



Investigation Report

D4/2008M

M/S FORTE, grounding off Kotka on 7 April 2008

Translation of the original Finnish report

This investigation report has been written to improve safety and prevent new accidents. The report does not address the possible responsibility or liability caused by the accident. The investigation report should not be used for purposes other than the improvement of safety.



INDEX

1	EVENTS AND INVESTIGATIONS	1
	The vessel	1
	Manning	2
	Bridge and its equipment	2
	Cargo	2
	Weather conditions	2
	Description of the accident event	3
2	ANALYSIS	7
3	CONCLUSIONS.....	11

1 EVENTS AND INVESTIGATIONS

The vessel



Figure 1. MS FORTE

Name of the vessel	FORTE
Home port	Rotterdam
Type of the vessel	Ro-Ro
Trafficking area	Western Europe
Call sign	PEDE
IMO No.	8802258
Year of construction	1989
Gross	3998
Net	1653
Draught (summer)	6.42 m
Length, max.	90.85 m
Breadth, max.	15.85 m
Engine power	4500 kW
Engine constructor	Wärtsilä
Ice class	1 A, inspection 10.12.2007
Hull insurance	ALANDIA, the vessel has a double bottom
Annual inspection	8.6.2007
Latest docking	10.12.2007



Manning

The vessel had a crew of nine persons. The officers of the vessel included the master, two officers, the chief engineer and two engineers. The crew consisted of three deckhands and a cook.

The watch system on the vessel consisted of four hours of sea watch and eight hours off.

Table 1. Before the accident the working hours of the persons who were standing watch had been as follows:

Master	10 hours
Officer	11 hours
Chief Engineer	10 hours
Deckhand	9 hours

Bridge and its equipment

The vessel's navigational instruments are presented in table 2. According to the master, they were all in use and worked flawlessly.

Table 2. The vessel's navigational instruments.

Device	Type of device
Radar	JRC
Radar	FURUNO
Display of ARPA radar	JRC
Gyrocompass	Anschütz
Magnetic compass	C Plath
Autopilot	Anschütz
Echo sounder	Furuno
GPS	Furuno, 2 devices

At the time of the accident the vessel was using a British nautical chart (BA 12899) from year 2005. The scale of the chart was 1:20 000, and it was stamped in 2005.

Cargo

The vessel was carrying 1,256 tons of pulp and 570 tons of paper reels. The cargo was located in the lower hold.

Weather conditions

According to the master's Marine Accident Report, the wind was from southeast (SE) 5–7 m/s and there was no sea. According to the Coast Guard, the wind direction was 140° and speed 6 m/s at 23.43. There was light fog in the area, but it has been estimated that it did not contribute to the accident. It was dark at the time of the accident.

Description of the accident event

The general description of the accident is based on the following: the Marine Accident Report made by the master, the pilot's deviation report, the List of Actions of the Gulf of Finland Coast Guard, and the AIS and radar recording of the Gulf of Finland VTS.

The description of the accident event is based on the report drawn jointly in English by the master, the officer and the pilot. In addition to this, the pilot had compiled his own report in Finnish on 10 April 2008. This investigation report is mainly based on the pilot's report. The data about the departure of the vessel and the passing times, courses and the speeds over ground for the different legs of the route are obtained from the VTS recording.

Before the departure the pilot discussed the route options with the master. On the basis of the visibility, weather conditions and draught it was decided that the Ruotsinsalmi 6.1 m fairway was to be used¹. The FORTE reported to the Kotka VTS station at 23.02.20 and informed that she would proceed through Ruotsinsalmi to the main port of Kotka. The vessel departed from Halla at 23.08.50 on 7 April 2008². The master, pilot and second officer were on the bridge.

