



CIRCAC releases findings of vessel self-arrest study

In 2015, the Cook Inlet Navigational Risk Assessment identified self-arrest as a risk reduction option. Self-arrest employs the use of anchor(s) to slow or stop a vessel that has lost propulsion. Experienced mariners have employed self-arrest—there was an actual self-arrest event in Cook Inlet during ice conditions in 2015—but its effectiveness has never been proven through simulation. The Risk Assessment included a self-arrest report which the Panel of Experts believed was inconclusive and warranted further study. In 2015, CIRCAC's Prevention, Response, Operations & Safety (PROPS) Committee authorized funding to determine if self-arrest is a viable technique to prevent a grounding or other casualty in Cook Inlet. The study was conducted in 2016-2017 and the findings presented to the Board of Directors in December. The final report is now available on CIRCAC's [website](#) and summarized below.

In Cook Inlet, marine pilots board each arriving tanker outside of Kachemak Bay near Homer to safely navigate them to moorage. As part of the study, CIRCAC interviewed marine experts and stakeholders to identify issues of concern related to a tank vessel self-arresting in Cook Inlet, provide context, and develop simulations based on their experiences and knowledge.

The Participants and conditions

CIRCAC tested the self-arrest technique with Andeavor and the Southwest Alaska Pilots Association (SWAPA) under simulated and controlled conditions which replicated loss of propulsion in critical Cook Inlet locations for crude oil tankers and inclement environmental conditions that may be encountered. These included maximum flood and ebb currents, elevated sea states along with wind direction and velocity, and ice coverage. The group conducted thirty-four ship simulations to determine the ability of different sized tankers, in different loaded conditions, to self-arrest at five locations based on commonly accepted routes within Cook Inlet.

Three active SWAPA pilots and one retired pilot representing a broad range of experience were selected to complete the simulated maneuvers and self-arrest technique. Self-arrest is, thankfully, not an evolution Cook Inlet pilots and mariners must perform often. Running through each exercise demonstrated its effectiveness and provided the added benefit of practice.



Pilots and research assistants discuss the simulation-exit interview process prior to beginning day one simulations.

The Models

The simulations utilized two tank vessel models—one consistent with the smaller oil tankers that currently operate in Cook Inlet, and the second consistent with larger oil tankers—both in ballast and loaded conditions. The simulations were conducted at the Alaska Vocational Technical Institute's Maritime Training Center in Seward over a period of two days in December 2016 and were supervised and administered with the assistance of a trained maritime simulator technician.

How the simulators worked

For reasons of economy, two simulators were used simultaneously to allow all of the simulations to be run over the two day period; each simulation and maneuver was performed by two SWAPA Pilots and one simulator technician, with one research assistant present in each simulator to document mariners' reactions, and process during the exercise. One SWAPA pilot was in command and one assisted. Pilots were tasked with completing a self-arrest maneuver as the vessel lost propulsion while under way at anticipated normal speeds for transiting Cook Inlet. Simulation times varied, but were approximately 30 minutes from beginning to end.

What happened next

After each simulation, pilots participated in an exit interview while consulting a video monitor with a screen shot of the vessel's movement throughout the simulation. The exit interviews captured the participants' response and gauged the realism of the environmental conditions, the vessel's characteristics, or condition and maneuverability; the safety of the vessel's position after self-arrest, the mariners' level of concern during this emergency maneuver, number of anchors used, anchor strain, and whether the anchor was sufficient to arrest the vessel.



In February 2017, a focus group of mariners and stakeholders discussed results to verify and interpret the data collected for each simulation; identify the causes of concern from pilots and stakeholders; and provide recommendations on how to mitigate issues related to self-arrest.

Among the study's findings:

- Self-arresting a tanker after the loss of power is a viable option in Cook Inlet as demonstrated by actual events and verified by the simulations. There is variation in terms of the amount of concern, process, and number of anchors used depending on the location in Cook Inlet.
- This research as conducted found that oil tankers are able to self-arrest in Cook Inlet. The probability of self-arrest is high given the conditions and local pilots used in this study.
- The results of the self-arrest in all of the locations in Cook Inlet were a success. This means that after the vessel lost power it was able to self-arrest in a temporarily safe location using only its anchor gear, with no anchor gear failure. However, the level of concern by the pilots performing the maneuver did vary by location.
- Finally, in terms of best practices to implement self-arrest, the practice depends on many

factors including the location, environmental conditions, vessel attributes, and human factors.

Important note

The practice of self-arrest was only simulated with a limited number of SWAPA pilots. The external validity of these results to other SWAPA pilots, as well as other mariners such as oil tanker captains is limited. Therefore, the results should not be generalized to any personnel beyond those who participated in these simulations. In order to determine the probability and reliability of other mariners performing self-arrest of an oil tanker in Cook Inlet requires additional research, and using the simulator by other mariners to practice self-arrest is recommended.

Conclusion

Ultimately, this research shows that self-arrest of an oil tanker in Cook Inlet is possible. Using properly trained and capable local pilots to perform self-arrest has a high probability of success, but this research does not find that other mariners could engage in such practices with the same reliable success unless properly trained.



This study reflects the positive results of using self-arrest as a risk reduction measure for crude oil tankers in Cook Inlet, as sought in the 2015 Navigational Risk Assessment. Local pilots are able to, with a high probability of success, self-arrest oil tankers in Cook Inlet even during inclement weather conditions and at various locations. With this study, we've shown that self-arrest of an oil tanker can be a valuable tool when conducted by highly skilled and proficient local pilots.

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