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Marine Accident Inquiry Agency

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Marine Accidents in Naka Suido (Channel) and Nishi Suido (Channel) of the Kurushima Kaikyo (Strait)

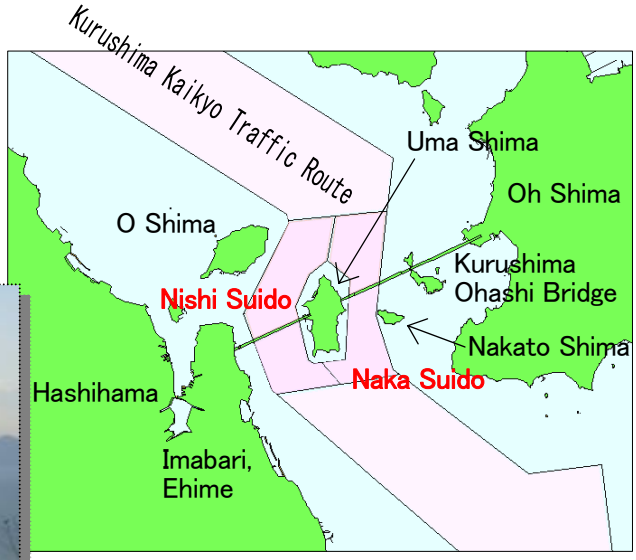
There are a number of narrow channels in Japan called “Kaikyo”, “Seto” or “Suido”. Particularly in the Seto Naikai (the Inland Sea), there are 724 islands and the number of those would reach 3,000 if unnamed rocks are to be counted. The narrow and winding channels running between these islands are dangerous spots for navigation because of poor visibility and rapid tidal current. Significant casualties have occurred repeatedly in such straits as “Kurushima Kaikyo” and “Kanmon Kaikyo”, both of which are essential and busy passage routes through the Seto Naikai.

This issue features the situation of marine accidents in “Kurushima Kaikyo”.

◆ Kurushima Kaikyo

“Maritime Traffic Safety Law” prescribes the traffic routes and traffic rules specific for the Kurushima Kaikyo. Particular attention must be given to a unique rule applicable for Naka Suido (the central channel) and Nishi Suido (the west channel), in which the traffic routes change their directions four times a day.

The particular pattern of maritime accidents which occur in this area is linked to this **“Sail Naka Suido with the tidal current, Sail Nishi Suido against the tidal current”** rule, as illustrated in the following examples.

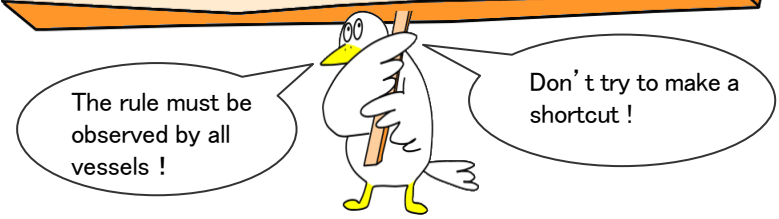


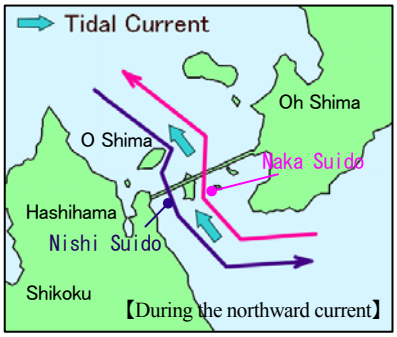
Kurushima Kaikyo
(Looking from Oh Shima to the direction of Imabari)

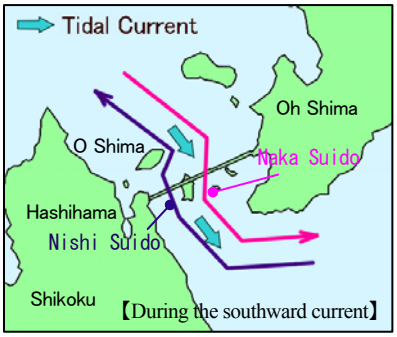
順中逆西

What is the *"Sail Naka Suido with the tidal current, Sail Nishi Suido against the tidal current"* rule ?

You must **take the right lane during the northward current** and **take the left lane during the southward current** in the Kurushima Kaikyo Traffic Route.