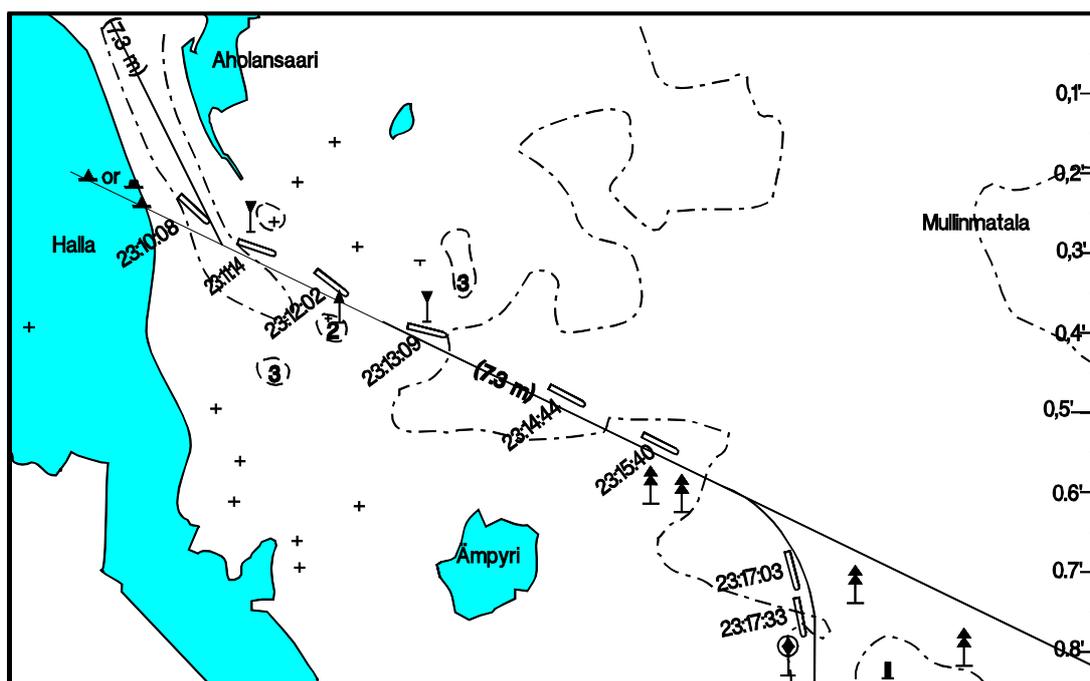


Figure 2. The yawing start of the voyage.

¹ According to the pilot's statement. The fairway in question is a shortcut fairway.

² VTS register. According to the pilot the departure took place at 23.00.

Table 3. The numerical values in Figure 2. HDG = compass direction, COG = course over ground, SOG = speed over ground.

Time	HDG	COG	SOG	
23:10:08	133	133.6	5.4	A turn to port
23:11:14	109	108.7	6.1	For a moment the vessel proceeds straight ahead, but continues its turn to port after that.
23:12:02	128	124.5	6.5	The vessel corrects yawing by turning to starboard.
23:13:09	104	106.2	7.7	The vessel turns to port again.
23:14:44	118	123.4	7.4	Unintentional yawing movement back and forth.
23:15:40	117	117.0	9.9	The vessel proceeds straight ahead before the turn.
23:17:03	165	163.6	8.7	The vessel turns slowly to starboard.
23:17:33	169	171.1	8.7	The vessel turns more sharply to starboard.

The FORTE departed from the port in a yawing manner by using slow speed. According to the AIS recording, the forecastle swerved somewhat at the lighted east spar-buoy (Figure 2). The vessel did not run over this buoy, but according to the recorded AIS position the buoy has been run over. The position of the buoy can also be somewhat too much to east on the VTS chart. The vessel has, however, passed close to the buoy. Because the passing distance is not precise, the passing has not been drawn in Figures 2 or 3.

