Investigation report

C 3/2002 M

DOURO CHEMIST, grounding at Lövskär junction area, February 19, 2002

SUMMARY

Portuguese chemical vessel the DOURO CHEMIST left Turku for Oulu on February 19, 2002 at 04.10, in ballast and under pilot guidance. The pilot arrived on board 20 minutes before departure. Master presented his passage plan from Turku to Isokari to the pilot, who had no comments to the passage plan. During the trip the pilot deviated from the Master's passage plan at the Väärämaa rock without prior notice and turned the vessel onto the fairway passing south of Innamo. The pilot announced that the reason for this was that the passage section between Väärämaa and Onyttan on the Master's passage plan was closed off. This was the start of a disturbance on the bridge that eventually led to a situation on board that had not been carefully and jointly planned in advance. After the pilot lost the Kaitkivi radar target that was used as the only point of reference in the turn, he performed unwarranted steering maneuvers in the uncertain situation and the vessel grounded south of the Kaitkivi. The damage caused by the grounding was relatively minor and after the inspections at anchor the vessel was transported to Turku on the same day.

INDEX

STATEMENTS

Finnish maritime administration , **Dnr 8/331/2002**

Finnish maritime administration , map and fairway department **8/331/2002**

Finnish maritime administration , district department of archipelago **36/502/2002**

LIST OF APPENDED SOURCES

Figure 1. M/T DOURO CHEMIST in the basin of Turku repair dock

INTRODUCTION

The Accident Investigation Board appointed 20.3.2002 an investigation group for investigating the accident. Juha **Sjölund**, master mariner, acted as chairman of the group and Pertti **Siivonen**, major retired, acted as expert member.

The final draft of the investigation report was sent for comments to the Finnish Maritime Administration, its Hydrography and Fairway Department and Southwestern Maritime District. The investigation group has agreed with some of the comments and the report text has been revised accordingly.

The final draft of the report was also sent for all interested parties for possible comments. No comments were received.

1 GENERAL DESCRIPTION AND INVESTIGATION OF THE ACCIDENT

1.1 Vessel

1.1.1 General data

Name	MT DOURO CHEMIST
Nationality	Portuguese

Home port	Madeira
IMO nr	9020429
Classification	GL +100 A5 M (restricted international service) E3
	Chemical Tanker Type 2 / Oil Tanker “corr” +MC E3
	Auto VF 48-60, Ice Class 1 A
Owner	BTR Biscaya Tank-Reederei Gmbh & Co, Hamburg
Managing shipping co	Transocean Shipmanagement Gmbh, Hamburg
Maximum length	90 m
Width	14.49 m
Dead weight	3741 ton
Draught, summer cargo mark	6,147 m
Gross	2634
Net	1101
Speed when loaded	13,5 knots
Main engine	2200 kW
Bow propeller	250 kW
Ice category	1 A

1.1.2 Crew, traffic restrictions and certificates

The vessel had a crew of 11 persons, German Master driving the watch, Croatian first mate, Philippine third mate, German chief engineer, Philippine third engineer, German repair man, Philippine pump assistant, Philippine cook, seaman, ordinary seaman and apprentice.

The certificates of the vessel were in order.

The vessel had a safety management system complying to IMO Resolution A.741 (ISM Code) that describes the activities on the bridge in various conditions.

The system had undergone internal auditing by the shipping company on June 20, 2001 and January 15, 2002. The corrective measures to remedy the deviations detected in the auditing had been undertaken accordingly.

The external auditing of the system on board had been performed by Lloyds Classification Society who issued a Safety Management Certificate based on this audit on October 4, 2001, valid until March 3, 2002. The shipping company managing the ship, Transocean Shipmanagement, is also audited by Lloyds and held a Document of Compliance Certificate issued by Lloyds on November 27, 2001 and valid until February 26, 2002.

The Finnish Maritime Administration inspector performed a Port State Control inspection on board on February 20, 2002. The ship was found completely seaworthy and all certificates were valid.

1.1.3 Cockpit and its equipment

Figure 2. Cockpit: The persons in the picture are situated as at the time of the accident. Pilot on the left, Master standing and mate sitting on the right.

The cockpit is spacious and well arranged offering 360° visibility except for the blind angle caused by the chimney.

The vessel has two radars. A true motion radar (pilot radar), Atlas 9600 3 cm, on the port side and an Arpa radar, Atlas 9600 10 cm (used by the crew of the vessel during piloting), on the starboard side. Both radars were functional and had been last serviced on May 9, 2001. Both radar antenna were at a height of about 31 m from sea level. There is no antenna in the bow for observing close targets.

The vessel has gyro compass Anschutz S6/26G/3/89 and two DHI 46/26G repeaters. Standard compass Classens & Plath A 11. Compass readings verified daily. Last check was done February 19, 2002 at 02.20. Other equipment on board included:

- Autopilot : Nautopilot D , DHI 046/32S/88 . Last service January 17, 2002.
- Rudder angle indicator Anschutz.
- GPS Navigator Raystar 920 and GPS Navigator Furuno Navigator GP 50 Mark 3, both were in order but no position recording.