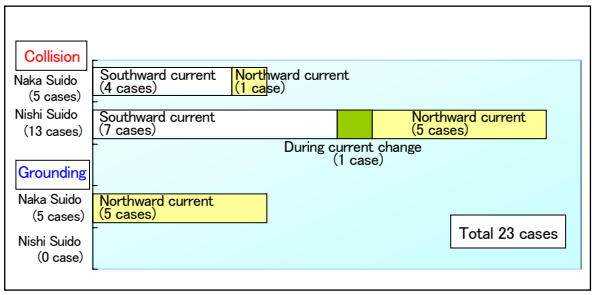




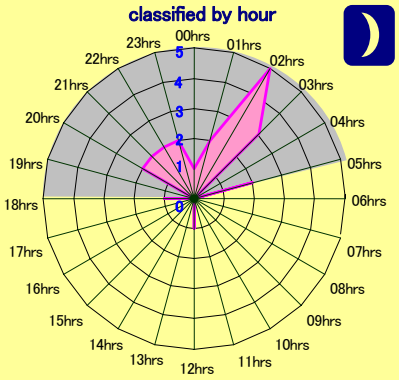


Maritime Traffic Safety Law (Law No.115, 1972)
Article 20.
When a vessel navigates the Kurushima Kaikyo Traffic Route along the course of such route, the vessel shall comply with any of the steering and sailing rules enumerated below. In such case, the provisions of Article 9 Paragraph 1 of the Law for Preventing Collisions at Sea shall not apply to a vessel navigating in compliance with any of these steering and sailing rules.
(1) To navigate the Kurushima Kaikyo Naka Suido (hereafter referred to as "Naka Suido") with the tidal current and to navigate the Kurushima Kaikyo Nishi Suido (hereafter referred to as "Nishi Suido") against the tidal current: Provided that, if there is a direction change of the tidal current while the vessel is navigating any of these channels, the vessel may continue to navigate the channel and that a vessel navigating Nishi Suido to enter the channel between O Shima and Hashihama or a vessel intending to enter from the same channel into the Kurushima Kaikyo Traffic Route and to navigate Nishi Suido, may navigate Nishi Suido even when navigating with the tidal current;
(2) To navigate as close as possible to Oh Shima and Oge Shima, when navigating via Naka Suido;
(3) To navigate as close as possible to Shikoku side, when navigating via Nishi Suido. In such case, a vessel having been navigating Nishi Suido and intending to enter the channel between O Shima and Hashihama or a vessel intending to enter from the same channel into the Kurushima Kaikyo Traffic Route and navigate Nishi Suido, shall keep to the Shikoku side of other vessels.

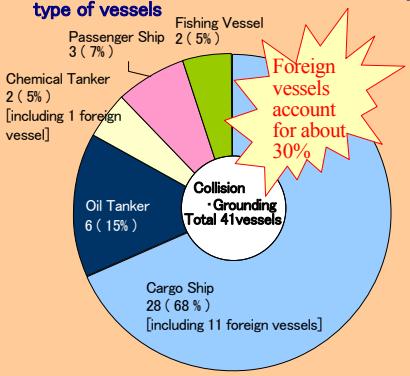
Occurrence of marine accidents classified by channels and tidal currents (1996～Aug., 2006)



Occurrence of marine accidents classified by hour



Occurrence of marine accidents classified by type of vessels



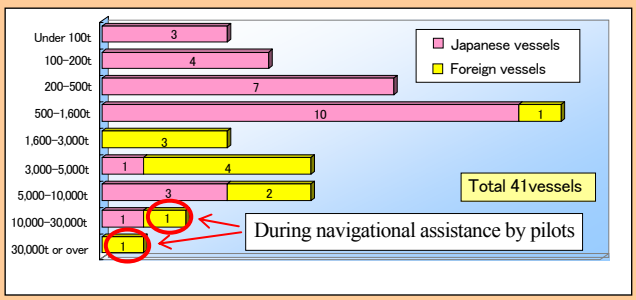
A significant number of foreign vessels are involved !

The collisions involving foreign vessels account for 8 cases (excluding vessels during navigational assistance by pilots) of the total (=18 cases). Some foreign vessels did not have any knowledge of the traffic rules applied to the Kurushima Kaikyo Traffic Route.

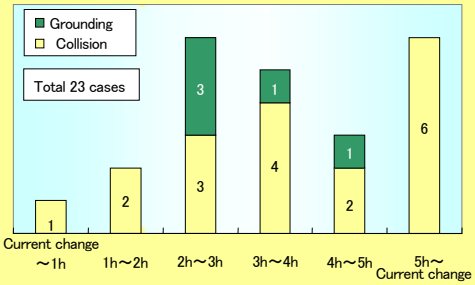
90% of the accidents have occurred at night !

Vessels which left Hanshin or Kyushu district in the evening, sailing west or east in the Seto Naikai, reach the Kurushima Kaikyo between 23:00-02:00. Therefore, the traffic through the Kurushima Kaikyo becomes busiest around midnight, making the occurrence of casualties concentrated at 01:00-02:00.

Occurrence of marine accidents classified by tonnage of vessels



Occurrence of marine accidents classified by time lapse from current change



◆ Typical Marine Accidents in Naka Suido (Channel) and Nishi Suido (Channel)

① Collisions while overtaking other ships in the center of Nishi Suido during the southward current
(Case 1 (page 4) and Case 2 (page 6))

During the time-consuming sailing against the tidal current, it is very difficult to change the angle large enough to overtake other ships safely. Especially at night, it is hard to recognize minor course changes of other ships even if you watch their stern lights and the radar screen. The narrow passage makes the maneuvering of ships even harder.

Your ship can be placed against your will in overtaking position with other ships, because of the complex tidal current and slow-down of other ships.

All these factors contribute to the frequent occurrence of collisions at this specific point.

You should watch the movements of ships ahead of you carefully, and keep ample distance from them.

Do not try to overtake other ships in this channel.