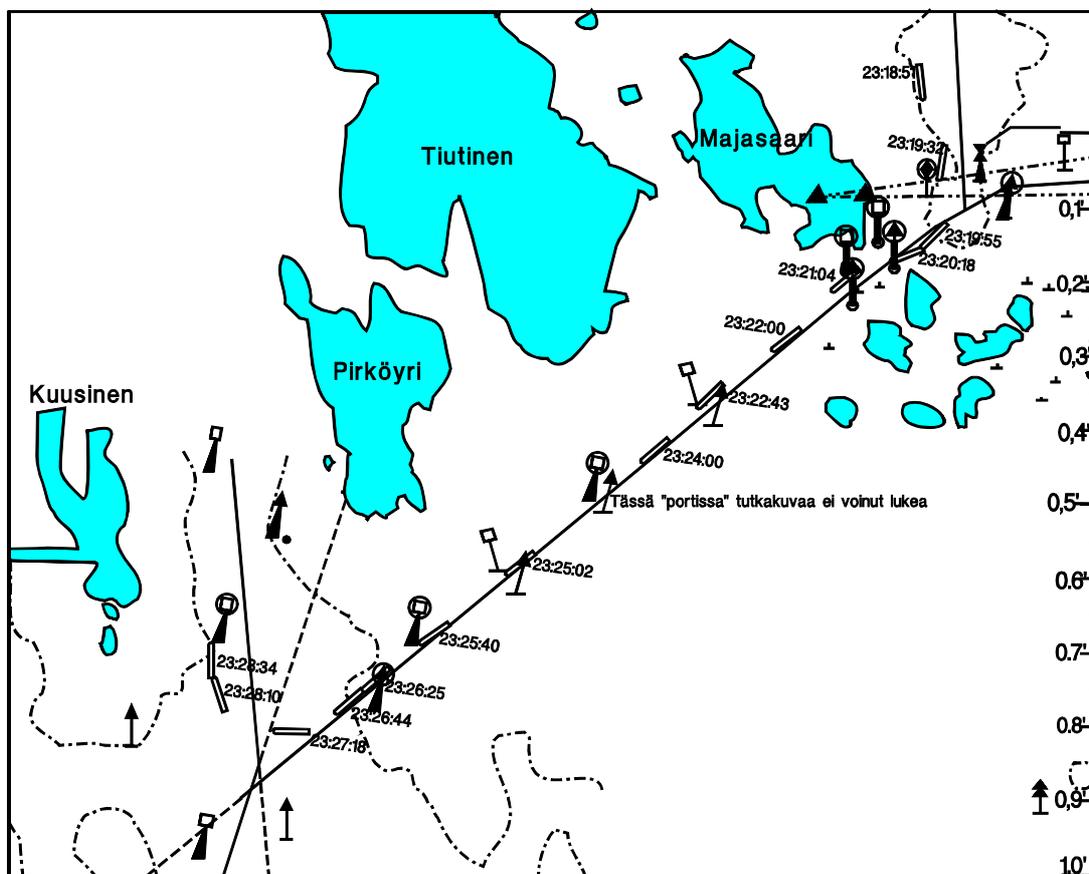


Figure 3. The vessel's route. The numerical values of the route are presented in table 4.



Table 4. The numerical values in Figure 3. HDG = compass direction, COG = course over ground, SOG = speed over ground.

Time	HDG	COG	SOG	
23:18:51	173	171.7	9.5	The vessel has proceeded too much to starboard and steers too close to the edge mark.
23:19:24	177	173.5	9.7	The turn to starboard begins.
23:19:32	189	174.8	9.1	The turn has started. The position of the vessel shifts during the following 17 seconds so it is not possible to follow the turn.
23:19:55	225	205.5	9.0	The vessel's symbol re-emerges. The turn has been somewhat too prolonged because the bend of the fairway is sharp.
23:20:18	248	237.3	8.0	The vessel passes the post at a very close distance.
23:21:04	230	237.8	6.4	A quick slowing down of the speed. The post is passed at a close distance.
23:22:00	232	234.8	8.0	The vessel has returned to the track but drifts again to starboard.
23:22:43	226	227.7	8.4	The red spar buoy is passed at a very close distance.
23:24:00	229	230.5	8.8	The following gate is steered through in the middle. The VTS radar video combines the navigation marks on the chart and the vessel as the same target. The vessel is on the track.
23:25:02	232	230.3	10.6	The vessel is on track in the gate formed by the spar buoys.
23:25:40	235	230.7	10.7	The red buoy is in the same place as the bow.
23:26:25	229	231.8	9.5	
23:26:44	229	231.0	10.0	The turn to starboard begins.
23:27:18	271	251.4	9.3	The turn continues.
23:28:10	342	333.0	7.8	
23:28:34	001	358.6	7.0	The bow is in the same place as the red buoy and the grounding takes place somewhat after this.