- Depth sound JRC JTE 570 and repeater monitor ELAC Daz 25.
- Log JRC JLN 203 D doppler
- Navtex receiver JRC NCR – 300 A
- 2182 kHz watch receiver Sailor 501
- Two searchlights
- Radio station on bridge
- Nautical charts with appropriate corrections

1.2 Accident events

1.2.1 Weather conditions

The weather on February 19, 2002 at 06.43 was: Wind 6 m/s / 230° , visibility good , air temperature + 2° C

1.2.2 Preparation for the piloting trip

Figure 3. Pilot's steering point

The bridge preparations for departure were made by drafting a passage plan and by verifying the functionality of the navigation equipment according to the safety management check list. No errors were detected in the navigation equipment.

The pilot arrived on board on February 19, 2002 at 03.50. The Master and the pilot discussed the passage plan and the pilot was presented with the pilot card, which is witnessed by the form signed by the Master and the pilot. The pilot did not inform the Master of his deviating passage plan and fairway restrictions at this point.

1.2.3 Accident voyage

Departure. Nautical charts BA 3436 and later 3439 were used The last rope was cast off at 04.10 and the vessel set off for Oulu. The Master, the pilot, the mate and the watchman were on the bridge. The draught of the vessel at departure was 3,90 m at the bow and 4,55m at the stern.

The departure of the vessel was performed by steering manually without tug assistance. The autopilot was switched on at buoys T15 – T18 and after this, the pilot drove on autopilot and the Master verified that the pilot knew how to operate the autopilot and the 3 cm radar on the port side of the bridge.

The autopilot had setttings 1-3-3 meaning ”jig”, ”rudder”, ”counter rudder”. The rate of turn was 40 degrees per minute.

The piloting trip. The pilot did not inform separately of the changes to the course since the Master saw them on the monitor in front of him and the autopilot also gave a signal when the course was changed. Communication on the bridge was very scarce.

Kalkkiniemi was passed at 03.22, Rajakari at 03.43 and Orhisaari at 04.15.

As the vessel was passing Purha island the Master believed that the course would be changed to heading 267,5°at this point according to the normal planned passage to Isokari. However, the pilot did not change course. After the Master’s inquiry why the course is not being altered, the pilot informed that the 10 m fairway north of Innamo was blocked by ice and told the Master that he would drive on the fairway south of Innamo. This restriction.information had not reached master earlier.

The Master and the pilot went over to the chart desk to study the chart together and the pilot explained the situation but apparently did not emphasise that the Kaitkivi turn would be driven based only on a single radar target. It is the impression of the investigators that it was intended to rely on optical observation in the final stages of the turn. The Master studied the route proposed by the pilot. It is a marked deep channel and the Master did not doubt the choice of the new passage and trusted the pilot in the situation in question. The Master familiarised himself with the new passage by taking the accurate position, the following heading and the distance. When a new course was adopted the Master went back to the chart to study the next leg of the passage.

Figure 4. Blue line depicts the passage plan made by the Master and the red line the passage selected by the pilot.

Both the Master and the pilot had to adjust sea clutter to improve the radar display. The buoys were well visible on the radar at three miles up to five miles but when the buoys came closer to 8 cables or to 6 cables they disappeared in the near clutter. When the anticlutter was reduced the monitors showed too much sea clutter and the buoys were lost in it.

The vessel was driving along the Kaskisgrundet stern lead. The lead was slightly open to the south. The pilot was driving an open lead in order to control the drift caused by the south-west wind. At 05.49 the vessel passed the south buoy VQ(6)+LF 10 s. The Kaitkivi light was visible on both radars. The Master went over to the chart desk to study the situation. The pilot continued along the Kaskisgrundet lead until the Grangrundet edge marke lay 4 cables off, at which point he turned to heading 270°. In this turn the Master was still convinced about safe navigation of the ship and of the pilot's chances to execute the sharp turn that was approaching.

The investigation has not revealed that the Grangrundet edge marker would have disappeared from the radar. This gives some comparison indication of the effect of the too low positioned Kaitkivi radar transponder on radar navigation.

Pictures 5-8 are recordings of the Archipelago VTS. The symbol with text in the pictures is indicating the actual position of the vessel. The radar echoes are coming afterwards with delay.