② Groundings on the south-east side of Uma Shima in the south entrance of Naka Suido during the northward current (Case 3 (page 7))

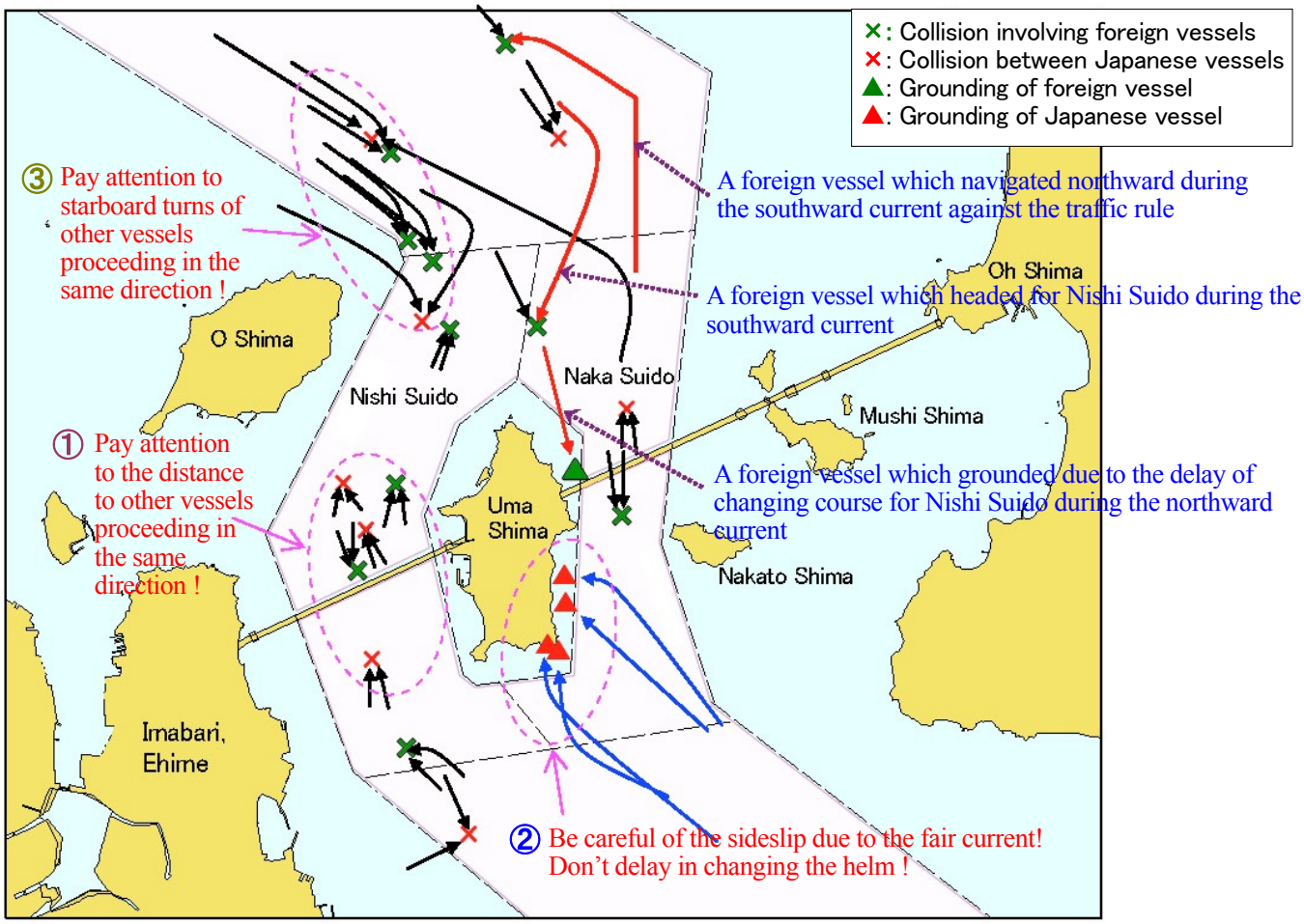
A number of groundings have occurred at the south entrance of Naka Suido with the fair current. Main causes are the delay to turn starboard and drifting due to turning at a small angle.

Operators should sail along the right (Oh Shima) side of the traffic route and order "Helm" (ex. Starboard 10°).

③ Collisions at the north entrance of Nishi Suido during the northward current

While entering Nishi Suido from the west entrance of the Kurushima Kaikyo Traffic Route, and turning starboard at the north-east corner of O Shima, many ships have collided with others proceeding in the same direction. These collisions are attributed to lack of proper lookout for the ships on the starboard (Shikoku) side and also to making starboard turns. Operators should keep proper lookout on the movements of other vessels proceeding in the same direction while turning starboard.

Point of Collisions or Groundings in the Last Decade (1996～Aug., 2006)



