Investigation report

C2/2010M

M/V GLOBAL CARRIER and M/V ECOSTAR G.O, collision in Oxelösund, Sweden on 27 February 2010

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

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SUMMARY

M/V GLOBAL CARRIER AND M/V ECOSTAR G.O, COLLISION IN OXELÖSUND, SWEDEN ON 27 FEBRUARY 2010

On 27 February 2010 the Finnish flagged vessel GLOBAL CARRIER was on a routine voyage from Turku, Finland bound for Oxelösund, Sweden with a cargo of semitrailers and trucks. There was dense fog in the archipelago but pilot assistance was not considered because the Master was licensed to carry out piloting. The Master had previous experience of this fairway in similar visibility conditions.

GLOBAL CARRIER approached the archipelago with a speed of 16.2 knots and navigation was carried out by the OOW, the 1st Officer and the Master was on the bridge. Two radars were in operation, one in 0.75 NM range and the other in 1.5 NM range. The electronic chart display was also in use.

When passing Ljungskär the speed was still 16.2 knots and the distance to harbour was 0.6 miles. At this stage the Master was in charge of navigation. The speed was reduced to 12.8 knots after passing Ljungskär. There was no communication concerning the manoeuvres between the team members on the bridge. The speed should normally have been 6 knots when passing Ljungskär.

Chief Officer released the first Officer about ten minutes prior the approach to harbour. The Master did order the Chief Officer for look out as there was no dedicated watchman for lookout. By this order the Chief Officer lost his situational awareness.

GLOBAL CARRIER collided with the alongside moored M/V ECOSTAR G.O in Oxelösund port with the speed of 7.2 knots.

This investigation raised several deficiencies such as inadequate voyage planning, poor Bridge Resource Management, excessive speed in dense fog, incomplete bridge manning, poor implementation of company procedures and poor follow up by the VTS.

The investigators recommend the management company to improve the implementation of the SMS procedures on board.

ABBREVIATIONS

AIS	Automatic Identification System
DGPS	Differential Global Positioning System
Gross	Gross register tonnage
Nrt	Net register tonnage
Dwt	Deadweight
IMO	International Maritime Organisation
RoRo	Roll on Roll off
NFU	Non follow up
FU	Follow up
VHF	Very High Frequency
NM	Nautical Mile
IMDG	International Maritime Dangerous Good (code)
UN	United Nations
UTC	United Time Co-ordinated
VTS	Vessel Traffic Service
S-VDR	Simplified Voyage Data Recorder
IALA	International Association of Marine Aids to Navigation
DPA	Designated Person Ashore
ISM	International Safety Management (Code)
SMS	Safety Management System
PEC	Pilot Exemption Certificate
TSFS	Swedish Transport Agency's regulations
OOW	Officer of the Watch
COLREGS	Collision Regulations
ARPA	Automatic Radar Plotting Aid
STCW	Standards of Training, Certification and Watch keeping
GMDSS	Global Maritime Distress and Safety System
VTSO	Vessel Traffic Service Operator

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INTRODUCTION

The Finnish flagged vessel GLOBAL CARRIER collided with the Marshall Islands flagged vessel ECOSTAR G.O in the port of Oxelösund in Sweden at noon on 27 February 2010. ECOSTAR G.O. was moored alongside for cargo operations.

Maritime Investigation Unit at the Swedish Transport Agency (STA) and the Accident Investigation Board of Finland (AIBF) were soon informed about the collision. An investigator from STA visited the ship on 3 March 2010 to gather information about the accident.

Based on a preliminary investigation, AIBF decided to initiate an investigation. AIBF and STA agreed to carry out a joint investigation and that Finland will be the lead investigate state, according to IMO Code for the Investigation of Marine Casualties And Incidents, Res.A.849(20).

AIBF investigator Captain Micael **Vuorio** was appointed investigator in charge and Captain Juha **Sjölund** was appointed as investigator. Investigator, Captain Richard **Blomstrand** represented the Maritime Investigation Unit at STA in the investigation.

The report was sent for a statement to the management company of the GLOBAL CARRIER, for comments to the GLOBAL CARRIER's Master, the Finnish Transport Safety Agency, the Swedish Transport Agency and to the Swedish VTS and for information to the Gleamray Maritime Inc, Greece. Some minor text changes have been made in part 1 of the report, based on email exchange with the management company of the GLOBAL CARRIER.

The time used in the accident report is the GLOBAL CARRIER ship time unless otherwise stated.

1 OVERVIEW OF THE ACCIDENT AND THE INVESTIGATION

1.1 The vessels

1.1.1 General information

M/V GLOBAL CARRIER

Figure 1. M/V GLOBAL CARRIER

Type	Cargo ship, RoRo
Built	1978, Ulsan, South Korea
Flag	Finnish
Homeport	Maxmo
Owner	Lillbacka Powerco
Management	ASP Ship Management
Class	Lloyds Register
IMO No.	7528647
Call Sign	OJLA
Gross	13117
Net	3935
Dwt	14690 t
Length	156 m
Breadth	21.20 m
Draft max.	7.30 m
Speed	17.5 knots

M/V ECOSTAR G.O

Figure 2. M/V ECOSTAR G.O *(Source: owners webpage)*

Vessel type	Bulk carrier (Panamax)
Built	2007 Hudong-Zhonghua Shipbuilding. (China)
Flag	Marshall Islands
Homeport	Majuro
Owner	Gleamray Martime Inc.
Class	ABS
IMO No.	9386421
Call sign	V7NQ3
Gross	40170
Net	25603
DWT	75149 t
Length	225 m
Breadth	32.26 m
Draft	14.2 m
Speed	13.9 knots

1.1.2 Manning on GLOBAL CARRIER at the time of the accident

There were totally 26 persons onboard the GLOBAL CARRIER at the time of the accident; 17 crewmembers and 9 passengers. According to the manning certificate the total number of crew should be no less than 15. The crew consisted of several nationalities; Finns, Estonian and one from Latvia. The Deck officers and crew were all Finnish.

Bridge team and experience

The bridge team on GLOBAL CARRIER consisted of the Master and the Chief Officer at the time of the accident. The Master was manoeuvring the ship from the centre console and the Chief Officer was monitoring the passage of seamarks in the fairway from the port bridge wing and reporting them to the Master. The Master had pilot license for the fairway to Oxelösund and therefore there was no pilot onboard at the time of the accident. The watchman was on the forecastle head reporting to the bridge by walkie-talkie. The first officer arrived to the forecastle just before the accident and he noticed ECOSTAR G.O and reported it to the bridge.

The Master has 10 years experience as officer and 3 years as Master on GLOBAL CARRIER. He holds a Finnish Master license. The Master had also a pilot exception certificate (PEC) for Port of Oxelösund. According to the Master he has participated in several Bridge Resource Management training sessions. Before the accident he had been on duty 1.5 hours. He felt rested, as he went to bed at 0300 ship time the night before. He had been working 11 hours during the last 24 hours and 81 hours during the last week.

The Chief Officer has 3 years experience as officer and 2 months as Chief Officer. He holds a Finnish Chief Officer certificate. He had been on duty 4 hours before the accident. He had been working 14 hours during the last 24 hours and 85.5 hours during the last week.

1.1.3 Bridge equipment on GLOBAL CARRIER

The ship was built in 1978 and the bridge layout is from that time with the bridge instruments placed in the center console along the front wall of the bridge. The radars, the autopilot and the electronic chart are located at the starboard side of the center console, close to the maneuvering place (Figure 3). The speed log display is situated in the center of the bridge console and is not visible from the Master's conning place. The speed information from the log was not reliable and therefore the speed log information was not used in the other bridge equipment. Due to this solution it is difficult to monitor the navigation equipment and Bridge Resource Management is not supported with this arrangement of instruments.

Figure 3a. The maneuvering place of the Master.