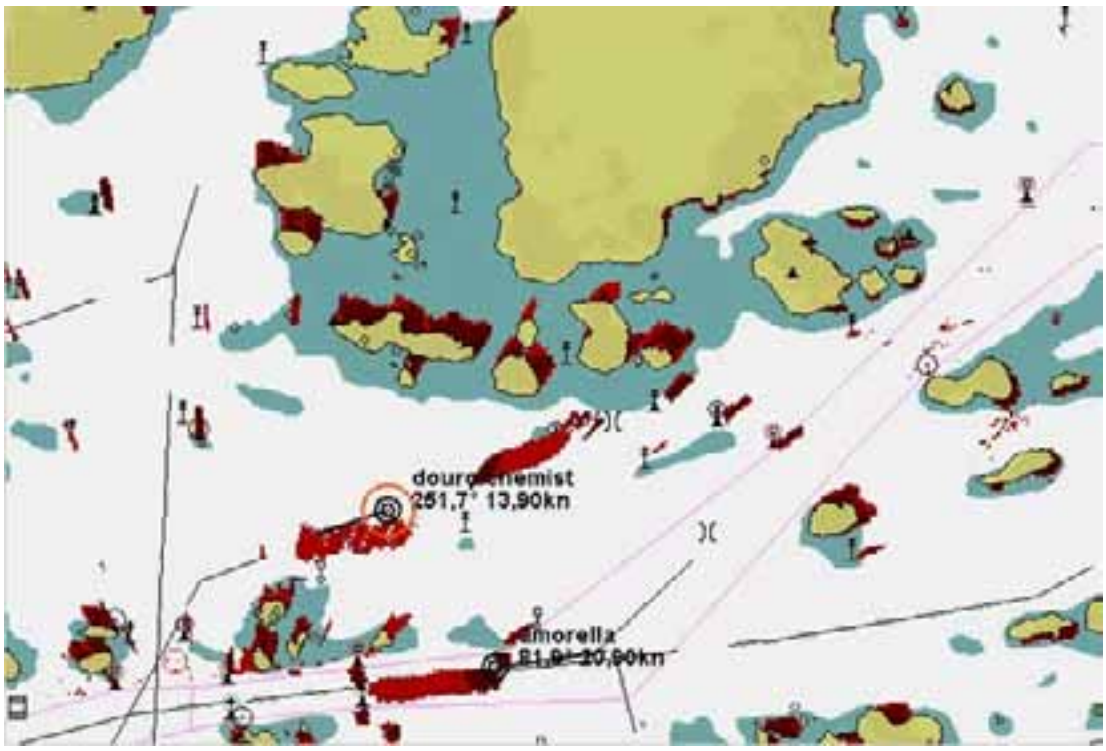

Figure 5. VTS registration display as the ship was driving on the Kaskisgrundet line before the turn to west.

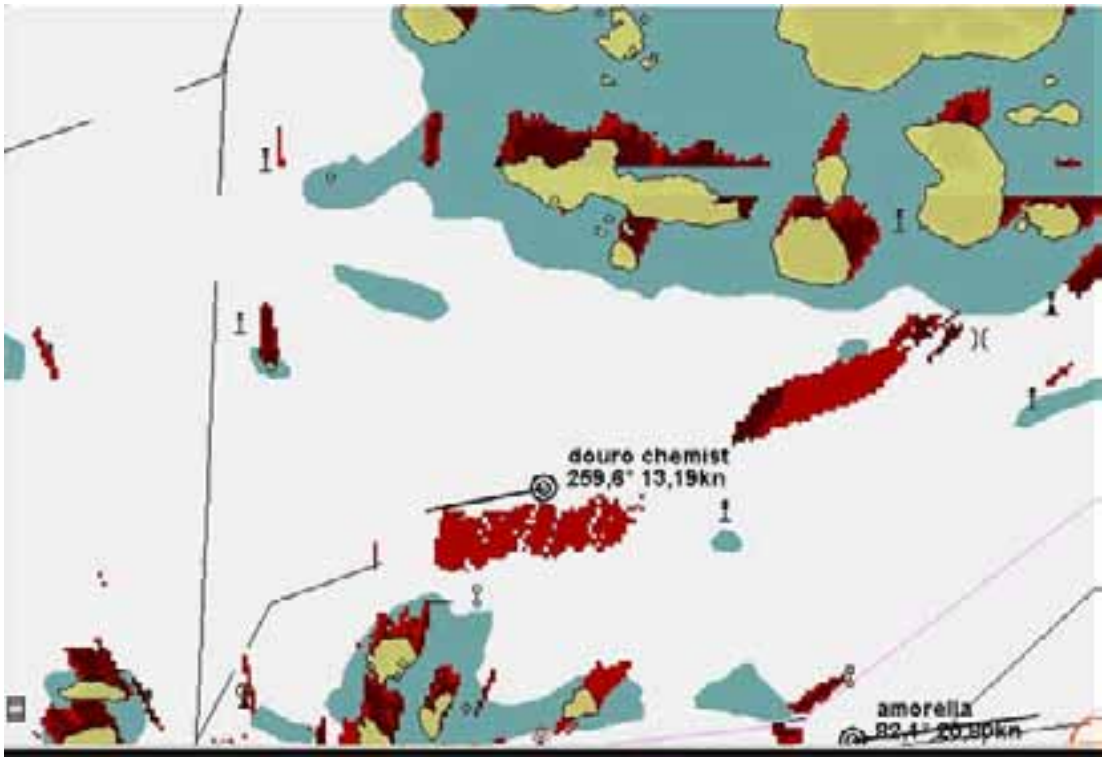

Figure 6. Vessel turning to heading 270 º. Grangrundet and Kaitkivi are still visible on the radar of the vessel.