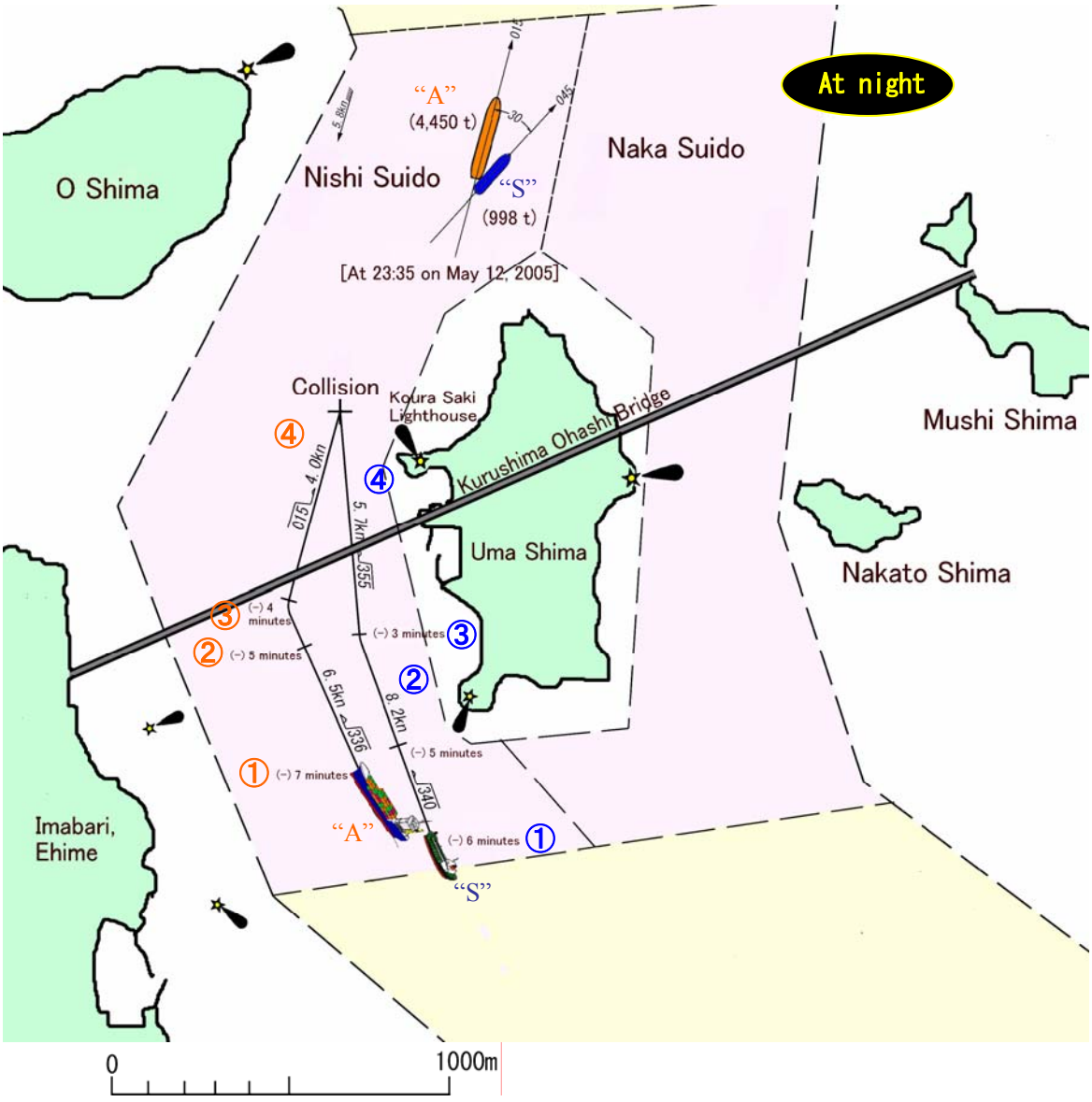
Case 1: While four vessels proceeded northbound, a vessel overtaking another near Uma Shima collided

The ship "S" Oil tanker (Register: Japan) G/T: 998 t LOA: 81m Crew: 8 Cargo: Heavy oil (2,008 kl)
Mizushima Port, Okayama → Kanmon Port
Master Age: 50 License: Forth class (Deck) Experience at sea: 30 years Experience as master: 14 years
Boatswain Age: 63 2 months on board "S"
The ship "A" Container vessel (Register: Germany) G/T: 4,450 t LOA: 99 m Crew: 13 (Ukrainian: 4, Filipino: 9)
Cargo: Container (1,069 t) Fukuyama Port, Hiroshima → Hiroshima Port (No pilot on board)
Master Ukrainian Age: 42 Experience at sea: 24 years
Time and date of accident: At 23:35 JST (UTC＋9h) on May 12, 2005
Place of accident: Kurushima Kaikyo Nishi Suido
Weather: Fine, NW wind with force 1 Tide: End term of flowing Current: 5.8 knots to south

Summary

Four vessels were proceeding northbound in line in the Kurushima Kaikyo Nishi Suido at night. The 4th vessel "S", after overtaking the 3rd vessel decided to overtake the 2nd vessel "A" by "A" 's starboard side, and changed the direction to starboard with reduced speed. Then "S" turned port slightly to avoid Uma Shima, and resulting in a close-quarters situation with the stern of "A".

On the other hand, "A" was proceeding with reduced speed to keep distance from the preceding vessel, while keeping a look on the movement of "S" approaching from her starboard aft. Although "A" tried to attract the attention of "S" with the use of light signals, "A" eventually collided with "S". "A" could not make port turn because of the preceding vessel close to her port fore.



"A" — Collision — "S"

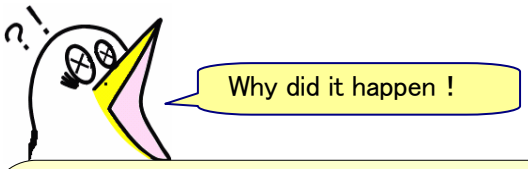
④ Just before the collision: "S" got even closer. **Being unable to turn port because of the preceding vessel near on her port bow,** "A" steered hard-a-starboard.

③ (-) 4 minutes: "A" changed course to 015°. "A" reduced her speed to 4.0 knots to keep distance from the preceding vessel 280m forward. As "S" got closer to 370m, 63° on her starboard quarter, **"A" gave the warning of "No overtake, dangerous" using VHF ch16, but received no response.** "A" also gave blinking light signals to attract "S" 's attention, but gave no sound signals so as not to confuse the other vessels.

② (-) 5 minutes: "A" sighted the lights of "S" 420m, 19° on her starboard quarter.

① (-) 7 minutes: "A" set course on 336°.

(-) 24 minutes: "A" entered the traffic route through the east entrance. The master assigned the chief officer to lookout, the able seaman to hand steering, and headed the ship for Nishi Suido.