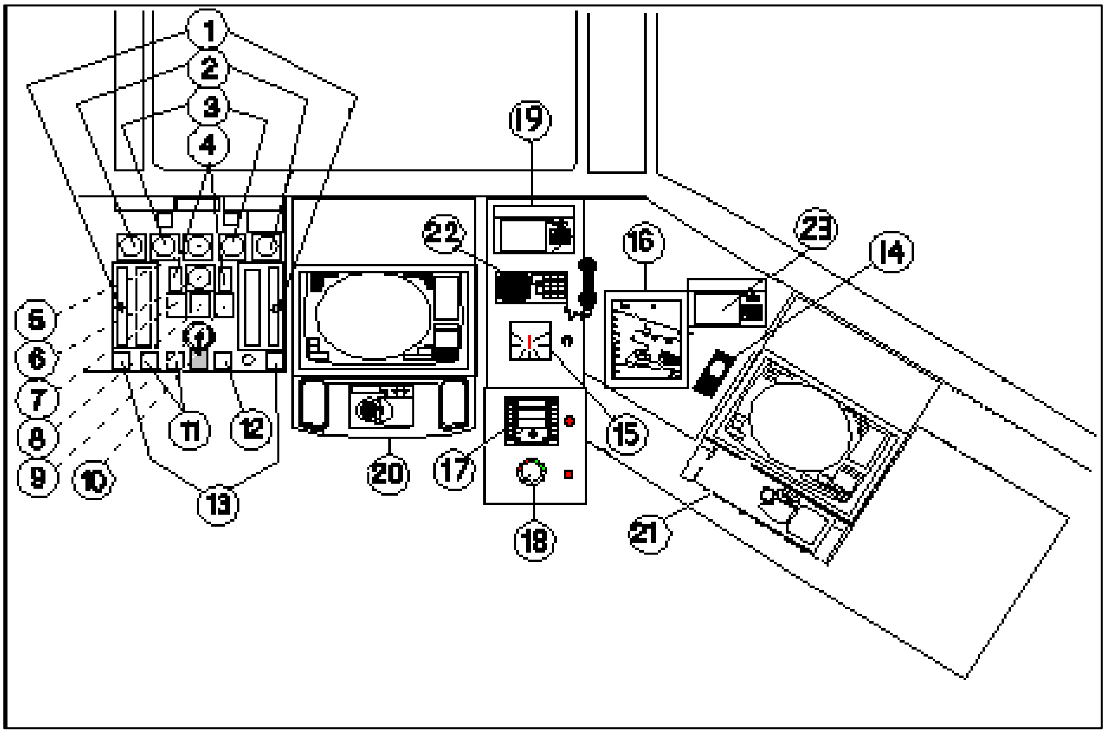


Figure 3b. The maneuvering place of the Master. See also the table below (explanations for numbers).

Nr	Instrument	Nr	Instrument
1	Engine maneuvering levers	15	Rudder angle indicator
2	Indicator for Propellers blade angle	16	NaviSailor 3000 Electronic chart
3	Indicator for the propeller shafts RPM	17	EMRI SEM 200 autopilot.
4	Main engines emergency stop	18	FU-manual steering.
5	Indicator for Bow thruster Propellers blade angle	19	MX Marine, MX 420 navigation system, D/GPS receiver
6	Bowtruster amphere indicator	20	Kelvin & Hughes 6000A S-band Radar (10 cm transmitter), Radar antenna at the bow.
7	Switch for NFU or FU Bow thruster operation	21	Kelvin & Hughes 5000t x-band Radar (3 cm transmitter), Radar antenna at the top mast
8	Bow thrusters, NFU maneuvring lever	22	Sailor VHF-radio
9	Switch for the operation position for the Bow thrusters (Center console – bridge wings)	23	SAAB AIS MKD
10	Bowtruster FU maneuvering lever		Furuno VDR VR-3000S
11	Switch for main engine NFU or FU operation		Furuno LS- Echo sounder
12	Switch for the operation position for the engine control (Center console – bridge wings)		SIMRAD GN33, D/GPS receiver
13	NFU pitch adjustment for the propellers		Sperry MK 37, Gyro compass
14	SIMRAD anemometer.		Speed log

Bridge equipment in use at the time of the accident

Both radars were running at the time of the accident. The range of S-band radar picture was 0.75 NM and on the X-band the range was 1.5 NM. The presentation of the radar picture was North Up/ True Motion on both radars. The S-band radar antenna is located at the forecastle and the X-band radar antenna is in the Main mast. The Master used the S-Band radar as the main navigation equipment during the approach to Oxelösund. The NaviSailor 3000 Electronic chart beside the S-band radar was in use. The presentation was North Up and the chart scale used was 1:4000. The position and speed information was from the MX 420 D/GPS.

There is a speed and course vector available in The NaviSailor 3000 Electronic chart, showing the movements of the ship. The Master maneuvered the vessel with manual steering and the Pitch control.

After the accident, the Master analyzed the data from the electronic chart and he suspected a delay in the position because the last plotted position is some distance away from ECOSTAR G.O (see appendix 1). The last position in the chart is however the position of the GPS antenna onboard on GLOBAL CARRIER which can be seen when the vessel symbol is activated on the electronic chart (picture 18).

1.1.4 Cargo

GLOBAL CARRIER had 79 units of cargo onboard, consisting of semitrailers and trucks, totally 2185 metric tons. Two of the units had IMDG cargo, consisting of UN 1950, Aerosols and UN 0081, Explosives. The cargo was loaded in Turku for Oxelösund and Travemünde. After the collision all the cargo was discharged in Oxelösund.

ECOSTAR G.O. had on arrival 71005 metric tons cargo of coal from Australia of which 11235 tons were loaded in the damaged cargo hold No.4. The surveyors on the site estimated that 555 tons had been discharged from the hold No.4 in form of “good cargo”.

1.1.5 Voyage plan for GLOBAL CARRIER

Voyage planning is a procedure to develop a complete description of a vessel's voyage from berth to berth. The plan includes leaving the dock and harbour area, the en-route portion of a voyage, approaching the destination and mooring.

There is a voyage plan form in the Company Safety Management System created by the Company. SMS states that all vessel specific plans used must cover as a minimum the fields included in the company standard form.

The vessel had prepared the voyage plan from Turku harbour to Oxelösund harbour. The voyage plan consist relevant waypoints and distances between them and some relevant information (See appendix 4) but very limited compared to the IMO Resolution A.893(21). The speed is not determined in this voyage plan and the column for this purpose was left blank. The Master stated that the reason for this was that the speed is not restricted in the approach to Oxelösund[1].

In addition to this the investigators received the ships pilot boarding card indicating ship’s main particulars. The pitch and speed column was left blank. Another document indicating turning circles, stopping data, maneuvering speeds and pitch settings was received (See appendices 2 and 3).

[1] More of Finnish maritime legislation concerning voyage planning in chapter 1.4.1

1.2 The accident

1.2.1 Location

Port of Oxelösund

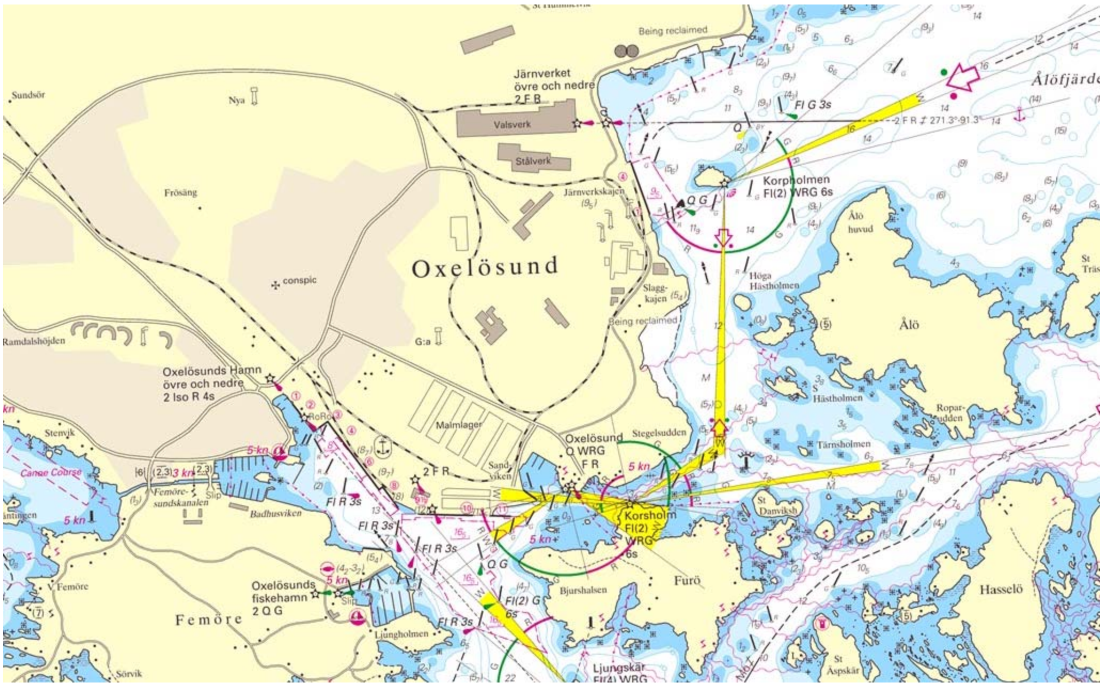


Figure 4. Chart of Oxelösund

The port of Oxelösund is located about 110 kilometers southwest of the Swedish capital Stockholm. The port is owned by equal parts by SSAB (Swedish Steel AB) and the municipality of Oxelösund.

