Shortcomings In Present EER Solutions For Maritime Operations In Ice-covered Arctic Waters

Ørjan Selvik (MARINTEK)
Tor Einar Berg (MARINTEK)
Rune Rautio (Akvaplan-niva)
Alexei Bambulyak (Akvaplan-niva)
Overview of presentation

- Definition of Escape, Evacuation and Rescue (EER)
- Norwegian and Russian maritime SAR Services
- Development prospects of Arctic EER systems
- Some challenges
- Success factors for Arctic EER systems
- Concluding remarks

Photo: Norwegian Coast Guard
Definition of EER

- **Escape** (ISO15544)
  - Act of personnel moving away from a hazardous event to a place on the installation where its effects are reduced or removed.

- **Evacuation** (ISO19906)
  - Planned precautionary and emergency method of moving personnel from the installation (muster station or temporary refuge) to a safe distance beyond the immediate or potential hazard zone.

- **Rescue** (ISO19906)
  - Process by which persons entering the sea or reaching the ice surface, directly or in an evacuation craft, are subsequently retrieved to a place where medical assistance is typically available.

Also the term Recovery should be mentioned:

- **Recovery** (ISO19906)
  - Transfer of evacuees to a rescue vessel, helicopter, etc.
Norwegian and Russian maritime SAR Services

• In Norway, the main rescue strategy is based on use of search and rescue helicopters
  − Few dedicated SAR resources (330 squadron)
  − However, one uses available resources on request
• In Russia, the main rescue strategy is based on application of surface vessels.
Norwegian SAR resources

The search and rescue service in Norway is a national effort and it is under administrative coordination by the Ministry of Justice and Public Security. All resources suitable for saving lives can and will be used. The rescue service only has direct control over a few dedicated resources. They are the Air Force 330 squadron's rescue helicopters on standby at six bases in Norway.

• AIR SAR capacities
  – Sea King – range approx. 200 nm (330 squadron, dedicated SAR resource)
  – Super Puma AWSAR helicopter at Svalbard, range approx. 200 nm
  – Norwegian Air Force
  – Other available resources (Norsk luftambulanse, etc.)

Photo: Forsvaret
Norwegian SAR resources

• Maritime SAR capacities
  – Norwegian Coast Guard
    – Cost guard ships and helicopters
  – Norwegian Navy
  – Redningsselskapet
  – Governmental towing preparedness (Statlig Slepeberedskap)
  – Polarsyssel
  – Other ships in the area

• Non-Governmental Organizations (NGOs)
  – E.g. Red Cross, Norwegian People's Aid, Norwegian Rescue Dogs, Mountain rescue climbers, etc.
Search and Rescue in Russian Arctic

Courtesy of Bambulyak (2016)
Search and Rescue in Russian Arctic

SAR resources in along the northwestern part of the Russian (Source: The Northern Sea Route Information Office)
Russian state-of-the-art ice-class rescue vessel

- 41 new rescue-salvage vessels are ordered by the Federal Agency of Maritime and River Transport of Russia to be delivered by 2020 (Bambulyak, 2016)
- Spatsel Kavdeykin, built in 2013, has Arc 5 ice class, power unit of 4 MW and may take up to 80 people onboard. Murman has Icebreaker 6 class, power unit of 7 MW and was put in operation in 2015.
- 27 vessels have been delivered, including three 7 MW icebreaking (IB6) and four 4 MW ice-class (Arc5) salvage ships (Bambulyak, 2016)
- Russian oil companies, Gazpromneft and Lukoil, have their own rescue ships located in the south-eastern part of the Barents Sea (the Pechora Sea), near Prirazlomnoe oil field and Varandey oil terminal. Both companies also hold large stocks of oil spill response resources on onshore bases in Varandey as well as on Prirazlomnaya platform.
Arctic SAR Agreement

- The Arctic Council prepared and approved the Arctic SAR Agreement at their Nuuk meeting in 2011 (Arctic Council, 2011).
- The geographical limitations of national Search and Rescue Regions (SRR) are shown in the figure.
- Norway has some special challenges for SAR north of Svalbard.
Examples of collaboration between Norwegian and Russian SAR-services

