and remain accessible at all time; and
2. all two-way portable radio communication equipment should be operable under the expected environmental conditions.
3. fire pumps including emergency fire pumps, water mist and water spray pumps should be located in compartments maintained above freezing;
4. the fire main should be arranged so that exposed sections can be isolated and means of draining of exposed sections be provided. Fire hoses and nozzles need not be connected to the fire main at all times, and may be stored in protected locations near the hydrants;
5. firefighter's outfits should be stored in warm locations on the vessel; and
6. where fixed water-based firefighting systems are located in a space separate from the main fire pumps and use their own independent sea suction, this sea suction should be also capable of being cleared of ice accumulation.

In addition, for vessels intended to operate in low air temperature, the following apply:

7. portable and semi-portable extinguishers should be located in positions protected from freezing temperatures, as far as practical. Locations subject to freezing are to be provided with extinguishers capable of operation under the expected environmental conditions.
8. materials of exposed fire safety systems should be approved by the U.S. Coast Guard, or a recognized organization accepted by it, taking into account standards acceptable to the Coast Guard or other standards offering an equivalent level of safety based on the expected environmental conditions.

VI. **Life Saving Appliances and Arrangements.** The goal of this chapter is to provide for safe escape, evacuation and survival.

A. **Functionality.** The following functional elements are embodied in the recommendations of this section:

1. Exposed escape routes should remain accessible and safe, taking into consideration the potential icing of structures and snow accumulation.
2. Survival craft and muster and embarkation arrangements should provide safe abandonment of ship, taking into consideration the possible adverse environmental conditions during an emergency.
3. All life-saving appliances and associated equipment should provide safe evacuation and be functional under the possible adverse environmental conditions during the maximum expected time of rescue.
4. Adequate thermal protection should be provided for all persons on board, taking into account the intended voyage, the anticipated weather conditions (cold and wind), and the potential for immersion in polar water, where applicable.
5. Life-saving appliances and associated equipment should take account of the potential of operation in long periods of darkness, taking into consideration the intended voyage.
6. Taking into account the presence of any hazards, as identified in the assessment in Section I, resources should be provided to support survival following abandoning ship, whether to the water, to ice or to land, for the maximum expected time of rescue. These resources should provide:
    a. a habitable environment;
    b. protection of persons from the effects of cold, wind and sun;
    c. space to accommodate persons equipped with thermal protection adequate for the environment;

d. means to provide sustenance;
e. safe access and exit points; and
f. means to communicate with rescue assets.

B. **Recommendations.** The following apply:
1. for vessels exposed to ice accretion, means should be provided to remove or prevent ice and snow accretion from escape routes, muster stations, embarkation areas, survival craft, its launching appliances and access to survival craft;
2. in addition, exposed escape routes should be arranged so as not to hinder passage by persons wearing suitable polar clothing; and
3. in addition, for vessels intended to operate in low air temperatures, adequacy of embarkation arrangements should be assessed, having full regard to any effect of persons wearing additional polar clothing.
4. Vessels should have means to ensure safe evacuation of persons, including safe deployment of survival equipment, when operating in ice-covered waters, or directly onto the ice, as applicable; and
5. where the recommendations of this chapter are achieved by means of adding devices requiring a source of power, this source should be able to operate independently of the vessel's main source of power.

VII. **Safety Of Navigation**. The goal of this section is to provide for safe navigation.

A. **Functionality**. The following functional elements are embodied in the recommendations of this section.
1. Vessels should have the ability to receive up-to-date information including ice information for safe navigation.
2. The navigational equipment and systems should be designed, constructed, and installed to retain their functionality under the expected environmental conditions in the area of operation.
3. Systems for providing reference headings and position fixing should be suitable for the intended areas.
4. Vessels should have the ability to visually detect ice when operating in darkness.
5. Vessels should have the ability to receive up-to-date information including ice information for safe navigation.
6. The navigational equipment and systems should be designed, constructed, and installed to retain their functionality under the expected environmental conditions in the area of operation.
7. Systems for providing reference headings and position fixing should be suitable for the intended areas.
8. Two-way voice and/or data communications ship-to-ship and ship-to-shore should be available at all points along the intended operating routes.
9. Suitable means of communications should be provided where escort and convoy operations are expected.
10. Means for two-way on-scene and SAR coordination communications for search and rescue purposes including aeronautical frequencies should be provided.
11. Appropriate communication equipment to enable telemedical assistance in polar areas should be provided.
12. For vessels intended to operate in low air temperature, all rescue boats and lifeboats, whenever released for evacuation, should maintain capability for distress alerting, locating and on-scene communications.
13. For vessels intended to operate in low air temperature, all other survival craft, whenever released, should maintain capability for transmitting signals for location and for communication.
14. Mandatory communication equipment for use in survival craft, including liferafts, and rescue

boats should be capable of operation during the maximum expected time of rescue.