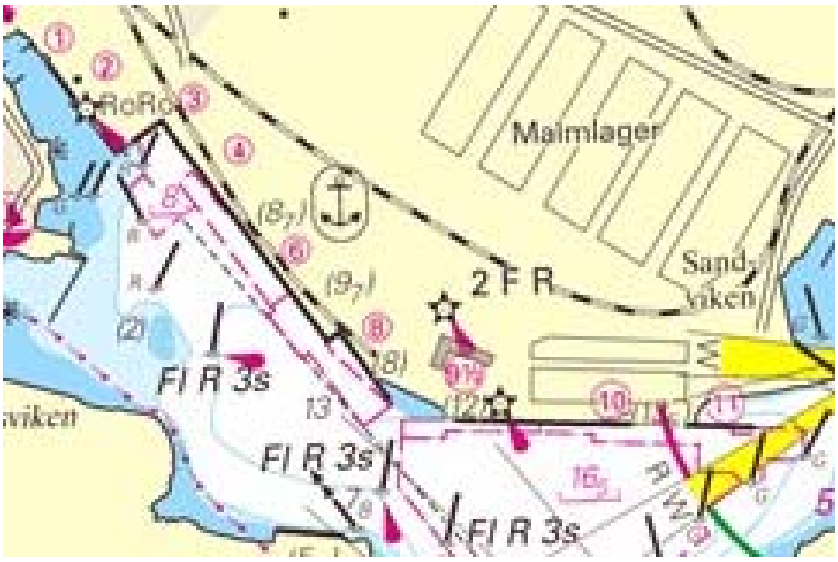


Figure 5. Chart of the accident location in Oxelösund

The main port consists of eight berths and an Oil pier. About one nautical mile (1852 meters) North East of the main port is the iron factory, producing the steel products which are shipped out from the port.

Berth numbers three to eight in the main port are used by container vessels and smaller bulk carriers and have a depth of 8–9.7 meters. Berths 9.5 and 10 are used by larger bulk carriers with a depth of 16.5 meters and berth number 11 is the Oil pier.

M/V GLOBAL CARRIER's normal berth was number 3 (Blue spot in figure 6). The turning basin south of berth 9.5 is about 350 meters wide.

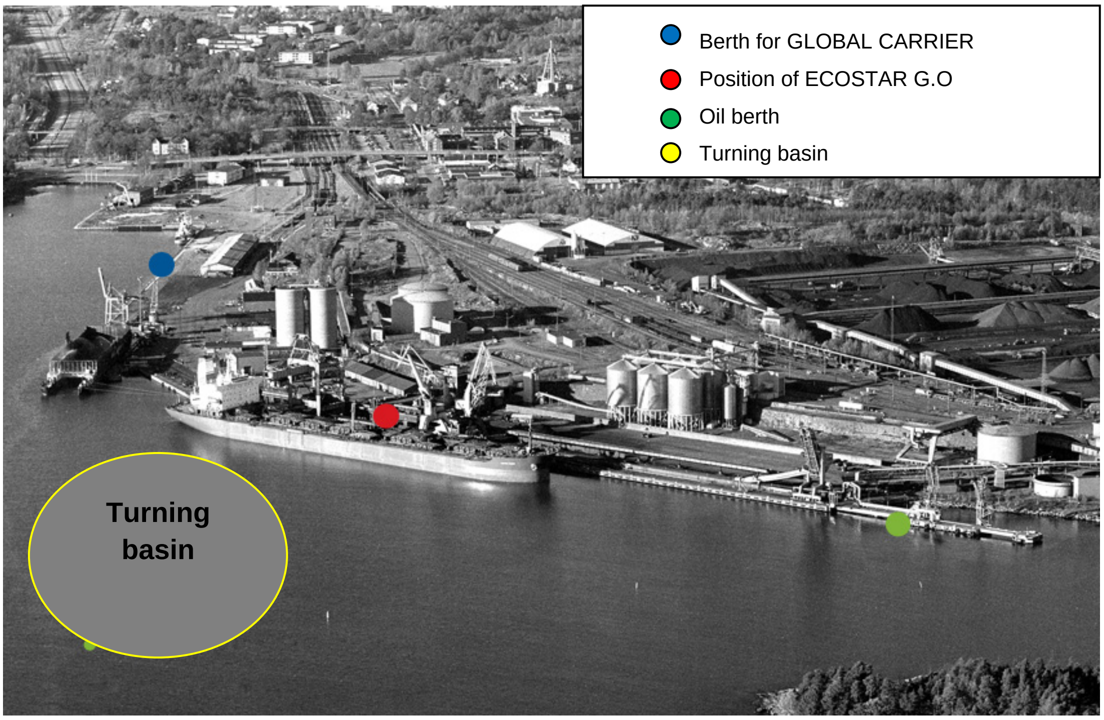


Figure 6. Skyphoto of the harbour. Vessels in the harbour are unrelated to this accident.

During the spring of 2006 simulations were made in order to stipulate the size of ships and the recommended maneuvers of tankers with the dimension of 250x44 meters in the port when a Pan-max vessel is alongside at berth number 9.5. The result of the simulations is not of major interest due to the relatively small size of the M/V GLOBAL CARRIER.

There are no speed restrictions in the fairway to Oxelösund and for vessels of M/V GLOBAL CARRIER size, no wind restrictions.

Wind and visibility restrictions in the port of Oxelösund

SHIP (M)	WIND	VISIBILITY
> 230 x 33 ballast	< 8 m/s	> 2 NM
> 185 x 33	< 10 m/s	> 2 NM
< 185 x 33	Depends on the ship	Depends on the ship

Source: Riktlinjer för Bråviken/SJÖV

1.2.2 The environmental conditions

According to the Swedish Meteorological and Hydrological Institute (SMHI) there was fog on their two closest weather stations already during the night of 27 of February. The visibility at Harstena weather station was between 200 and 800 meters during the day and at Landsort weather station from100 to 300 meters. At approximately 1800 UTC on 27 February the visibility increased to 1.5–5 km on both stations due to change of the wind direction from SE to SW.

According to GLOBAL CARRIERS logbook, the visibility remained poor due to heavy fog during the approach to the harbour. Visibility was about 150–200 meters, wind E-SE 2–3 b (2–4 m/s) and temperature +1°C.

There was some ice in the fairway but this did not affect the ships speed.

1.2.3 The accident voyage

The GLOBAL CARRIER left Turku on February 26 2010 at 2125 bound for Oxelösund little behind the schedule. The planned arrival should have been at 1000 the next morning. On 27 February at 1054 GLOBAL CARRIER reduced speed for pitch manoeuvre control testing and resumed passage at 1108.The pitch was working normally. The reason for the manoeuvre control test was that the propeller pitch had been unstable the night before.

The Master came up on the bridge for the pitch manoeuvre control test and navigation resumed together with the Second Officer. Visibility was poor but pilot assistance was not considered at any time despite of the poor visibility. The Master was licensed to carry out piloting

The vessel approached the archipelago in front of Oxelösund passing Norra Kränkan at 1146. Her speed was 16.2 knots when approaching the archipelago. At 1200 the Second Officer and the First Officer changed watch. Last fixed position before the collision was at 1208 when passing Grässkären. At this stage the vessels speed was 16.2 knots and there was still 4.7 miles to go. Two radars were in use; one on the 0.75 NM range and the other on the 1.5 NM range.

The Chief Officer released the First Officer 5–10 minutes before the arrival for arrival preparations and there was no evidence that the watch change over procedure was carried out according to SMS as logbook entry. The Master and the Chief Officer discussed about average matters when the Chief Officer took over his bridge duties. When passing Ljungskär the speed was still 16.2 knots. According to the Master the speed should normally have been 6 knots when passing Ljungskär and according to the Chief Officer it should have been 12 knots (Figure 8). The speed was reduced to 12.8 knots. There was no communication between the Master and the Chief Officer before these manoeuvres.

Figure 7. Bridge wing, Port.

The Chief Officer went to the port bridge wing as normally during an approach procedure, where he had an electronic chart display to monitor the approach. Speed was displayed in small figures in the electronic chart and it was hardly visible. The Master ordered him to look out for the buoys and he replaced himself in front of the wing window trying to observe the red buoy on the port side. Due to the lookout duties, ordered by the Master, the chart display and speed was not followed by him. The Master ordered the Chief Officer to report when the first red buoy is observed. According to the Master the Chief Officer reported a red buoy and the Master thought this was the first one located on a distance of 0.9 NM from the harbour.