• Last 10 years, at least 120 SAR actions with Norwegian resources (mainly SAR helicopters from 330 squadron and sometimes Norwegian Coast Guard Vessels) has taken place in the Russian Search and Rescue Region (SRR)
• An example is from Rybachiy Peninsula, December 2007, where a Norwegian Sea King rescued 12 seafarers from a grounded Russian vessel

Pictures from the Fisherman’s Peninsula, December 2007 (iFinnmark, 2012). Photo: 330 Squadron RNoAF
Development prospects of Arctic EER systems

- Subcommittee 8 “Arctic operations” of ISO Technical Committee 67 develops a new standard ISO/AWI 35102 “Petroleum and natural gas industries -- Arctic Operations -- Escape, evacuation and rescue from offshore installations”.
  - This work is related with the development of similar Russian federal standard GOST R “Petroleum and natural gas industries -- Arctic Operations – Search and rescue of personnel”. The draft of that Russian standard will be published by the end of 1st quarter 2016 (in Russian).

- The SARiNOR "WP4 – Redning" and "WP5 – Overlevelse i kaldt klima" have been working with needs related to survival and rescue in the high north (Færevik, 2015)
Some needs for a lifeboat in polar conditions
How to recover persons from lifesaving appliances in Arctic waters in an efficient way?

Photo: Arild Lokøy
Fast transfer of personnel
Fast transfer of personnel
How to recovery of persons from lifesaving appliances (LSA) in Arctic waters in an efficient way?

• In open water or managed ice?
• Use of Emergency Response Vehicles (ERV) with rescue zones or aft ship ramps
• Use of Platform Supply Vessels (PSV)
  – Do these need any specialized equipment for an effective recovery of persons from LSAs?
Success factors for Arctic EER systems

Successful outcomes of maritime EER operations in Arctic waters depend on a number of factors such as

- design of escape routes,
- available evacuation means,
- distance to appropriate SAR resources,
- early information/detection related to maritime accidents,
- metocean and
- ice conditions data
Success factors for Arctic EER systems

• Early warning
  – Traffic surveillance and detection of maritime accidents
• Operability of evacuation means under Arctic conditions
• Available resources
  – Ships and helicopters
  – Transit speed of seaborne rescue vehicles
  – Range of SAR helicopters
  – Transfer of personnel from lifeboats/life rafts to helicopter or rescue vessel
• International collaboration
• Operational experience from Arctic waters

Picture: https://www.youtube.com/watch?v=kv.sRO.v.0U
Challenges – Large distances

- New Norwegian AWSAR helicopters shall be able to pick-up 20 persons within a distance of 266 nm
- It shall be able to fly 315 nm and return without refueling
- Time in helicopter (@ speed 150 kn)
  - ~ 320 nm to Hammerfest (~2.1 h)
  - ~ 307 nm to Kirkenes (~2.0 h)
  - ~ 273 nm to Bear Island (~1.8 h)
Challenges – Transit speed for seaborne rescue vehicles

• Assuming that the evacuation is a success, the persons in a LSA need to be rescued within a reasonable amount of time.

• In the figure, the green and magenta circles show the radius covered in 4 hours by a seaborne rescue vessel in 16 kts and 35 kts, respectively.

• Distances and time from 74°30’N 36°
  – ~ 320 nm to Hammerfest (~20 h @ 16 kts)
  – ~ 307 nm to Kirkenes (~19 h @ 16 kts)
  – ~ 273 nm to Bear Island (~17 h @ 16 kts)

• Speed loss in waves
  – Voluntary
  – Involuntary (important for SAR operations)
Year round operation of arctic EER systems

- One of the challenges for arctic EER system is that it must be operational in:
  - Open waters
  - Partly ice covered waters
  - Ice covered waters


The Prirazlomnaya platform is located 60 kilometers from the coast in the Pechora Sea. (Photo: shelf-inet.gazprom.ru)

Source photo: http://www.offshoreenergymr.com/russia-arctic-oil-enters-global-market/
Concluding remarks

• Time is a critical factor in Arctic environments
• More research and development is needed to develop and use technology for fast transfer of many persons from lifeboats (LSA) to safety
  – These methods should also be usable in harsh environment as polar lows with heavy wind, fog and or heavy snow.
• It is needed to continue development work on dry evacuation rescue systems
Thank you for your attention!

Photo: Torbjørn Kjosvold - Forsvarets mediasenter
References