The radius of the sharp turn is only 400 metres at Majasaari. The radius should be five times the length of the vessel, i.e. 454.25 metres. The Waterways Department of the Finnish Maritime Administration emphasizes that the users of the fairway have wanted to have such a shortcut fairway even though the fairway planning recommendations of the Finnish Maritime Administration cannot be entirely fulfilled³. The turn was too long also in this case, and the FORTE proceeded very close to the south edge of the fairway. The progress of the vessel was winding after the sharp turn. It was possible to stop the unintentional yawing between Pirköyri and Tiutinen at 23.24.00.

³ VOLGO BALT 235 steered a too long turn 12.2007.



While the vessel was turning towards the fishing harbour from the Ruotsinsalmi fairway at the red-green buoy gate, the pilot asked the master of the vessel to turn the rudder first 10° to starboard. According to the pilot, a bigger rudder angle at this point would have caused the aft of the vessel to turn on the green buoy. The speed of the vessel was 6 knots. After a while the pilot noticed that it was possible to make a sharper turn, and he told the master to turn the rudder hard to starboard and to increase the engine power in order to hasten the turn.

The above-mentioned measures did not prevent the vessel from drifting to the wrong side of the middle red buoy off Kuusinen Island. The vessel slightly touched ground at 23.50.

After the grounding the voyage proceeded towards Vällilaituri in Kotka. The pilot informed the VTS centre about the incident. The vessel was moored to berth number 4 in Vällilaituri. The pilot asked the master to check the vessel's draught, to sound the tanks and to check the vessel for possible oil leakages. Nothing unusual was observed. The Coast Guard made a breathalyser test, and found nothing to remark.

2 ANALYSIS

The traffic from Halla to Kotka main harbour is conducted on a new traffic route. The turn from the Ruotsinsalmi fairway around the Pirköyri Island towards the main port has not been planned. According to the chart the turn becomes very sharp.

The fairway planning guidelines drawn by the Waterways Department of the Finnish Maritime Administration is based on international recommendations. According to this instruction, the turning radius cannot be smaller than 5 vessel lengths⁴.