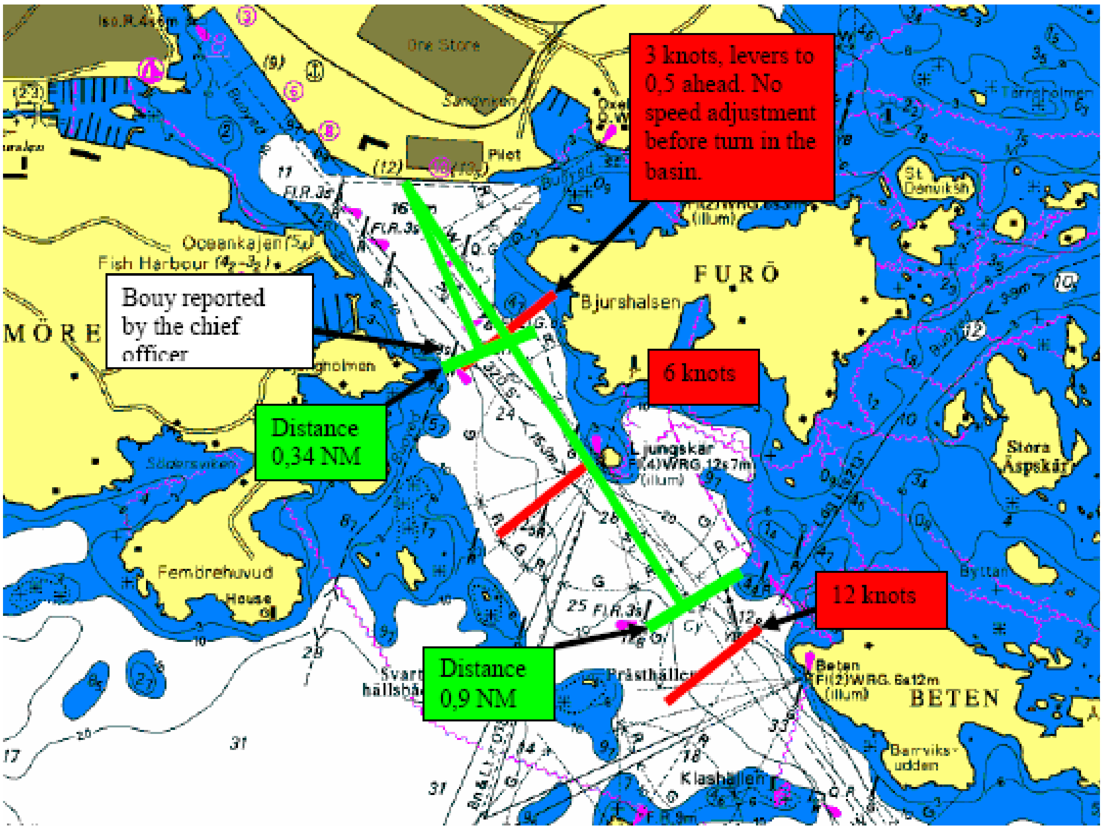


Figure 8. The Chart of the approach. Green boxes indicate the distance to ECOSTAR G.O. Red boxes indicate the speed normally used by the Master of GLOBAL CARRIER.

The distance from buoy observed by the Chief Officer to the berth is 0.34 NM and the distance from the first one is 0.9 NM which the Master thought the ship was passing at that moment. Chief Officer noticed that the speed was reduced by the Master and a slight turn to starboard was carried out.

The First Officer on the forecastle reported that there was a vessel ahead. He realized that there will be a collision and he, the watchman and one apprentice ran away from the forecastle. The Chief Officer shouted to the Master to take full astern by the engine, which he did. The speed was reduced. According to VTS recording the speed just before the collision was 7.2 knots.

The Oxelösund police made an alcotest on the Master and the Chief Officer up on arrival, requested by the Master. The result of the test was negative.

1.2.4 Injuries to persons

There were no injures to any persons in this accident.

1.2.5 Damage to the ship

GLOBAL CARRIER's forward part and the bulb were damaged. There was also leakage in ballast tanks 1 and 6. GLOBAL CARRIER sailed to Poland for reparations and she was at the yard from March 7 to March 30. Totally 32.4 tons of steel was replaced. Reparation expenses were around 220.000 Euros excluding hire costs.

Figure 9. GLOBAL CARRIERs damages in the bow.

ECOSTAR G.O's cargo hold number 4 and the upper top Side ballast tank number 3 were penetrated by the bulb of GLOBAL CARRIER. Above the hold there were deformed side shell longitudinals and deck railings. Some of the cargo in cargo hold number 4 was also destroyed due to the salt water. After the cargo was discharged on 11 March 2010 ECOSTAR G.O shifted to berth 3-5 in Oxelösund were the reparations of the damages commenced. An estimated area of 14 x 6 meter steel plates was replaced. All the reparations were done in Oxelösund by personnel from the shipyard Gotaverken Cityvarvet in Gothenburg and the work was completed on 20 March 2010 and ECOSTAR G.O departed for Ventspils, Latvia.

Figure 10. The hole in ECOSTAR G.O.

Figure 11. The penetration effects in the cargo hold.

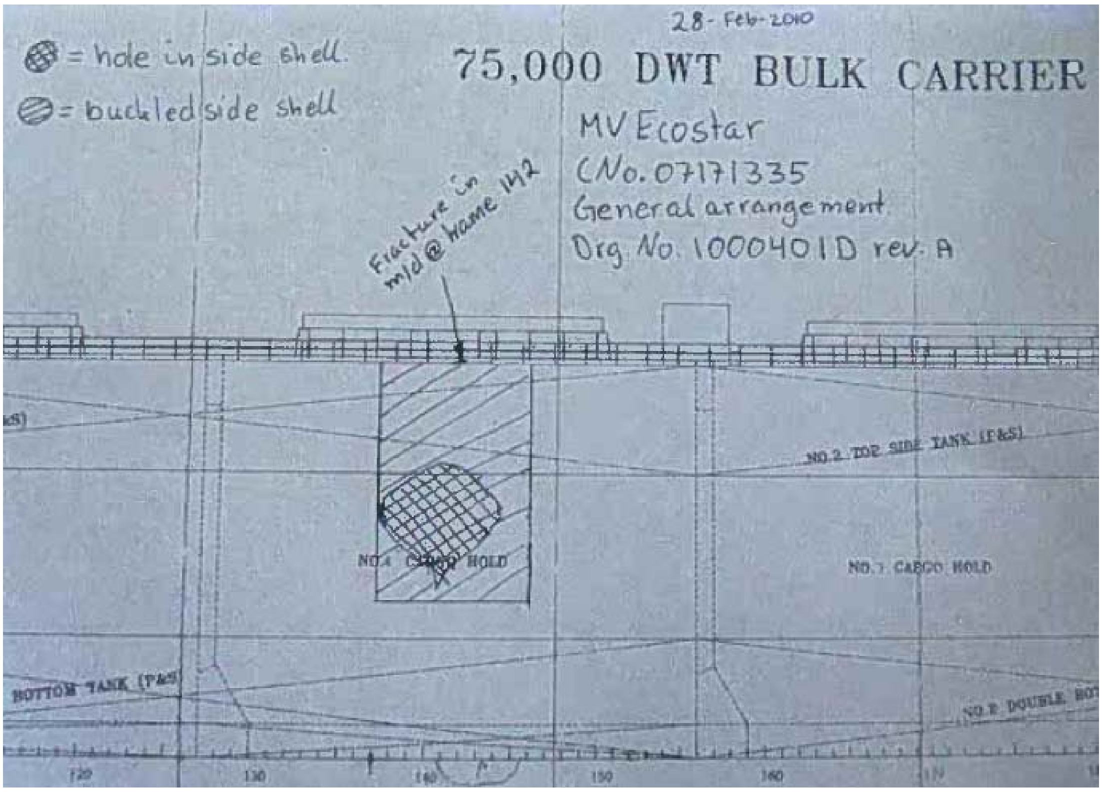


Figure 12. The General drawing with the damage.

Figure 13. An inside view from the wing tank of the ECOSTAR G.O.

1.2.6 Recorders on GLOBAL CARRIER

S-VDR

There is a simplified VDR recorder, FURUNO VR-3000S, installed on the GLOBAL CARRIER. The S-VDR system continuously stores data from the past 12 hours to the flash memory in the capsule, erasing the oldest data stored as new data is recorded. The S-VDR consists of the Data Recording Unit, Data Collecting unit and the Remote Alarm Panel.

S-VDR information is copied automatically into a removable hard disk for 12 hours in the Data Collecting Unit and is then automatically overwritten by new data. In case of an accident the removable hard disk data is stored and the overwriting stops by pressing the save button on the remote alarm panel. The save button was pressed on GLOBAL CARRIER immediately after the collision with ECOSTAR G.O.

Figure 14. VDR remote panel

When the GLOBAL CARRIER arrived in Turku/ Finland on 1 April, the data from the removable hard disk was retrieved. There were 84 tracks of data on the hard disk and they were dated 27.2.2010. The extracted data was then viewed by the Furuno Liveplayer software. However there was no serial data available and only the audio from the microphones and the VHF was readable on some tracks, not relevant for the accident investigation. The data was too corrupted to give any useful information.

Manoeuvring recorder

The manoeuvring recorder was not in use on GLOBAL CARRIER on the accident voyage.

NaviSailor 3000 Electronic chart

The movements of GLOBAL CARRIER were recorded in the ships Electronic chart, Navisailor 3000, and were extracted for the investigation purpose.