B. **Recommendations.** The following apply:

1. communication equipment on board should have the capabilities for ship-to-ship and ship-to-shore communication, taking into account the limitations of communications systems in high latitudes and the anticipated low temperature.
2. two-way on-scene and SAR coordination communication capability in vessels should include:
    a. voice and/or data communications with relevant rescue coordination centers; and
3. all rescue boats and lifeboats, whenever released for evacuation, should:
    a. for distress alerting, carry one device for transmitting ship to shore alerts;
    b. in order to be located, carry one device for transmitting signals for location; and
    c. for on-scene communications, carry one device for transmitting and receiving on-scene communications.
4. recognizing the limitations arising from battery life, procedures should be developed and implemented such that mandatory communication equipment for use in survival craft, including liferafts, and rescue boats are available for operation during the maximum expected time of rescue.

VIII. **VOYAGE PLANNING.** The goal of this chapter is to ensure that the Company, master and crew are provided with sufficient information to enable operations to be conducted with due consideration to safety of the vessel and persons on board and, as appropriate, environmental protection.

A. **Functionality**. The voyage plan should take into account the potential hazards of the intended voyage, taking into account the following:

1. the procedures required by the Manual;
2. any limitations of the hydrographic information and aids to navigation available;
3. current information on the extent and type of ice and icebergs in the vicinity of the intended route;
4. statistical information on ice and temperatures from former years;
5. places of refuge;
6. current information and measures to be taken when marine wildlife is encountered relating to known areas with densities of marine wildlife, including seasonal migration areas;
7. current information on relevant vessels' routing systems, speed recommendations and vessel traffic services relating to known areas with densities of marine wildlife, including seasonal migration areas;
8. national and international designated protected areas along the route; and
9. operation in areas remote from search and rescue (SAR) capabilities
10. considerations outlined in the checklist located in the Appendix A.

APPENDIX A
AWO-Coast Guard Regional Quality Steering Committee
Alaska Towing Vessel Ice and Cold Weather Operation Guidelines

Checklist for tug and barge operators making initial arrival in Alaska areas covered by the IMO Polar Code, specifically areas north of 60° N latitude.

Pre docking	
Checklist Item	**Master's Initials**
1. Review Port Information Book prior to arrival	
2. Check most current weather forecast 1 hour prior to docking maneuvers	
3. Check tide/current tables and advise tankerman of slack tide periods and range of tide, which must be noted in barge load plans	
4. Determine maximum allowable current velocity during docking/undocking maneuvers	
5. Check operation of mooring winches	
6. Check mooring lines/wires (compliance with facility's mooring requirements)	
7. Discuss mooring plan with crew	
8. Review load plan with tankerman	
9. Ensure tug mooring lines (double head and spring lines if moored on the hip)	
10. Ensure second generator on standby	
11. Ensure backup steering pump online	
12. Determine radio communications with dock and assisting tugs	
13. Ensure all crew required to assist with docking/undocking maneuvers	
14. Determine use of an assist tug at Master's discretion	
15. Determine mooring arrangement: north/south facing orientation	

While Moored at dock	
1. Maintain wheelhouse watch at all times when moored	
2. Check weather update 1 hour prior to all water slack	
3. Notify dock control pending weather concerns	
4. Monitor mooring lines/wires (check with dock control for tension indicators)	
5. Determine when to bring barge hydraulics on line. Example ½ hour before low slack	
6. Determine/manage crew leave while moored at dock	
7. Determine status of tug main engines, steering and navigation equipment before tide changes	

Towed Barges - Parameters	
1. Determine when head and spring lines should be doubled when operating in and around facility	
2. Consider loading barge as uniformly/flat as possible (especially one hour before low slack)	
3. Consider maneuvering barge to get tug a lee after departure to minimize slamming damage	

Towed Barges Weather
Parameters Example: S, SW 20 kts or less, seas 3’ or less Example: SE, E, NE 35 kts or less, seas 3’ or less Example: N, NW, W 25 kts or less, seas 3’ or less

Articulated Tug Barges (ATB) - Parameters	
Checklist Item	**Master's Initials**
1. Determine when ATB's must be all fast at berth. Example: at least one hour prior to high water slack	
2. Determine when ATB's mooring at the berth will moor port/starboard side to, bow facing south/north	
3. Determine when tug Master will brief the assist tug regarding weather parameters for emergency departure, connection location(s) for tow hawser, if needed and departure procedures	
4. Determine when during all periods of flood tides, tug and barge must be hard coupled	
5. Determine when tug will commence coupling maneuver. Example: at least ½ hour prior to low water slack, allowing sufficient time to complete coupling prior to the change of tide	
6. Determine when during coupling maneuvers barge transfer operations are to be shut down and header valve(s) closed	
7. Determine when crew will use ballast and loading trim to minimize the number of couple/de-couple maneuvers	
8. Determine when tug will have main engines and navigational equipment online and in state of readiness for emergency departure	
ATB Weather Parameters Example: S, SW 15 kts or less, seas 2' or less Example: SE, E, NE 30 kts or less, seas 2' or less Example: N, NW, W 20 kts or less, seas 2' or less	

Emergency Departure Guidelines	
1. Advise Dock Control of intent to depart	
2. Advise assist tug of intent to depart and discuss departure plan	
3. All vessel crew called out to assist with departure	
4. Secure transfer operations	
5. Secure barge valves	
6. Barge positioned to squarely spring off dock fender panels (do not allow barge to drift inside face of fender panels)	
7. Notify company of emergency departure	