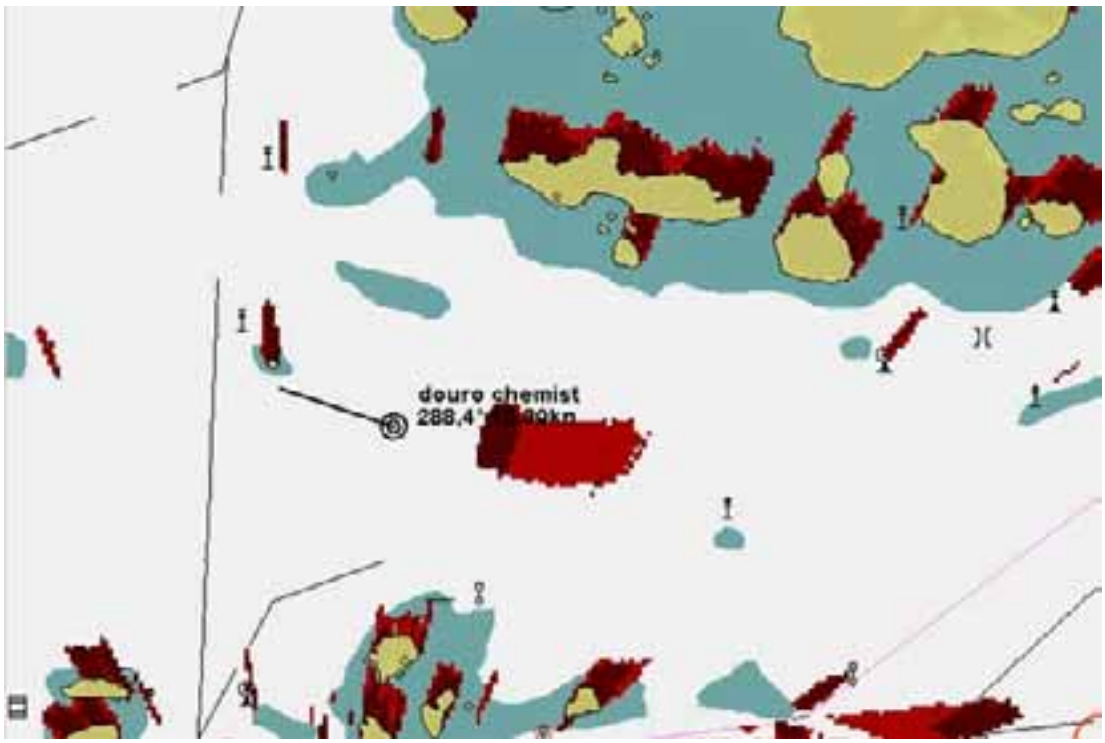

Figure 7. Last chance to avoid the accident if the positioning had been successful.

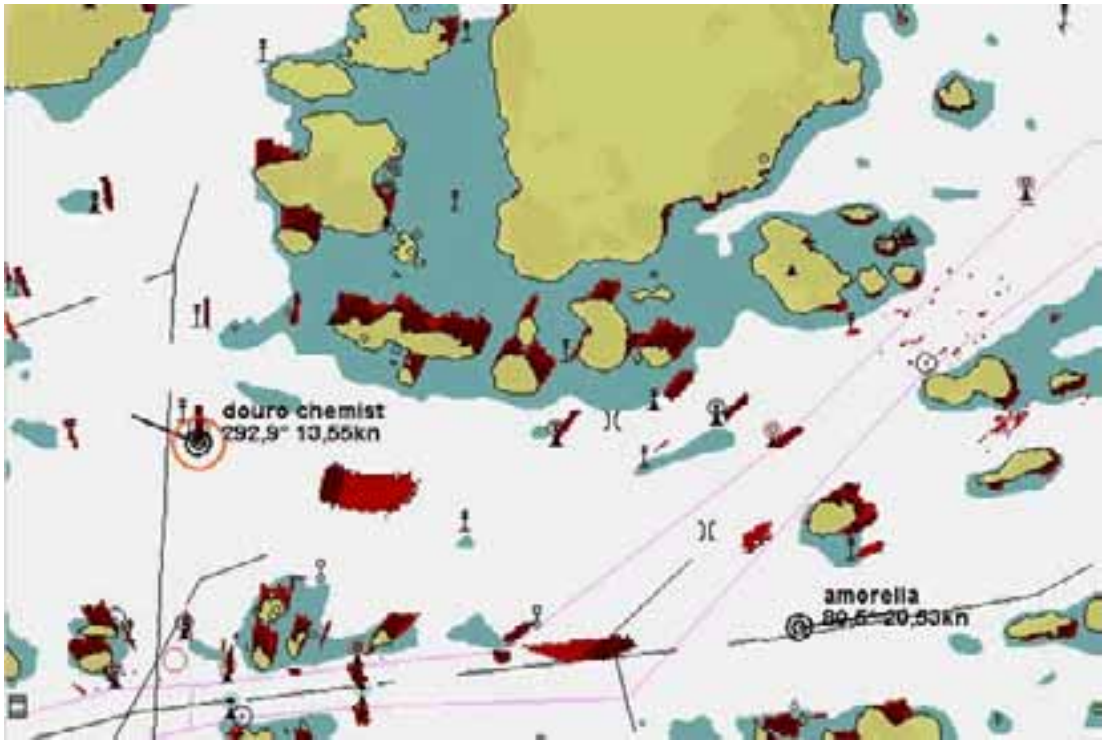

Figure 8. Vessel and Kaitkivi shallow meet

At 0553 the Master noticed that the pilot was uncertain about the navigation. Pilot tried to adjust the radar display and tried to use the binoculars in order to sight Kaitkivi. At this point, the pilot had already turned the vessel to heading 280° in order to prevent the Kaitkivi turn from going wide. The pilot informed the Master that he had lost the Kaitkivi light. He could not see it on the radar or optically. The Master immediately reduced speed, and the pilot asked the III mate to switch on the starboard searchlight. When the searchlight was switched on, Kaitkivi was detected at about 10 metres starboard of the bow. The pilot then started a turn to port and immediately after this, at 05.54, the vessel grounded. The vessel has no course plotter for subsequent investigation of the driven courses. The watch was touring the engine room at the time of the accident.