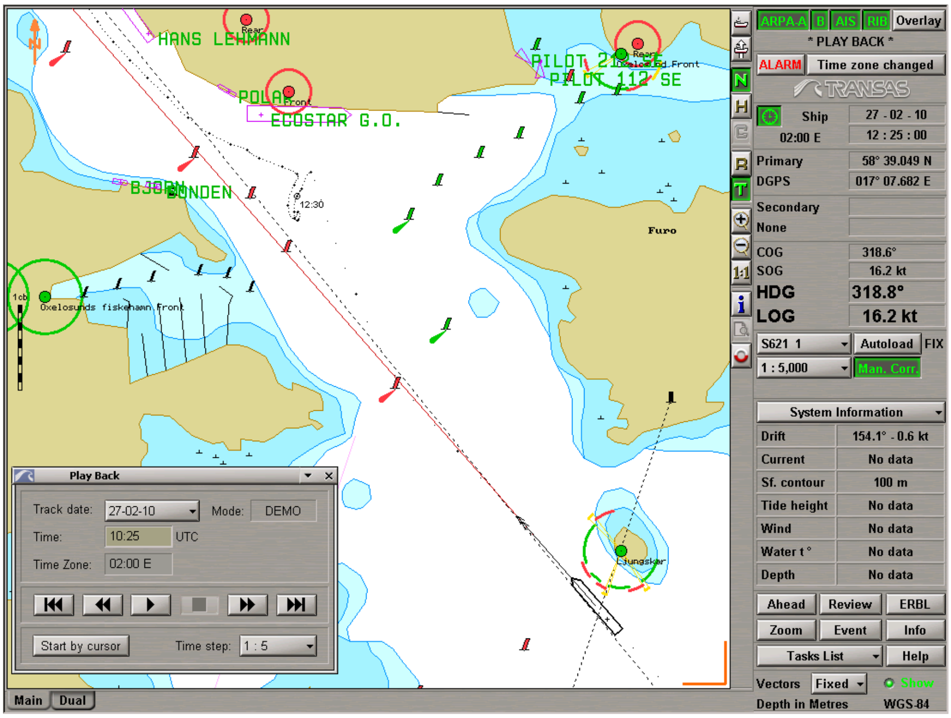


Figure 15. Passing Ljungskär, speed 16.2 kt. The distance to ECOSTAR G.O is 0.6 Nautical miles. The time to the collision is 3 minutes.

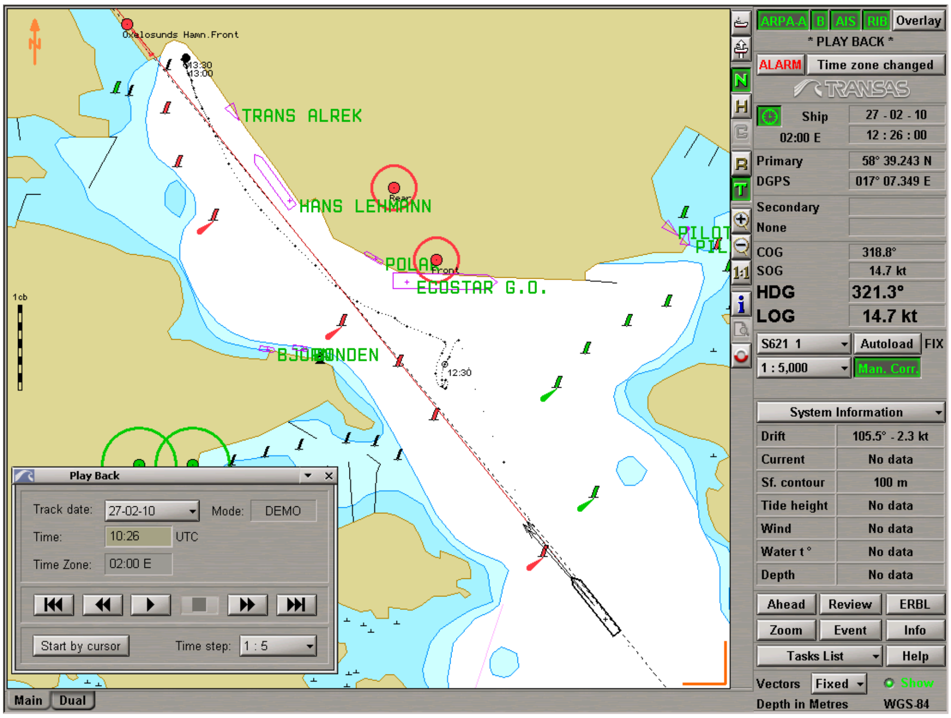


Figure 16. Speed 14.7 kt. The distance to ECOSTAR G.O is 0.4 Nautical miles. The time to the collision is 2 minutes.

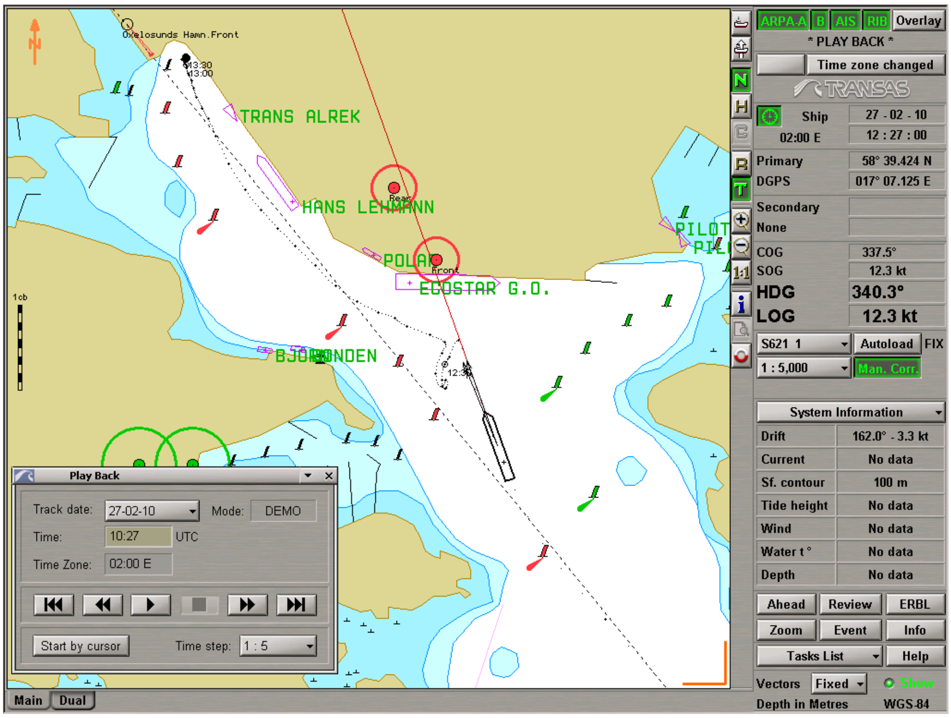


Figure 17. Speed 12.3 kt. The time to the collision is 1 minute. The limit for a succeeded crash stop was about at this stage which means the point of no return was passed.

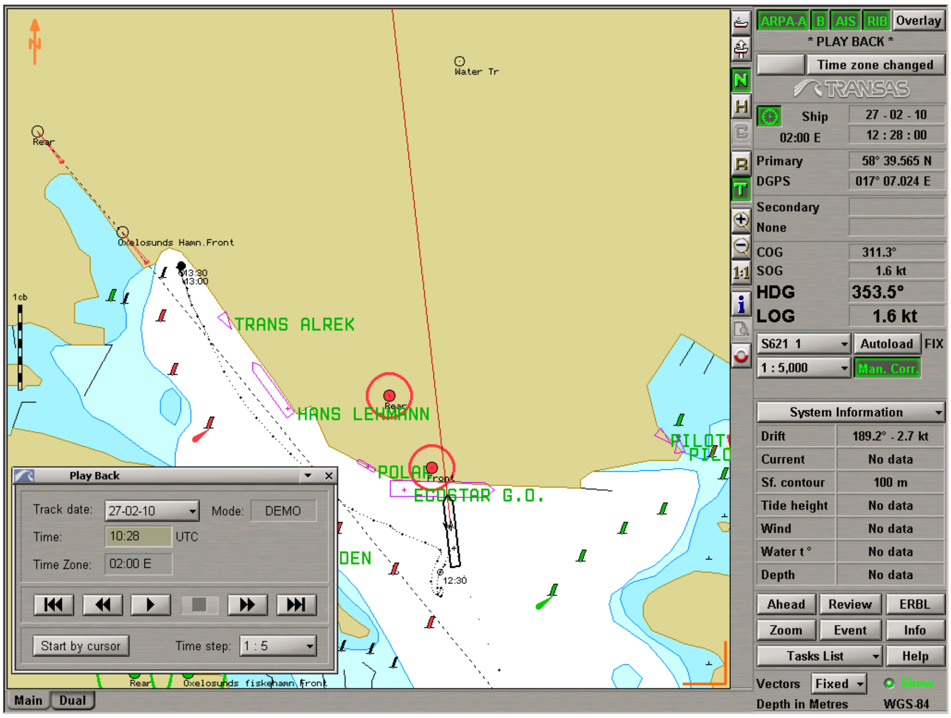


Figure 18. The Impact.