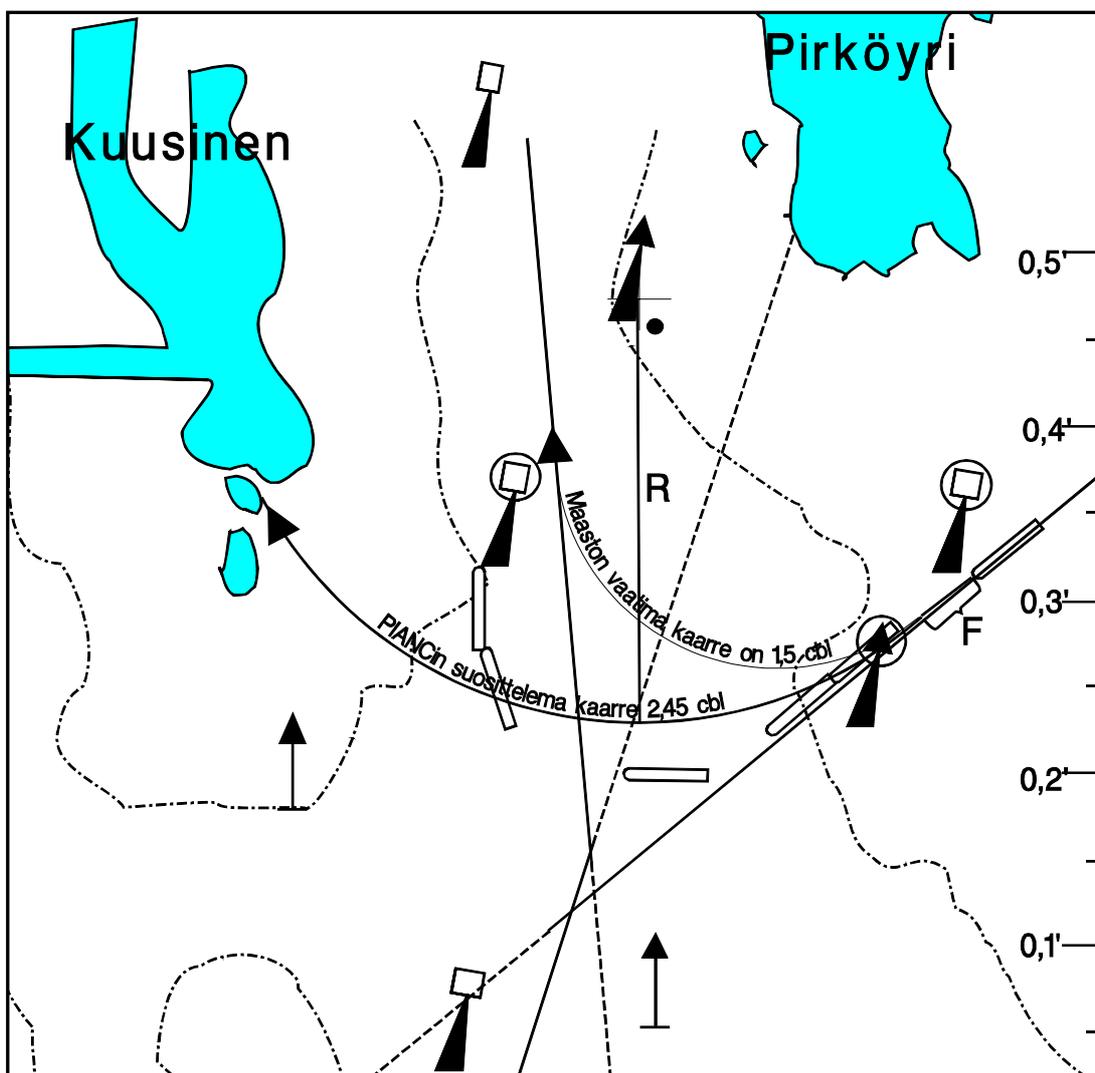


Figure 4. The fairway planning guidelines of the Waterways Department of the Finnish Maritime Administration recommend that the turning radius for a vessel of the size of the FORTE should be 2.45 cable lengths. Based on the chart it can be estimated that the radius is only 1.5 cable lengths. The vessel symbols show the track of the FORTE.

⁴ Laivaväylien suunnitteluohjeet [Fairway planning guidelines], Finnish Maritime Administration, Internal publications 1/2001, Helsinki, ISBN 1456-9442, page 17.

The usable water area did not allow the vessel to be steered in the bend according to the fairway planning guidelines. There was no space so it was not possible to draw a pilot plan for the bend described above. The planned bend was also too short in the previous turn by Majasaari (Figure 3) when the turn was too long and caused the unintentional yawing.