Grounding. When the searchlight was switched on, Kaitkivi was detected at 05.54 about 10 metres starboard of the bow in the light and at the same moment the vessel grounded during the turn to port. At the time of the grounding the pilot, III mate and the Master all observed that Kaitkivi was unlit. According to the investigation, the vessel was not in the lit sector of Kaitkivi at this time.

According to the survey of the seabed performed by a diver on March 5, 2002, the first grounding took place in the south-east, about 20 metres from Kaitkivi where the depth is about 4,2 metres. This place is in the dark sector of Kaitkivi.

The marks from the grounding can be seen at depths of 3,8 – 5,2 m. The marks form an arc along the rocky wall. The arc lies roughly in the direction south-east to north-west and is about 12 metres long.

1.2.4 Activities after the grounding

The vessel was anchored on February 19, 2002 at 05.57 south-west of Kaitkivi for surveying the damage caused by the grounding. The pilot reported the grounding to the authorities.

The Maritime Rescue Coordination Centre alerted patrol vessel Tursas at 06.49 and hovercraft IA 2002 at 07.00. Patrol vessel Uisko was on standby in Turku.

The vessel was empty, the previous cargo had been versanex 80 and versane 100 YK 1760. This chemical is a liquid corrosive. There was no damage to the empty cargo tanks.

The Coast Guard boarded the vessel at 08.35 for inspecting her and a small oil leak was detected at this time. Later it was ascertained that this had come from the broken rudder. The service boat of the Finnish Maritime Administration arrived at 08.25 to inspect the Kaitkivi light. The light was found operative. The Coast Guard performed an alcohol test on the Master and the pilot at 09.20. Both recorded 0/00.

The vessel had sustained damage to three ballast tanks in the double bottom, 4 C, 6 C and 7 S, to the double bottom of the engine room, to the propeller and to the rudder.

Since the damage to the vessel did not prevent moving her to Turku, she received permission from the Martime Inspector at 10.05 to continue to dock escorted by patrol vessel Tursas. She lifted anchor at 10.15 and was driven to Turku with the rudder 22 degrees to starboard in order for her to travel straight as a result of damage to the steering gear.

In the Maritime Accident Report dated by the pilot on February 19, 2002 and delivered to the Master he states the probable cause for the accident as having been darkness of the Kaitkivi light. The Kaitkivi light was inspected on March 5, 2002. The inspection showed no sign of the light having been malfunctioning in any way at the time of the grounding of the Douro Chemist on February 19, 2002.

1.2.5 Damage to the vessel

The rudder, rudder butt and the rudder machine had been damaged. All four propeller blades, the propeller shaft and the coupling machine had also sustained damage. All these had to be dismantled, repaired and remounted. Ballast tanks 4 C, 5 SB, 6 C and 7 SB had sustained damage in an area of about 150 m2. 11 metres of the bilge keel had been damaged. A total of 7458 kg of steel was used for the repairs.

Figure 9. Damage to the rudder

Figure 10. Damage to the propeller, all blades damaged

Figure 11. Hull damage on outer bottom of vessel. Water dripping out of a ballast tank

2 ANALYSIS

2.1 Conditions for navigation and piloting

2.1.1 Piloting practices in the archipelago

The safety level of the vessel should improve when the pilot boards her.

The pilots use the fairway book as their passage plan. The fairway book describes the fairway geometry and the safety equipment. The geometry includes the fairway locations, directions and verified depth in the fairway area and nearby. The sectors of the safety equipment are shown in different colours and the lead lights are shown as sectors. The Kaitkivi turn when approaching from the east is not planned in writing in the fairway book. The section of the fairway is probably not designed to be driven this way. The fairway north of Innamo is shortest way to navigate to Isokari and its depth is also 10 meters. All the preparations made to the pilots airway book are made for optical navigation except the passing and turn point distances. The navigation of the pilot immediately before the grounding was based only on one radar target (Kaitkivi), other distances to various targets were not taken into account. This shows that the Kaitkivi turn was not planned sufficiently carefully.

The first statement of the pilot of the Kaitkivi light having been unlit at the time of the incident points to insufficent preparation also with regard to optical navigation. In fact, the vessel was approaching the light from a direction that was not supposed to be lit in the first place.

2.1.2 Directions and practices of shipping company for the piloting situation

According to the directions of the shipping company, the Master and the mate on the watch shall monitor carefully the navigation of the pilot and intervene, if deemed necessary. However, in the maritime declaration session the mate on the watch was of the opinion that he had no special navigation duties since the Master was on the bridge. Such an attitude is entirely contrary to safety conscious thinking. If a person has the ability, the skill and the possibility to make observations concerning safe navigation of the ship, he must participate in the cooperation on the bridge. In the opinion of the investigators, the directions drafted in the safety management system of the vessel are compiled with expertise but remain in part only text on file. The personnel on board observes mainly the safety directions issued by the shipping company. The Finnish pilot is not familiar with the directions of the shipping company and for this reason the cooperation between the personnel and the pilot remains incomplete. In the piloting situation, this factor causes a risk depending on the person of the pilot.