1.2.7 Functioning of the VTS and monitoring systems

VTS East Coast is the VTS centre from which the traffic monitoring and traffic service in the East Coast Maritime Traffic Area is performed by VTS Stockholm, VTS Södertälje and VTS Oxelösund. These three are located at the lock in Södertälje under the common name VTS East Coast.

The VTS areas cover the area from Öregrund in the north to Bråviken in the south, including Lake Mälaren. The areas are operated by two operators in the VTS centre.

The equipment in VTS EC is VHF, AIS information and to some extent radar. The VTS Oxelösund area is covered by radar at Hävringe lighthouse. Due to a radar shadow it is not possible for the operators to see the ship movements by radar in the port of Oxelösund.

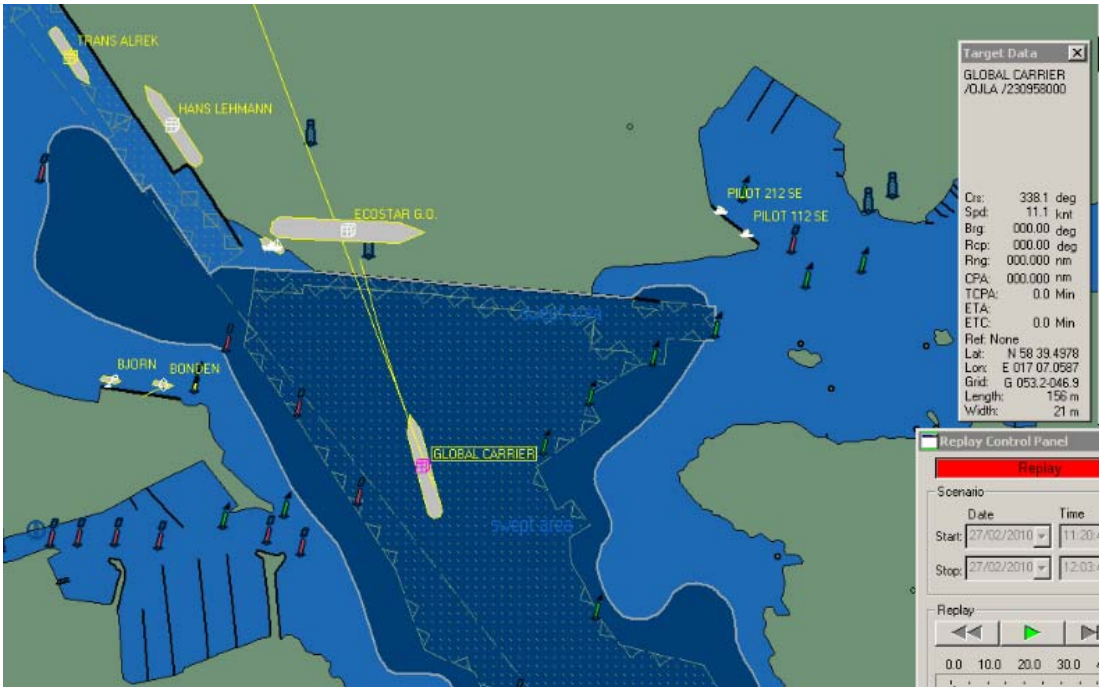


Figure 19. An extract from the VTS monitor. Speed 11.1 kt.

There is one type of VTS service in Sweden which is a so called Information Service (INS). It is a service to ensure that essential information becomes available in time for on-board navigational decision-making. (A 20/res.857)

The operators may also interact with the traffic and respond to traffic situations that may occur.

The obligation of vessels that are inside a VTS area and which information the VTS **shall** give to the vessels, are regulated in Swedish Transport Agency´s Regulations and General Advice (TSFS 2009:56) on vessel traffic service (VTS) and ship reporting systems (SRS).

1.2.8 Training of VTS operators

The operators in the VTS centers have at least a Deck officer class VII competency and are also trained according to IALA Recommendation V-103, which covers both the model course V-103/1 for VTS operators and V-103/3 for on-the-job training locally at the VTS centre.

1.3 Rescue operations

Rescue operations in the port of Oxelösund

All times and information are from the National Rescue Services incident report of the occurrence.

At 1142 LT on 27 February the SOS Alarm centre received an alarm regarding a ship collision in the port of Oxelösund. SOS called out the local Rescue services at 1145 and the first vehicle arrived at the port at 1157.

One Rescue crew went onboard the M/V GLOBAL CARRIER whilst another went onboard the M/V ECOSTAR G.O to assess the situation. No pollution was detected from neither of the ships and there were no occupational injuries.

When discussing with the Master of M/V GLOBAL CARRIER, he informed the Rescue crew that he made the judgment that their services were not needed anymore. He was waiting for inspectors from the Swedish Transport Agency and a representative from the insurance company to come onboard to examine the damage.

Also on the M/V ECOSTAR G.O they came to the same conclusion and the rescue operation were cancelled at 1215 LT.

Rescue operations onboard Global Carrier according to the Master's statement

- The collision with ECOSTAR G.O occurred at 1128 lt and the Master pressed the save button of the VDR.
- At 1131 lt the deck officer in the forecastle reported that the ship's bow was leaking and there was a hole in the bulb and no leakage in the lower hold.
- At 1132 lt Forward collision valve closed.
- At.1136 lt Report that 4 pcs of bulkheads are broken in the fore's rope store. Engine room reported everything ok.
- At 1145 lt the Master reported to VTS Oxelösund about the collision.
- At 1205 lt the Master reported to the company DPA about the accident.
- At 1220 lt Ship moored alongside at normal berth in Oxelösund harbour.
- At 1230 lt the Master reported to the ship's owner about the accident.
- At 1245 lt Local fire department checked ship out- and inside. No injuries and no leakage were found.

1.4 Laws and regulations

1.4.1 Finnish maritime legislation concerning voyage planning 30.12.2002/1359

Free translation:

Chapter 6, 3a§

The Master shall, before starting the voyage, ensure that the intended voyage has been planned using the relevant navigational charts and publications of the concerned area.

The plan shall indentify the ship's voyage, so that it:
1) *takes into account the traffic separation system which affects on the voyage*
2) *provides adequate sea area for safe passage of the entire voyage*
3) ***anticipate the well-known navigational risk factors and adverse weather conditions, as well as***
4) *Takes into account of relevant marine environment protection measures and, where possible, to avoid the activities and operations, which may cause damage to the environment.*

Voyage planning consists of four stages: appraisal, planning, execution, and monitoring. These stages are specified in **IMO Resolution A.893(21), Guidelines For Voyage Planning.**

Resolution A 893(21) chapter 3.2 states following:

3.2 The detailed voyage or passage plan should include the following factors:

.1 the plotting of the intended route or track of the voyage or passage on appropriate scale charts: the true direction of the planned route or track should be indicated, as well as all areas of danger, existing ships' routeing and reporting systems, vessel traffic services, and any areas where marine environmental protection considerations apply;

.2 the main elements to ensure safety of life at sea, safety and efficiency of navigation, and protection of the marine environment during the intended voyage or passage; such elements should include, but not be limited to:

.1 safe speed, having regard to the proximity of navigational hazards along the intended route or track, the manoeuvring characteristics of the vessel and its draught in relation to the available water depth;

.2 necessary speed alterations en route, e.g., where there may be limitations because of night passage, tidal restrictions, or allowance for the increase of draught due to squat and heel effect when turning;

.3 minimum clearance required under the keel in critical areas with restricted water-depth;

.4 positions where a change in machinery status is required;

1.4.2 National Swedish law concerning Pilot exception certificate

The possibilities to obtain a pilot exception certificate (PEC) are regulated in Swedish Transport Agency´s Regulations and General Advice (TSFS 2009:123) on Pilotage. Normal period of validity for a PEC is 3 years. The holder is however obliged to use a Pilot if one year or more has passed since the latest passage in the fairway.

A decision on a fairway based PEC is based on the results of examinations of following parts:

- Safety assessment
  - ship size and maneuvering ability
  - ship equipment
  - cargo
  - number of crew, watch scheme and routines
  - crews certificates
- Theoretical test
  - knowledge of the fairway.
  - reporting procedures in VTS-areas and ports.
  - existing reporting points and reporting lines, what VHF channels to be used in the area, reporting procedures at accidents, near-accidents, environmental accidents or at any risk of an environmental damage.
  - influence of wind direction and currents during passage.
  - valid General Conditions to use a PEC and their significance.
- Practical test
  - knowledge of the fairway.
  - maneuvering.
  - optical navigation.
  - radar navigation.
  - handling of equipment.
  - communication.
  - cooperation.
  - assistance of tugboats (if a part of the PEC)

The theoretical examination is a test when the applicant shall answer questions regarding the fairway, the port, reporting procedures, influence of weather and General Conditions to use a PEC. The test may be in writing and include that the applicant draws data in a blank chart.