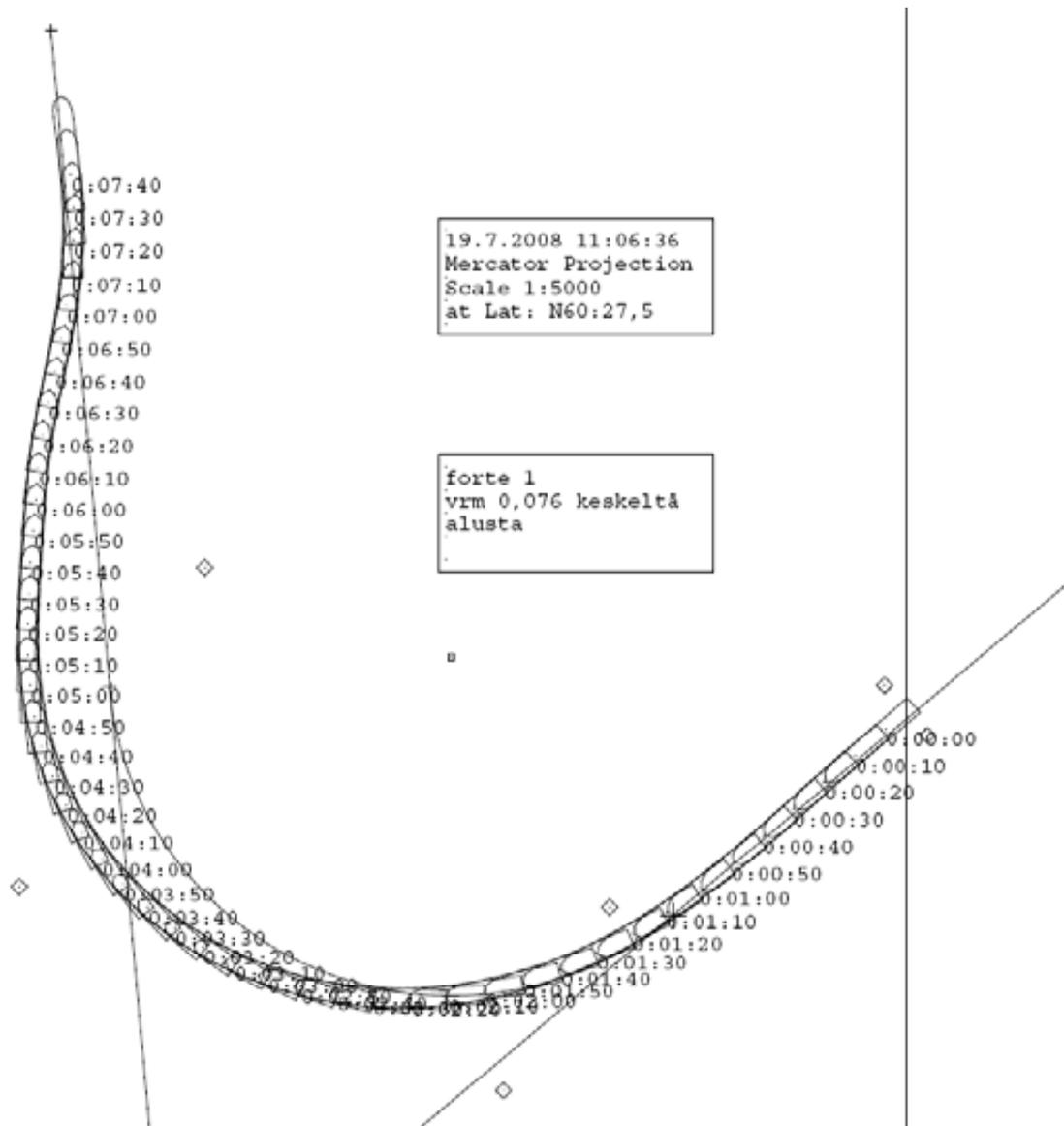


Figure 5. This is a test conducted in a simulator, and it describes how a successful turn could have been completed. In table 5 on the next page e.g. the rudder angles used in the simulator can be seen.

During the moments before the accident the vessel had proceeded too much to south in the fairway close to the green buoy. It was not possible to turn the vessel immediately because of the proximity of the green buoy could have damaged the steering gear.



Table 5. The numerical values used in figure 5.