2.1.3 Cockpit arrangement and conditions for piloting

The bridge of the vessel is well designed and spacious. The navigation and steering equipment is placed freely but well within reach. The pilot has his own steering point with a 3 cm radar and autopilot. The Master and the mate have a 10 cm radar and a repeater monitor for the autopilot and the override handle for the steering. The vessel has no electronic charts which would have helped the Master in monitoring the piloting when the passage plan was unexpectedly altered. The passage plan was based on the memory and the fairway book of the pilot whereas the Master had to run to the chart desk. Thus, the Master could not follow the working of the pilot sufficiently carefully, since his own activity focused on gathering information from the chart.

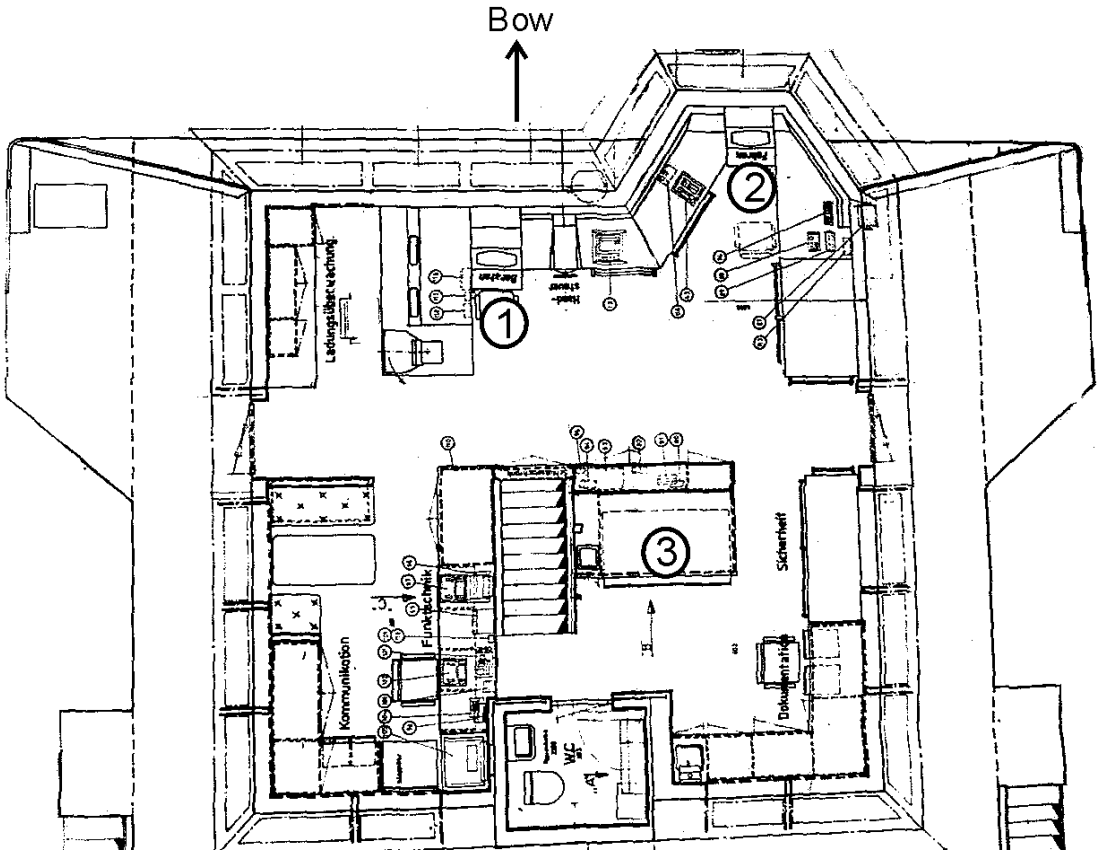

Figure 12. Layout of the bridge

1	Pilot's steering point
2	Master's/mate's steering point
3	Chart desk

2.2 Navigation on the accident voyage

2.2.1 Weather and movement of the ice

Visibility in the accident area was good, wind was from the south-west at 6 m/s and open water. Kaitkivi is low (5,2 m from sea level) and there were stacks of ice around it which could have made it more difficult to get a good radar echo of Kaitkivi even though it is equipped with efficient but low-mounted radar transponders.

Figure 13. Kaitkivi light

The currents in the vicinity of the location of the grounding have not been officially measured. When the ship anchored after the accident it was noticed that she turned north to south with the bow pointing south due to the prevailing south-west wind and the current. The investigators have empirical experience of the strait between Nauvo and Korppoo. Currents of up to 6 knots have been detected in this Storströmmen strait. It can be concluded from the circumstances that there was a south to north flow in the accident area that had an effect on the navigation. The effect of the current cannot be estimated further due to the lack of more precise information.

2.2.2 Piloting trip

The piloting should include a possibility for alternative navigation methods, optical navigation and radar navigation. In order to facilitate navigation in the accident area, the

height of Kaitkivi should be increased, for example by mounting a radar transponder higher up. The sectoring of Kaitkivi should be increased for optical navigation so that the sector would be visible also to the 10 metre fairway south of Innamo. The trunk of the Kaitkivi light should also be lit. The sector change would support the start of a turn at the planned radius to the fairway leading north. Optical navigation at the Kaitkivi turning point could also be facilitated by lit leads.

