How long can a person survive in the Arctic in a lifeboat or life raft? Will survival equipment function as needed in polar conditions? How will the Arctic environment impact search and rescue (SAR) operations?

An attempt to answer these questions, American Bureau of Shipping (ABS) joined the University of Stavanger and other participants in an SAR research exercise near Svalbard, Norway, in April 2016 as part of a joint effort among Norwegian and Canadian academic institutions, Norwegian industry, Norwegian Armed Forces, the Norwegian Coast Guard and lifesaving equipment manufacturers. The goal was to advance the understanding of and evaluate the risks associated with increased vessel activity in Arctic waters and how typical SARS operations could be impacted.

Survival Craft Capacity

Another interesting finding that came out of this study is the posted persons on board (POB) capacity on survival craft. Because there were only 22 people assigned to the 55-person lifeboat, the boat was not near capacity. However, 20 participants could barely fit in the 25-person life raft. Findings from lifeboat capacity studies in both the Gulf of Mexico and Arctic waters indicate that it is not unusual for the posted maximum capacity to be an overestimation.

In the case of the Arctic study, participants were wearing bulky personal protective equipment (i.e., immersion suits, life jacket, boots, gloves, etc.), which increased the space needed for each person on the life raft. Because the life raft was provisioned with a large bag of survival supplies (food, water, flares, etc.), the entire middle section of the life raft was not available for use by personnel. Even with a healthy group of participants, there was not enough room for 20 people.

In reality, in Arctic conditions, there could be even more safety equipment in the life raft, including survival kits such as tents, warm clothes, flashlights and cooking equipment, all of which would require additional space. Based on existing research including the recent Svalbard study, the POB capacity for survival craft, including both lifeboats and life rafts, should be re-evaluated.

Carbon Dioxide Level Concerns

Another important issue identified in the study was the poor air quality in both the life raft and lifeboat. Previous research identified carbon dioxide (CO2) levels as a concern in lifeboats. For safety reasons, portable oxygen (O2) metres were used in each craft. Every 20 to 30 minutes the O2 meter alarm sounded in both crafts, indicating required ventilation, which took the form of opening entranceways or hatches. Each time a craft was vented the temperature within the survival craft dropped noticeably.

Today, survival craft are not required to have an O2 or CO2 alarm. Without an alarm occupants may not be aware of the need to periodically circulate fresh air through the survival craft. Since many of the initial symptoms of overexposure to CO2 – including increased respiration, headache, sweating, increased heart rate and blood pressure and hyperventilation – are difficult to distinguish from shock and stress, it would be possible for a potentially deadly situation to develop in a relatively short span of time. Existing research and conclusions from this study indicate that all survival craft should be equipped with life-saving equipment to monitor air quality, or alternatively that ventilation options should be explored.

Recommendations and Remaining Work

While a number of questions cannot be answered with certainty at this point, results indicate that even with a healthy group of participants and excellent weather conditions, the risks during SAR operations are very serious. If conditions had been more severe, the results could have been considerably different particularly for the life raft due to the possibility of seaskiness, water entering the life raft and a colder environment. Primary findings suggest industry may find it difficult to meet Polar Code requirements for surviving for at least five days in polar waters.

The results of the Svalbard study indicate further research is needed in the following areas:

- Lifeboat and life raft performance in harsher weather conditions for longer periods of time.
- The adequacy of thermal protection after exposure to water.
- The adequacy of thermal protection during repeated periods of time.
- The adequacy of thermal protection in a colder environment.
- The adequacy of thermal protection for escape, evacuation and survival.

Participating and contributing to this world-class Arctic research has provided the opportunity for ABS to support research efforts on human element considerations in the Arctic and will provide input for future updates to the existing ABS Guide for Vessels Operating in Low Temperature Environments.

A full report on this research exercise, available to the public through the fall of 2016, will contain detailed results with input from all of the research team members. The results will help industry meet Polar Code requirements for escape, evacuation and survival.

Participating and contributing to this world-class Arctic research has provided the opportunity for ABS to support research efforts on human element considerations in the Arctic and will provide input for future updates to the existing ABS Guide for Vessels Operating in Low Temperature Environments.

RESEARCH SAVING LIVES IN ARCTIC SEAS

Arctic research provides clarification for Polar Code requirements.

Katie Aylward of ABS shares recent findings from lifeboat and life raft survival suitability studies.