During the practical parts of the examination the appointed pilot may demand that navigational aids as charts, radar charts, electronic chart devices etc shall be unavailable to the applicant. During the examination the applicants Voyage Plan or file of notes are to be used and will be evaluated.

The Master onboard GLOBAL CARRIER had the part “assistance of tugboat” in his PEC which allowed him to make use of tugboat if needed without taking pilot. In order to obtain this he had to show, in the practical test, that he could communicate with the tug’s Master and maneuver the vessel with assistance by a tug.

In accordance with Swedish Transport Agency´s Regulations and General Advice (TSFS 2009:123) on pilotage Chapter 9 3 § a PEC may be withdrawn if the holder is involved in an accident at sea. In that case all the PEC of the holder will be withdrawn.

The PEC can be withdrawn for minimum of six months unless Swedish Transport Agency decides otherwise. After six months the Master needs to apply for another new, both theoretical and practical, examination of the fairway in order to obtain a new PEC.

The PEC for the Master of GLOBAL CARRIER was withdrawn for 6 month’s after this accident.

1.4.3 Operator's Safety Management System (extracts)

***1-7.6 Navigation responsibility, para 3*.**

In conformity with Bridge Resource Management principles the Master must ensure that an atmosphere conducive to the free exchange of information is maintained with regard to the bridge navigation team. When personally conning the vessel, the Master must, in order to obtain optimum assistance from the bridge team, keep the other team members appraised of his/her intended manoeuvres as fully as circumstances permit.

9-1.4 Vessel Speed

Vessels are to be manoeuvred at all times in compliance with Rule 6 of the Rules of the Road.

When approaching any confined area such as jetty, dock, anchorage or pilot station the Master must ensure that the speed is low enough to allow for headway being accelerated by engine movements used for turning. Allowance must also be made in the approach speed for extent and availability of astern power to stop the vessel, particularly in respect of loss of steering and the induced transverse movement whilst going astern.

When underway in rivers, harbours or other restricted waters the vessel's speed must be regulated to comply with local speed restrictions and to avoid damage to shore installations, moored vessels and tows.

9-2.3 Role of OOW

Regardless of who is conning the vessel the OOW must never assume that the Master and/or Pilot is aware of any potential hazardous situation. It is the responsibility of the OOW to advise the Master/Pilot if the vessel is "off track". He must never hesitate to convey any doubts that he/she may have with regard to the safe navigation of the vessel.

In situations where the bridge manning has been increased due to weather conditions or traffic density the bridge OOW should continue with his duties plotting the course of the vessel. Additional personnel should be used only for those tasks for which they were specially summoned.

9-4.5 Bridge Team Operation

The Bridge team concept which minimises the risk that an error made by one person will have disastrous consequences must be implemented on all vessels.

At all times when more than one Deck Officer is on duty on the bridge all those present must be aware of the voyage plan in progress and alert to the overall navigation and traffic situation to the maximum extent possible. There must be a free exchange of information between bridge team members.

The conning Officer must keep other bridge team members apprised of intended manoeuvres as fully circumstances permit. In the event of the conning Officer personally operating the bridge controls, (such as autopilot course changes, changing engine controls settings etc.) the practice of announcing the "order" to those present on the bridge must be adhered to this is imperative to keep Bridge team members up to date with a developing situation. Bridge Team Members who notice any factors, which my influence the safe navigation of the vessel, must not hesitate to call them to the attention of the appropriate team members.

9.6 Navigation in reduced visibility

9-6.1 Speed in reduced visibility

in conditions of reduced visibility vessels must proceed at a safe speed appropriate to the prevailing circumstances and conditions of restricted visibility. Engines must be ready for immediate manoeuvre and the COLREGS must be complied with at all times with particular regard to the sounding of fog signals, proceeding at a safe speed and having the engines ready for immediate manoeuvre.

It is important that the Navigation Watch Keeper should know the handling characteristics of his vessel, including her stopping distance, and should appreciate that other vessel may have different handling characteristics.

The Master must establish procedures to be followed in situations where:-

a) Visibility begins to diminish.

b) When reduced visibility is suddenly encountered.

In developing these procedures the following points should be considered:-

a) End-on closing speeds of 40 knots are not uncommon under present day conditions.

b) The time lapse necessary for the engines to be brought from full ahead to the standby manoeuvring condition.

c) Any temporary engine fault or Engine Room condition which could increase the time lapse or limit engine manoeuvrability.

d) Density of traffic, traffic type, and traffic flow patterns in the area navigated.

e) Necessity for calling Ratings and/or Mates, and the time lapse before they can be on the Bridge and effectively on duty.

f) Any manoeuvring restrictions due to draught and depth of water, the presence of shoals, or any other navigational danger in the area that could restrict any immediate, bold, alteration of course before speed could be reduced.

g) Time lapse before radar becomes fully operational.

h) Condition of radar equipment.

i) The vessels stopping distance from operation speed and the problem of maintaining heading control while stopping.

The Master must ensure that all Mates fully understand the procedures that he/she has established.

9-6.3 Radar / ARPA

The navigating Watch Keeper's attention is drawn to the contents of Rule 19C in the International Regulations for the Prevention of Collisions at Sea. The rule gives radar the more positive role in collision avoidance. It also, however, demands its efficient use by proper radar plotting either manually or by automatic means. The use of radar must not overrule the need to proceed at a safe speed, reduced as necessary to the degree of visibility.

1.4.4 International agreements and regulations

Steering and sailing rules (COLREGS) particularly relevant to this case

Section 1 - Conduct of vessels in any condition of visibility

Rule 5 requires that "every vessel shall at all times maintain a proper look-out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision.

Rule 6 deals with safe speed. It requires that: "Every vessel shall at all times proceed at a safe speed...". The Rule describes the factors which should be taken into account in determining safe speed. Several of these refer specifically to vessels equipped with radar. The importance of using "all available means" is further stressed in Rule 7 covering risk of collision, which warns that "assumptions shall not be made on the basis of scanty information, especially scanty radar information"

Section III - conduct of vessels in restricted visibility (Rule 19) Rule 19 states every vessel should proceed at a safe speed adapted to prevailing circumstances and restricted visibility.

STCW

Bridge Resource Management is mentioned in the STCW code; section B-VIII/2. The shipping companies should develop and support bridge routines based on Bridge Resource Management principles.

Bridge resource management is a tool for team building, and communication on bridge, leadership, decision-making, and resource management on the bridge. BRM addresses the management of operational tasks, as well as stress, attitudes and risks.

2 ANALYSIS

The investigation report analysis section is made in two parts. It begins with the voyage analysis to give the reader the investigators point of view about the voyage. Secondly the Barrier analyse is presented. The investigators decided to use Barrier analysis method to find the Root cause in the accident. The Root cause can be defined as the causal factor, including management systems deficiencies, which, if corrected, might prevent recurrence of the accident

2.1 Voyage analysis

Ship safety may cover many different aspects like manning, navigation, operations and the ship itself; like hull construction, machinery, equipment, maintenance and a lot of other aspects.

The visibility had been moderate or poor over the night to the Oxelösund arrival date. Prior to approach the visibility was poor and the Master didn't even consider taking a pilot because he believed in his own skills as he possessed Pilot Exemption Certificate. The Master had good experience on this fairway and had executed the pilotage several times in dense fog. Because of his many other duties and perhaps because of the familiarity and long experience, he may be tempted to take a casual attitude towards his navigation duties. Some reflection to this direction can be noticed in the Marine declaration where he stated *"the speed is what it is*" as reply to the question of voyage plan in the archipelago. This can also be an accidental comment.

Before the approach and especially in this kind of weather condition there should have been made a risk assessment covering operational (speed) hazards including evaluation the effects of weather conditions (dense fog) and any other relevant factors. The output from the risk assessment should be used to develop risk mitigation measures. One of the mitigation measures might have been to take a pilot, to increase the competence of local knowledge and thereby an additional monitor of the approach.

There was a dense fog and the vessel approaches in the archipelago with high speed and rely was put on the Masters skills and the ships navigational equipment. When the radar is in use, limitations of the equipment; scale in use; sea-state, weather and other interference, should be considered. The speed was evidently not safe as regulated in the Colregs.

Colregs Rule 6 can be interpreted as follows: Any vessel must proceed at a safe speed at which she can to take action to avoid collision and be able to stop within a distance suitable to the prevailing conditions, which include the visibility; traffic density; her manoeuvrability (e.g. stopping distance and turning ability); background lights and other dazzle; the state of the wind, sea, current and nearly hazards; draft in relation to the available water.

When approaching closer to the harbour the Master ordered the Chief Officer to lookout in order to catch eye contact with the buoys as there was no dedicated crewmember for this duty. At this stage the Chief Officer had to leave the electronic chart display which he was monitoring. This caused a situation that the Chief Officer partly lost the position- and the speed awareness and there were no fixed reference points in sight. This loss could be one of the factors which led to the accident.