The opportunities provided by modern positioning technology should be systematically used in further development of the piloting. A piloting GPS should be developed for the pilots as an alternative navigation device. The fairways used for the piloting and their reserves could be programmed into the device. Such a device would sound an alarm and would show the location of the vessel with regard to the safe fairway in a hazardous situation. This would provide the person piloting the ship with the information for correcting the steering without much delay and independently of the navigation system of the vessel.

The VTS system should be developed so that it would sound an alarm if a ship that is being monitored leaves the safe fairway area.

According to the pilot's statement, he has been taught by a senior pilot to navigate the Kaitkivi bend so that the Kaskiskgrundet lead is followed until the Grangrundet edge marker is 4 cables off at which point the vessel is turned to heading 270°, which direction is continued until Kaitkivi is 3 cables off on the radar, at which point a change of heading to the north is begun. When turning this way, the distance of the ship from Kaitkivi is maintained at 3 cables and the vessel positioned straight to the next heading 002,5°. According to the understanding of the investigators this plan makes the turn too steep, especially since there is a wide area of navigable water. Wider use of the waters also improves optical navigation. When the Grangrundet border marker lies directly abeam the heading should be changed to 280° and when the green sector of Kaitkivi becomes visible, the heading must be changed to 002,5° . This makes optical navigation possible if the steering properties of the vessel allow it. This also makes alternative navigation possible in addition to the radar. The requirements for safe navigation include that there are at least two independent positioning methods available at all times.

The pilot changed the heading to 270° when Grangrundet lay 4 cables off but he panicked after he "lost" Kaitkivi. Without knowing the true location of the vessel he started to turn further to starboard, first to 280° and later even further with the aim of stopping the turn from going wide. According to the understanding of the investigators the vessel must be stopped if the vessels position is uncertain and the passage can be resumed only after the position has been ensured. According to the pilot, the moderate southwest wind at 6 m/s and the flow to the north also contributed to the accident.

Passage planning that is based on tradition does not necessarily yield the best results. Communication between the authorities gauging the sea and the persons using the fairway should be seamless.

The closing of an official fairway without prior notice to vessel under foreign flag is not acceptable from the point of view of navigational safety.

Information about closing a fairway is a local warning, which is issued by the local authorities of Finnish Board of Navigation. This information is published in the Finnish Notices to Mariners written in finnish and swedish and is read in the local radio, several times a day, in finnish and swedish but not in english. This kind of local warning are not published either in NAVTEX or in British Armiralty Notices to Mariners. The system is believed to function so, that informing to foreign ships is left to the local pilots duty. The system lying on pilots memory did not work In this case. Safety system left on one man, which concerns vessels under foreign flag with communication language in english, could be imprived to increase use of english among the domestic languages. Innovation proposals could be considered distributing local warnings via local agents to all vessels under foreign flag which are entering to the harbours in the area and parallel use of english in the VTS – system. It should be considered that the local warnings are read also in english in addition to the domestic languages.

2.2.3 Cooperation on the bridge

According to the understanding of the investigators, the activity on the bridge conformed to the practice described in the safety management system except for the passivity of the mate having the watch. It is surprising that the pilot deviated from the agreed passage plan without prior notice and steered the vessel towards the fairway (10 m) leading south of Innamo instead of the north fairway. The pilot should have notified the Master of his intentions in good time so that the Master could have prepared himself for the situation more carefully. The Master had to run between the chart desk and the steering point on the bridge in order to find out the location of his ship and the intentions of the pilot. However, this does not exclude the fact that the Master of the vessel shall be able to take care of the navigation even in unexpected situations. The fact that the pilot did not voice his intentions to change the course during the piloting trip to the Master and did not immediately and audibly notify him of the fact that he was in an uncertain situation can be considered contrary to good seamanship. Thus, the ship ended up in a situation where it was impossible to avoid danger. The activity of the Master in following the operation of the pilot initiated last minute salvage efforts. Neither the Master nor the pilot had precise information of the true location of the vessel at 0549 immediately before the grounding.

All activities improving the communication on the bridge are welcome.

2.2.4 Distress signal and launch of the rescue operation

After the gorunding on February 19, 2002 at 05.57 the vessel was anchored south-west of Kaitkivi for inspection of the damage caused by the grounding. The Maritime Rescue Coordination Centre received a distress signal on February 19, 2002 at 06.36. The vessel reported that there were no personal injuries.

The MRCC alerted patrol vessel Tursas at 0649 and hovercraft IA 2002 at 07.00. Patrol vessel Uisko was ordered to stand by in Turku.

The vessel was empty the previous cargo having been versanex 80 and versane 100 YK 1760. The empty cargo tanks had sustained no damage.

At 0835 the Coast Guard boarded the vessel for inspection and a small oil leak was detected. This was later ascertained to have come from the broken rudder. At 0920 the Marine Guard performed an alcohol test on the Master and the pilot, both recorded 0/00.

The vessel had sustained leaks in three ballast tanks in the double bottom, 4 C , 6 C and 7 S, in the double bottom of the engine room, in the propeller and in the rudder.

When the damage to the vessel had been inspected and since no danger of sinking or of environmental damage was to be expected the Maritime inspector and the environmental authorities permitted the vessel to sail to dock escorted by patrol vessel Tursas. The vessel lifted anchor at 1015 and she sailed to Turku with the rudder indicator at 22° to starboard in order to make her travel straight after the damage to the steering gear. The rudder and the rudder angle indicator did not show identical readings. In Turku the firefighters were prepared for oil damage control but this was not necessary.