④ Because "S" 's master had no experience to sail near Uma Shima, he could not reduce the speed for fear of sideslip. He turned port to avoid Koura Saki. The master noticed soon that the vessel got closer to the stern of "A" and ordered boatswain to give sound signals, but he failed because he did not know where the whistle button was. The vessel steered starboard 20° just before the collision.

③ (-) 3 minutes: After overtaking another vessel, which was following "A", "S" changed course to 355° and halved her speed. "S" sighted "A" 270m, 34° on her port bow, but continued overtaking.

② (-) 4 minutes: **"S" heard through VHF ch16 that Kurushima Martis (VTS) was making a warning, "Watch the movement of "A". She is reducing her speed."** But "S" continued overtaking, judging "A" was safely away from "S".

① (-) 6 minutes: "S" set course on 340° and proceeded with full speed northbound near Uma shima. **The master ordered boatswain to report the distance from "A". The master could not see the radar because he was engaged in hand steering.**

(-) 23 minutes: "S" entered the traffic route through the east entrance.
The master ordered the boatswain to steer by hand, but the boatswain did not follow the order because he was unfamiliar with the Kurushima Kaikyo. So the master himself steered by hand, and headed the ship for Nishi Suido, assigning the boatswain to lookout of radar and the chief engineer to operate the engine. The movement of "A" was recognized by radar with ARPA.

The master of "S" engaged himself in steering by hand, so he could not leave the steering stand.
No.2 Radar with ARPA was installed away from the steering stand.

○ The master ordered the boatswain to steer by hand, but the boatswain did not follow the order, because he was not familiar with the Kurushima Kaikyo.

○ The master further ordered the boatswain to take the steering stand and to operate following his instruction, but the boatswain did not follow it.

So, the master had no other choice but to engage himself in steering by hand. Consequently, the master could not monitor the movement of other ships directly on radar.

A few temporary seamen dispatched from a manning company were always on board "S" to replace those on leave.

No special training or education had been provided by the owner for those newly employed temporary seamen.

The boatswain had been temporarily on board "S" for 2 months. But he was unable to steer by hand in the Kurushima Kaikyo and did not know where the whistle button was.

Crew must be trained and educated appropriately for specific voyages.

Case2: Collision in Nishi Suido while trying to pass through between two preceding vessels

The ship "P" Container vessel (Register: Panama) G/T: 4,393 t LOA: 114 m Crew: 15 (South Korean: 13, Filipino: 2)
Cargo: Container (1,691 t) Wakayama Shimotsu Port, Japan → Gwangyang Port, South Korea (No pilot on board)
Master South Korean Age: 61 Experience at sea: 40 years
The ship "G" Chemical tanker (Register: Panama) G/T: 3,868 t LOA: 104 m Crew: 20 (South Korean: 10, Vietnamese: 10)
Cargo: Styrene monomer (4,748 t) Mizushima Port, Okayama, Japan → Kaohsiung Port, Taiwan (No pilot on board)
Master South Korean Age: 58
Time and date of accident: At 02:27 JST (UTC+9h) on March 7, 2002 Place of accident: Kurushima Kaikyo Nishi Suido
Weather: Fine, West wind with force 3 Tide: Middle term of flowing Current: 4.5 knots to south

Summary

"P" intended to pass through between two vessels while proceeding northward in the Kurushima Kaikyo Nishi Suido at night. "G" was on "P" 's starboard bow, and another vessel on "P" 's port bow was slow. "P" paid most attention to the slow vessel on the port side, and did not notice that the courses of "P" and "G" were in crossing position. Although "G" sighted "P" approaching from stern, "G" assumed that "P" would overtake "G" safely on her port side, and proceeded without giving warning signals. As a result, the two vessels collided.

"P" Collision "G"

③ (-) about 1 minute before collision
Having her attention caught by the port side vessel, **"P" did not notice that the courses of "P" and "G" were in crossing position.** "P" was informed of the risk of collision through VHF from Kurushima Martis (VTS). Shortly before the collision, "P" gave a prolonged blast and steered hard-a-port.

② (-) 5 minutes
"P" changed course to 023° **to pass through between the two vessels.**
Sighted "G", 240m and 23° on her starboard bow.

① (-) 11.5 minutes
"P" sighted the stern light of "G", 460m and 17° on her starboard bow.
Assuming that "P" would overtake "G" near the north exit of Nishi Suido, "P" did not reduce the speed.

(-) 22 minutes
"P" entered the traffic route through the east entrance.
"P" 's master commanded the operation, and the second officer was engaged in lookout of radar.
Full speed with hand steering.

⑤ (-) about 1 minute before collision
Although "G" heard herself addressed by Kurushima Martis (VTS) on VHF, "G" was too busy to reply with maneuvering the vessel. Shortly before the collision, "G" steered hard-a-starboard.

④ (-) 5 minutes
"G" did not notice the change of course and the approach of "P" because she was paying attention only to the vessel on her port bow.
Continued proceeding without giving warning signals.