M/S FORTE Simulation Recording:dtsreca 19.7.2008 Page 4												
Time	U-SPD	HDG	Drift	ROT	Port		Starboard		Stern		Bow	
hh:mm:ss	[kn]	[deg]	[deg]	[deg/m]	Pitch	Rddr	Pitch	Rddr	Thru	Wind	Thru	Wind
					[deg]		[deg]		[kN]	[kN]	[kN]	[kN]
*0:00:00	+06,4	228,7	+000,4	-002,0	+04,6	+10,0	+04,6	00,0	-0025	+0009	0000	+0007
*0:00:10	+06,5	228,4	+000,4	-002,3	+04,6	00,0	+04,6	00,0	-0002	+0009	0000	+0008
*0:00:20	+06,5	228,0	+000,4	-002,3	+04,0	+09,9	+04,0	00,0	-0021	+0010	0000	+0008
*0:00:30	+06,5	227,8	+000,2	+001,9	+04,0	+27,5	+04,0	00,0	-0051	+0010	0000	+0008
*0:00:40	+06,5	229,0	-000,4	+011,3	+04,0	+35,0	+04,0	00,0	-0056	+0010	0000	+0008
*0:00:50	+06,5	231,4	-001,0	+016,0	+04,0	+14,0	+04,0	00,0	-0019	+0009	0000	+0007
*0:01:00	+06,5	234,2	-001,4	+019,2	+04,0	+35,0	+04,0	00,0	-0053	+0009	0000	+0007
*0:01:10	+06,4	237,9	-002,1	+024,3	+04,0	+35,0	+04,0	00,0	-0057	+0009	0000	+0007
*0:01:20	+06,3	242,2	-002,6	+027,2	+03,8	+35,0	+03,8	00,0	-0047	+0008	0000	+0006
*0:01:30	+06,3	246,9	-003,1	+028,9	+03,8	+35,0	+03,8	00,0	-0046	+0008	0000	+0006
*0:01:40	+06,2	251,8	-003,4	+030,2	+03,8	+35,0	+03,8	00,0	-0045	+0007	0000	+0005
*0:01:50	+06,1	256,9	-003,7	+031,1	+03,8	+35,0	+03,8	00,0	-0045	+0007	0000	+0004
*0:02:00	+06,1	262,2	-004,0	+031,7	+03,8	+35,0	+03,8	00,0	-0045	+0006	0000	+0004
*0:02:10	+06,0	267,5	-004,2	+032,1	+03,8	+35,0	+03,8	00,0	-0044	+0006	0000	+0003
*0:02:20	+05,9	272,9	-004,4	+032,4	+03,8	+35,0	+03,8	00,0	-0044	+0005	0000	+0003
*0:02:30	+05,8	278,3	-004,5	+032,5	+03,8	+35,0	+03,8	00,0	-0044	+0005	0000	+0002
*0:02:40	+05,7	283,7	-004,6	+032,6	+03,8	+35,0	+03,8	00,0	-0044	+0004	0000	+0002
*0:02:50	+05,7	289,1	-004,7	+032,6	+03,8	+35,0	+03,8	00,0	-0044	+0004	0000	+0001
*0:03:00	+05,6	294,6	-004,9	+032,6	+03,8	+35,0	+03,8	00,0	-0044	+0003	0000	+0001
*0:03:10	+05,5	300,0	-005,0	+032,6	+03,8	+35,0	+03,8	00,0	-0044	+0002	0000	+0001
*0:03:20	+05,4	305,4	-005,1	+032,6	+03,8	+35,0	+03,8	00,0	-0043	+0002	0000	0000
*0:03:30	+05,4	310,9	-005,1	+032,6	+03,8	+35,0	+03,8	00,0	-0043	+0001	0000	0000
*0:03:40	+05,3	316,3	-005,2	+032,7	+03,8	+35,0	+03,8	00,0	-0043	0000	0000	0000
*0:03:50	+05,3	321,8	-005,3	+032,7	+03,8	+35,0	+03,8	00,0	-0043	-0001	0000	0000
*0:04:00	+05,2	327,2	-005,4	+032,7	+03,8	+35,0	+03,8	00,0	-0043	-0001	0000	0000
*0:04:10	+05,1	332,7	-005,5	+032,7	+03,8	+35,0	+03,8	00,0	-0043	-0002	0000	0000
*0:04:20	+05,1	338,1	-005,6	+032,7	+03,8	+35,0	+03,8	00,0	-0043	-0003	0000	-0001
*0:04:30	+05,0	343,6	-005,7	+032,7	+03,8	+35,0	+03,8	00,0	-0043	-0004	0000	-0001
*0:04:40	+05,0	349,0	-005,8	+032,7	+03,8	+35,0	+03,8	00,0	-0043	-0004	0000	-0002
*0:04:50	+04,9	354,3	-005,7	+029,9	+03,8	+10,5	+03,8	00,0	-0001	-0005	0000	-0002