After being surveyed by divers in Turku port it was decided to dock the vessel at Turku repair docks.

3 CONCLUSIONS

3.1 Chain of events leading to the grounding

The unexpected deviation from the Master's passage plan mitigated the advance opportunities of the crew of the vessel to prepare for the new part of fairway. The markings on the new part were deficient with regard to the turn in question. The loss of the only radar target for the turn at a critical moment eradicated the support for making a safe turn. The turns to starboard that were made too early in the last minute panic and the combined effect both of the south-west wind and the north current drove the ship towards the Kaitkivi shallow. The evasive movement to port in connection with switching on the searchlight and sighting of Kaitkivi caused the stern of the vessel to shift to starboard, closer to the rocks. This explains the fact that the damage was sustained on the starboard side of the ship from midship to stern.

3.2 Underlying factors contributing to the accident

The safety equipment of the fairway in the Kaitkivi turn from east to north is not designed for a turn to navigate in this way. The present safety equipment do not provide adequate support for a safe turn.

The information of closing part of the Fairway leading to had not reached the Master. The pilot notified of the closure until the Master had to inquire why the passage plan was not followed. When the vessel is steered by ignoring the Master's instructions or deviating from them, this kind performance and behavior can be at least critisized. However, the approval of the Master negotiated after the deviation somewhat softens the above interpretation.

The two VTS system radars in the area can measure the position of the monitored ship accurately but they do not alert sufficiently early if the vessel stays off the fairway. VTS recording indicate that theturning route is not displayed in theis chart. Therefore they have no way to compare vessels movements in the turning point.

The obvious reason for the loss of the Kaitkivi target from the radar screen is its low height (5,2 m), and alternative echoes were not used. Observing the target weakens its unlit trunk and the lack of the sector light in the direction used for the approach. However the vessel was not stopped when the situation became uncertain.

Since the signals to the Master were reliable and in some sense reassuring earlier on during the trip, nothing indicated to the Master that the pilot could lose control of the situation. The trip proceeded in silence relying on the technology and by making personal observations whereas, on the other hand, there should have been lively exchange of information relating to the positioning and commands during the voyage. The mate should have also participated in the exchange information. Now, the cooperation on the bridge with the pilot remained insufficient and the loss of the single radar target at a critical moment realised the inherent risk in the operation method.

4 RECOMMENDATIONS

4.1 On fairway restrictions

To give the possibility to the foreign vessels to prepare the passage plan well in advance, taking into account the local warnings, the investigators recommend for the maritime districts that:

1. *The navigation district office of the Finnish Maritime Administration should take care that the issued local warnings are informed in time and in English to the foreign vessels sailing in the area.*

4.2 On piloting

The pilot's passage plans should also take into account optional fairway choices for exceptional situations. These passage plans should be drawn up under control of the navigation district and they should be included in the pilot examination. The investigators recommend for the maritime districts and the Finnish Maritime Administration that:

2. *The pilot present his passage plan openly and well in advance to the master of the vessel and compare it to the Master's corresponding plan in order to detect the possible deviations before the start of the piloting. Co-operation on the bridge shall be seamless and the communication clear.*

3. *The Finnish Maritime Administration study the possibility of acquiring modern equipment, such as portable GPS positioning devices, to help the pilots in case there are disturbances in the navigation equipment of the vessel. Such an arrangement provides the pilot with a better opportunity for reacting more quickly if the vessel stays off the fairway than a delayed alert coming from elsewhere.*

4.3 Fairway markings

The investigators recommend for the Hydrography and Fairway Department of the Finnish Maritime Administration and Southwestern Maritime District that:

4. *The Kaitkivi turn be marked more clearly by using leads and a radar transponder higher up. The sector of the Kaitkivi light should be extended to the approach direction used in this case and also the trunk of the light should be lit.*

   If the fairway chosen in this case will be used in the future the Kaitkivi turn should be planned more carefully and the various positioning methods be used more extensively.

4.4 Role of the company

The investigators recommend for the owner of the DOURO CHEMIST that:

5. *The company and the Master should emphasise to the mates the importance to comply the procedures mentioned in the safety management system.*

4.5 Role of VTS

The investigators recommend for the maritime districts that:

6. *The VTS should monitor the vessel traffic more carefully and act as an active alerting party if a vessel is on its way into a dangerous situation.*

Helsinki 25.11.2002

Juha Sjölund

Pertti Siivonen

Enclosures mentioned below are written in Finnish, and are therefore filed in the office of Accident investigation Board.

Statements:

Finnish maritime administration , **Dnr 8/331/2002**

Finnish maritime administration , map and fairway department **8/331/2002**

Finnish maritime administration , district department of archipelago **36/502/2002**

The following appended sources are on file at the Accident Investigation Board:

1. Maritime Declaration protocol with appendices
2. Bridge and general arrangement drawings of the Douro Chemist
3. VTS-recordings
4. Photographs
5. Notes of the investigators
6. Activity list of the Maritime Rescue Coordination Centre
7. Copy of the navigation directions of the safety system of the shipping company.
8. Extract from operation manual of the autopilot
9. Master voyage plan