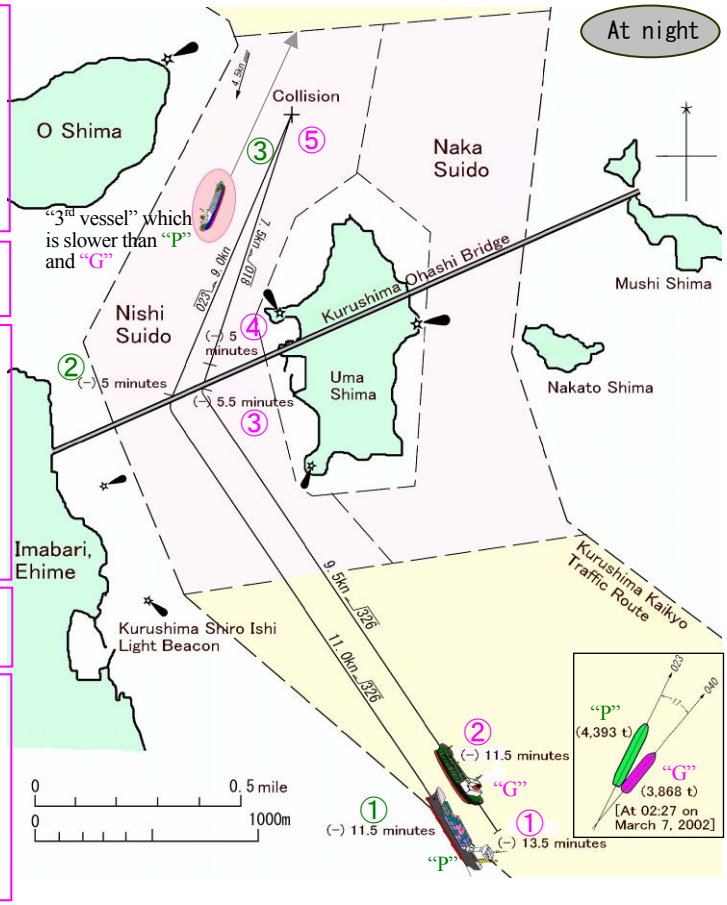
③ (-) 5.5 minutes: "G" changed course to 018°.

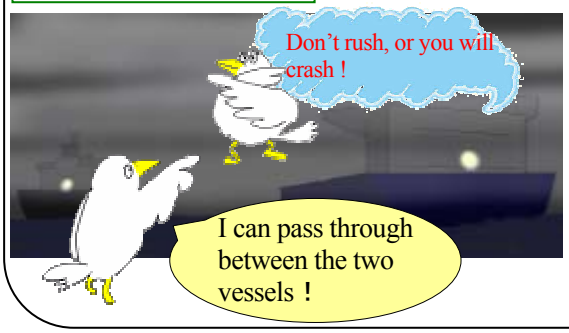
② (-) 11.5 minutes
"G" recognized "P", 460 m and 17° on her port quarter by radar (1.5 miles range scale).
Sighted "P" proceeding northward on the port side. "G" assumed that "P" would overtake "G" safely and watched only ahead of her.

① (-) 13.5 minutes
Set course on 326° for Nishi Suido.

(-) 24 minutes
"G" entered the traffic route through the east entrance.
"G" 's master commanded the operation, and the second officer was engaged in lookout.
Full speed with hand steering.

Keep listening to VHF ch16 !
Turn on VHF ch16 at all times
to obtain information from Vessel Traffic Service (VTS) and to communicate with other vessels.





Keep an ample distance from other vessels in Nishi Suido !

Even when the radar vision is readily available, operators tend to rely on the actual sight of stern lights of preceding vessels to judge their movement. But **it is very hard to measure the distance and predict the course precisely with the eye** especially at night. In addition, the fast-flowing current against the ship in the narrow passage makes it tremendously difficult to maneuver the ship.

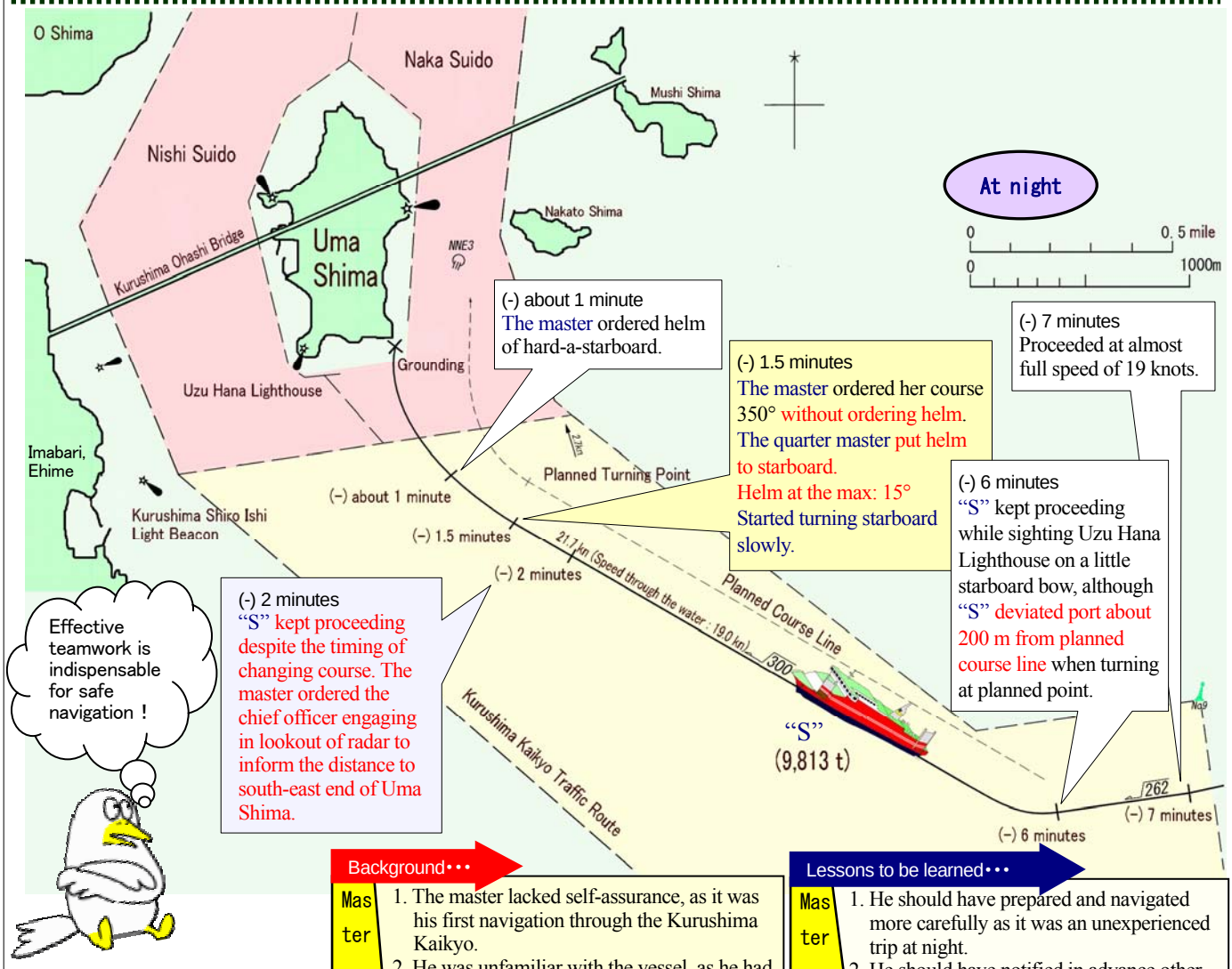
You should never try unnecessary overtaking in Nishi Suido !
Keeping ample distance is imperative here !