*0:05:00	+04,9	358,7	-004,8	+021,7	+04,0	-24,4	+04,0	00,0	+0055	-0005	0000	-0002
*0:05:10	+04,9	001,6	-003,6	+014,2	+04,0	-35,0	+04,0	00,0	+0060	-0005	0000	-0003
*0:05:20	+04,9	003,5	-002,5	+008,6	+04,0	-35,0	+04,0	00,0	+0060	-0006	0000	-0003
*0:05:30	+04,9	004,4	-001,5	+002,8	+04,0	-35,0	+04,0	00,0	+0059	-0006	0000	-0003
*0:05:40	+04,9	004,5	-000,8	-000,8	+04,0	-11,6	+04,0	00,0	+0023	-0006	0000	-0003
*0:05:50	+05,0	004,6	-000,6	+002,5	+04,0	-01,0	+04,0	00,0	+0003	-0006	0000	-0003
*0:06:00	+05,1	005,6	-001,0	+011,2	+04,0	+33,9	+04,0	00,0	-0054	-0006	0000	-0003
*0:06:10	+05,2	008,2	-001,8	+017,4	+04,0	+10,5	+04,0	00,0	-0011	-0006	0000	-0003
*0:06:20	+05,2	010,7	-001,7	+011,0	+04,0	-24,4	+04,0	00,0	+0051	-0006	0000	-0004
*0:06:30	+05,2	011,8	-001,0	+001,9	+04,0	-35,0	+04,0	00,0	+0059	-0006	0000	-0004
*0:06:40	+05,2	011,4	-000,2	-006,3	+04,0	-35,0	+04,0	00,0	+0057	-0006	0000	-0004
*0:06:50	+05,2	009,7	+000,7	-013,8	+04,0	-35,0	+04,0	00,0	+0055	-0006	0000	-0004
*0:07:00	+05,3	006,9	+001,5	-019,3	+04,0	-35,0	+04,0	00,0	+0053	-0006	0000	-0003
*0:07:10	+05,3	003,3	+002,3	-023,2	+04,0	-35,0	+04,0	00,0	+0052	-0006	0000	-0003
*0:07:20	+05,3	359,2	+003,0	-025,6	+04,0	-28,0	+04,0	00,0	+0040	-0006	0000	-0003
*0:07:30	+05,3	355,3	+003,0	-020,5	+04,0	+06,9	+04,0	00,0	-0025	-0005	0000	-0003
*0:07:40	+05,3	352,7	+002,2	-010,7	+04,0	+35,0	+04,0	00,0	-0060	-0005	0000	-0002

Cause analysis

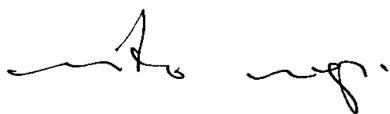
The immediate cause of the accident can be regarded to be a navigational error. Starting the turn was delayed since the vessel had drifted too much to south and it was not possible to use the rudder angles efficiently enough in order to make a successful turn. The turn should have been started as early as at the previous red buoy.

3 CONCLUSIONS

Because the turn is not planned for a vessel of the size of the FORTE, it requires special attention and the turn must be started early enough using adequate rudder angles. If the success of the turn is doubted in advance, the speed should be reduced so that it is very low, and the turn should be assisted by using the bow thruster. Using tug assistance should also be considered, but the need must be known already when the vessel departs from the port.

On the basis of the information obtained about the event and this investigation report it can be concluded that matters relevant with reference to general safety are not linked with the incident so this incident is not investigated more comprehensively.

Helsinki, 12 February 2009



Risto Repo



Kari Larjo



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