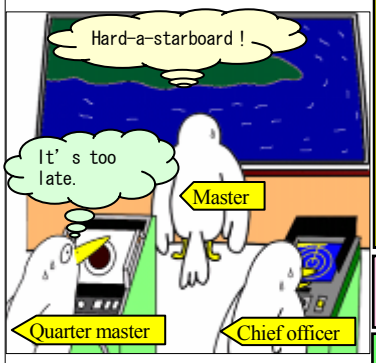
Case3: Grounding off the south-east coast of Uma Shima due to delay of changing course while proceeding northward for Naka Suido at 19 knots

The ship "S" Cargo vessel (Register: Japan) G/T: 9,813 t LOA: 167 m Crew: 12
Cargo: Container(127), Chassis(63), Vehicle(93) Osaka Port → (via Seto Naikai to shelter from typhoon) → Naha Port
Master Age: 49 License: First class (Deck) Experience at sea: 16 years Experience as master: 5 years
Time and date of accident: At 05:05 JST (UTC+9h) on Oct. 20, 2004
Place of accident: Off south-east coast of Uma Shima, Kurushima Kaikyo
Weather: Rain, NNE wind with force 3 Tide: Middle term of ebbing Current: 2.7 knots to north

Summary

En route from Osaka Port to Naha Port, "S" intended to anchor for sheltering from a typhoon off Yashiro Shima, Yamaguchi, under the condition that typhoon No.23 was approaching the south coast of Shikoku. The vessel proceeded westward in the Seto Naikai (the Inland Sea) and reached the Kurushima Kaikyo. Receiving NNE wind on her starboard bow, "S" was proceeding with the fair current at almost full speed of 19.0 knots at the south entrance of Naka Suido, when the ship ran aground on shallows off the south-east coast of Uma Shima due to the delay of changing course.





Background・・・

Master
1. The master lacked self-assurance, as it was his first navigation through the Kurushima Kaikyo.
2. He was unfamiliar with the vessel, as he had been on board "S" for 8 days.
3. He had previously been woking on board a ferry boat which was smaller (4,000 t) and had better maneuvering ability.
4. He kept the speed of 19.0 knots because the departure had been delayed, and he needed to reach the sheltering spot promptly as the typhoon was approaching.

C/O In response to the master's request, the C/O answered only the distance to Uma Shima.

Q/M The Q/M followed the master's instruction to turn starboard, but the helm, no more than 15°, was not enough to take the course of 350°.

Lessons to be learned・・・

Master
1. He should have prepared and navigated more carefully as it was an unexperienced trip at night.
2. He should have notified in advance other bridge members of the planned course line and the planned turning point.
3. He should have ordered concretely the proper helm to take in the narrow channel.

C/O He should have given the master more detailed information obtained from the radar image, such as the deviation from the planned course line and the distance to the planned turning point.

Q/M Being instructed to take "the course to 350°", he should have asked how far he should turn the helm or notified the helm he took and the consequent change of the course.

Case4: While proceeding southward in Naka Suido, an overtaking at the narrowest spot caused a collision

The ship "I" Cargo vessel (Register: Japan) G/T: 199 t Registered Length: 42 m Crew: 3
Cargo: Magnesium hydroxide (340 m³) Ube Port, Yamaguchi → Himeji Port, Hyogo
Master Age: 64 License: 3rd class (Deck) Experience at sea: 48 years Experience as master: 25 years
The ship "O" Cargo vessel (Register: Philippine) G/T: 7,416 t LOA: 108 m Crew: 18 (Filipino)
Cargo: Plywood (4,168 t) Kokura Section, Kanmon Port → Takamatsu Port, Kagawa (No pilot on board)
Master Age: 46 Filipino
Time and date of accident: At 01:00 JST (UTC+9h) on Dec.15, 1999 Place of accident: Kurushima Kaikyo Naka Suido
Weather: Fine, no wind Tide: End term of flowing Current: 3 knots to south

Summary

The two vessels, "I" and "O", had recognized each other's size, speed and course beforehand. However, after entering Naka Suido, while concentrating on maneuvering the vessel in the narrow route, the existence of each other had slipped from their minds until they collided.

"I" Single watch by the master, Full speed, Hand steering

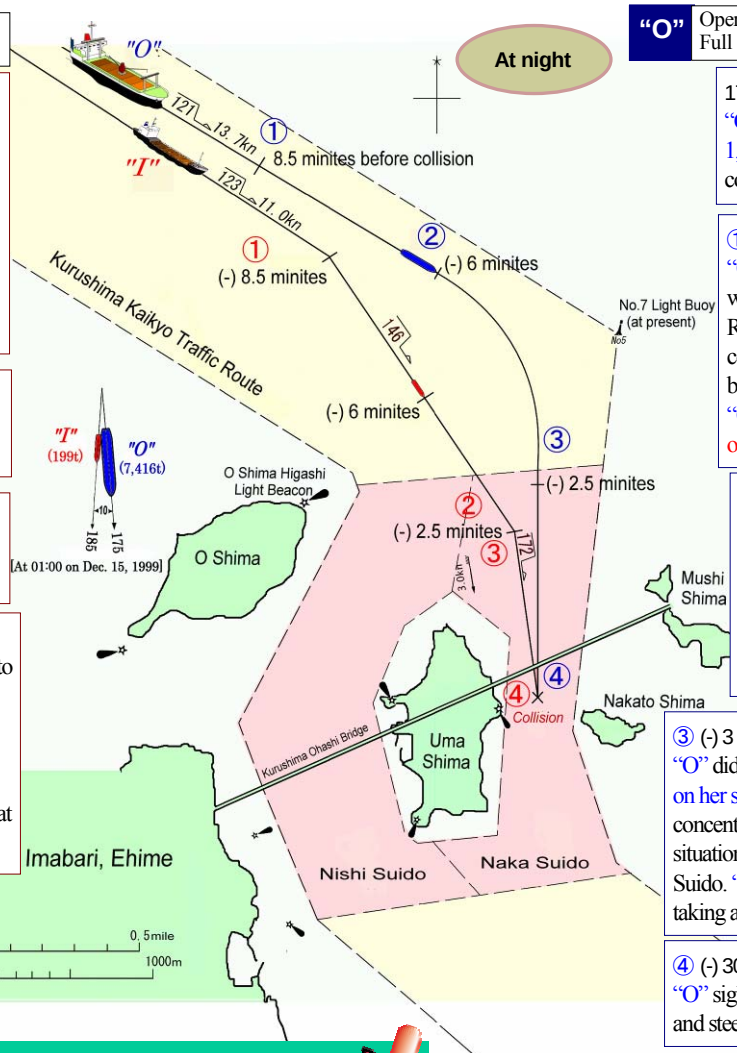
17 minutes before collision
"I" sighted the lights of "O", 1,250 m on her right stern and also confirmed by the radar that "O" was larger and faster than "I" and was trying to overtake her.
After that, "I" did not monitor the movement of "O" assuming that "O" would overtake her safely.

① (-) 8.5 minutes
"I" changed course to 146° and reduced her speed to 10 knots.

② (-) 3 minutes
"I" did not notice "O" close to 350m, 17° on her port beam.

③ (-) 2.5 minites
"I" changed course to 172° heading to the center of Naka Suido. Since she did not notice that "O" was getting closer, she did not give warning signals nor take any actions to avoid collision. She continued proceeding at 12.5 knots with the tidal current.

④ (-) 30 seconds
"I" sighted the starboard bow of "O" close to her and steered starboard 30°. → Collision



"O" Operation commanding by the master, Full speed, Hand steering

17 minutes before collision
"O" sighted the stern light of "I", 1,250 m on her right bow and set course on 121° with 13.7 knots.

① (-) 8.5 minutes
"O" confirmed by the radar that "I" was smaller and slower than "O". Recognizing that "I" changed her course to starboard and the distance between the two vessels increased, "O" did not monitor the movement of "I" after that.

② (-) about 6 minutes
"O" reduced her engine's revolution by making it standby and gradually turned starboard at 14 knots with the tidal current to set her course to the center of Naka Suido.

③ (-) 3 minutes
"O" did not notice "I" close to 350m, 35° on her starboard bow because she concentrated on watching the forward situation, the narrowest point in Naka Suido. "O" continued proceeding without taking any actions to avoid collision.

④ (-) 30 seconds
"O" sighted "I" close to her starboard side and steered port 15°. → Collision

Bridge crew are fully occupied with forward lookout to maneuver the vessel !

POINT

The Kurushima Kaikyo is congested with heavy traffic around midnight. Crew members are obliged to concentrate their attention on maneuvering the vessel in the narrow and winding routes. Therefore, **they sometimes lack enough attention to recognize the movement of overtaking vessels.**

Should you need to overtake other vessels, **you must give the overtaking signal in order to notify them of your intention. The flashing light signal is also effective at night.**

On the other hand, if you do not want other vessels to overtake you, you should give more than five short blasts to warn them.

The signal to overtake on the port side of other vessels ——— – –
The signal to overtake on the starboard side of other vessels ——— –

Maritime Traffic Safety Law (Art.6)
An overtaking vessel equipped with a whistle, shall, when intending to overtake any other vessel in a traffic route, give the whistle signal.