Every vessel must at all times keep a proper look-out by sight (day shape or lights by eyes or visual aids), hearing (sound signal or Marine VHF radio) and all available means (e.g. Radar, ARPA, AIS, GMDSS...) in order to judge if risk of collision exists.

In some cases commercial pressures placed on Masters to handle ships in marginal conditions and schedule is one of the many factors which might have some influence on Master's behaviours.

2.2 Barrier analyzing

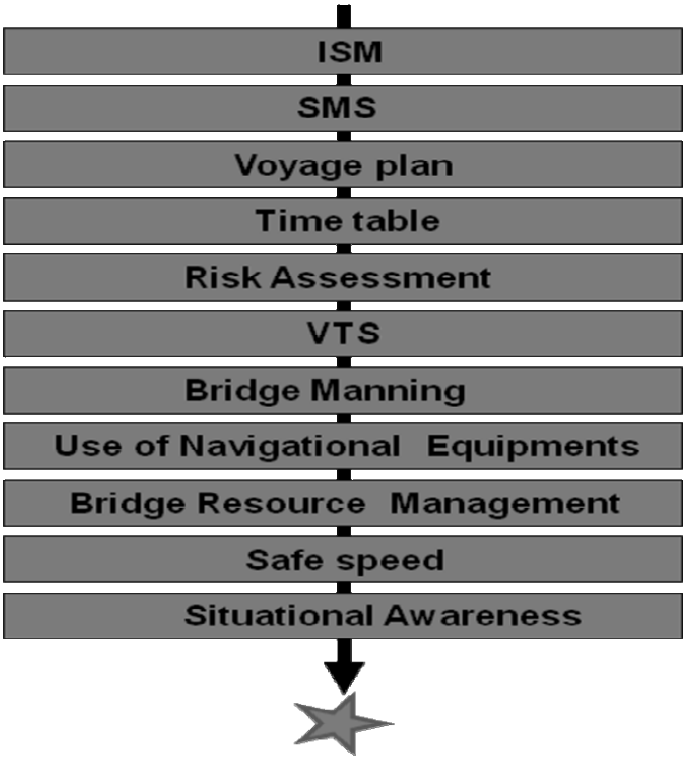


Figure 20. Barrier analyzing.

Investigators used the barrier analysis technique to identify hazards associated with the accident and the barriers and controls that should have been in place to prevent the accident. Investigators had to define the adequacy of existing barriers and controls to determine why they were not used or failed, and whether barriers were installed, and if not, why not. Evaluating these barriers and their failures facilitates identification of causal factors.

2.2.1 Barrier ISM

ISM "The safety management system should ensure; that applicable codes, guidelines and standards recommended by the Organization, Administrations, classification societies and maritime industry organizations are taken into account". ISM 1.2.2 Safety management objectives of the company should, inter alia: 1. provide for safe practices in ship operation and a safe working environment.

Factor in Barrier failure: The interpretation of ISM code is flexible therefore an actual non-compliance of the code cannot be addressed.

Analysis: The Company should see the implementation of the principles in ISM-Code as an opportunity to instruct the crew as clearly as possible and it can be noticed that this has been done rather well by the company. Effective implementation of the ISM Code should lead to a move away from a culture of "unthinking" compliance with external rules towards a culture of "thinking" self-regulation of safety - the development of a 'safety culture'. The safety culture involves moving to a culture of self regulation, with every individual - from the top to the bottom - feeling responsible for actions taken to improve safety and performance.[2]

2.2.2 Barrier Safety Management System concerning navigation

Safety Management System provides instructions for safe navigation.

Factor in Barrier failure: Safety Management System obviously not fully implemented onboard.

Analysis: Implementation of Safety Management System on board is in hands of the Master. Compliance should be monitored by the company in internal audits and in external audits by the administration or classification societies.

ISM Code states "The safety management system should ensure; that applicable codes, guidelines and standards recommended by the Organization, Administrations, classification societies and maritime industry organizations are taken into account". Compliance of IMO- and Maritime industry guidelines can be interpreted as good seamanship.

The Safety Management System on GLOBAL CARRIER is rather comprehensive, consists the main features of safe navigation and the importance of safe speed has been emphasized in several occasions. Some References are also made to the ICS Bridge Procedure Guide.

2 www.imo.org

2.2.3 Barrier Voyage plan

Compliance of IMO Guidelines and Company instructions regarding voyage plan.

Factor in Barrier failure: Non-compliance of Company SMS and IMO Guidelines. Voyage plan was not completed as instructed by the company. The company instructions (SMS) for voyage plan is as a basis for formulating vessel specific voyage plan. Nevertheless this was not complied with and can be interpreted as a SMS non- conformance and the company should implement corrective actions.

Analysis: IMO *Resolution A.893(21), Guidelines For Voyage Planning* reflected in the local laws of some IMO signatory countries. Global Carrier sails under Finnish flag but the Finnish Transport Safety Agency has no valid comprehensive guidelines for voyage planning. At the moment the reference is made to Finnish maritime legislation concerning voyage planning 30.12.2002/1359.

The IMO-Guidelines specify three key items to consider in the practice of voyage planning:

- having and using a voyage plan is "of essential importance for safety of life at sea, safety and **efficiency of navigation** and protection of the marine environment,"
- voyage planning is necessary for all types of vessels on all types of voyages, and
- the plan's scope should be based on all information available, should be "berth to berth," including when under pilotage, and the plan includes the execution and the **monitoring of progress.**

It should not be an enormous job to draw a comprehensive voyage plan, especially for vessels sailing constantly the same route. The same plan can then be used on and on.

2.2.4 Barrier Time table

Vessel has more or less fixed time table but voyage plan allows changes to it, based on navigational safety. According to the Company SMS the economic objective of time and distance saving is secondary to safe navigation and must be disregarded whenever the Master deems it necessary to do so.

Factor in Barrier failure: Time table may contain a hidden pressure on the Master which might lead to risky behaviour.

Analysis: There is no evidence indicating that the Master was under hidden pressure in this case. Company instructions (above) for this Barrier are clear and Masters should bear those in mind.

2.2.5 Barrier Risk Assessment

Voyage planning is necessary to support the bridge team and ensure that the ship can be navigated safely between ports from berth-to-berth through risk assessment of hazards and waypoint selection. The voyage plan should cover ocean, coastal and pilotage waters.

The risk assessment is mentioned in Marine Industry guidelines (ICS Bridge Procedures Guide).

Pre-arrival planning:

A preliminary plan should be prepared covering pilotage waters and the roles of the bridge team personnel.

A plan should still be prepared even if the Master of the ship has a Pilotage Exemption Certificate for the port.

Planning for anchoring off the port, or aborting port entry in the event of problems arising, should be included as part of the plan. The plan should also identify charted features that will assist in monitoring progress and include **contingency measures in the event of primary equipment failure, poor visibility etc.**

For example risk assessment should first establish the hazards associated with navigation in the archipelago and then identify the significant risks arising out of the navigation. The assessment should take into account any existing precautions to control the risk, such as pilotage, PEC, SMS-procedures, voyage plan etc.

Typical questions that should be answered when carrying out a risk assessment are:

What can go wrong?

An identification of the hazards and accident scenarios, together with potential causes and outcome.

How severe and how likely?

An evaluation of the risk factors.

Can matters be improved?

An identification of risk control options to reduce the identified risks.

What is the effort involved and how much better would the result be ?

A determination of the benefit and effectiveness of each risk control option.

What action should be taken?

An identification of the appropriate course of action to deliver a safe activity based on the hazards, their associated risks and effectiveness of alternative risk control options

In summary, the risk assessment should ensure that preventative and precautionary measures are taken which will reduce the risks associated with navigation in the archipelago to a level that is considered to be as low as reasonably practicable.

Factor in Barrier failure: Company SMS does not consist a risk assessment method and therefore there is no evidence that this was made on board on GLOBAL CARRIER.

Analysis: Incorporation of applicable Marine Industry Guidelines including description of risk assessment into the Company SMS may provide added value.

2.2.6 Barrier VTS

The IMO definition of VTS in Resolution A.857(20) states that, "Vessel traffic service (VTS) - a service implemented by a Competent Authority, designed to improve the safety and efficiency of vessel traffic and to protect the environment. The service should have the capability to interact with the traffic and to respond to traffic situations developing in the VTS area". So when a VTS is established it needs to have the capability to interact with vessel traffic and respond as and when necessary not only to developing traffic situations but prior to their development also. This means that VTSOs have a duty of care to monitor and look after the safety of navigation in their VTS area.

Factor in Barrier failure: VTSO was not aware of the traffic situation

Analysis: Even though Sweden only has INS (Information service) it does not mean that the VTSO can’t call the vessel and give the Master warnings and advice if it is found necessary by the VTSO. The area that VTS EC covers is rather large and the concentration is in the Stockholm area. It might have been a contributing factor to the accident that the VTSO wasn’t aware of the high speed of M/V Global Carrier during the passage into the port of Oxelösund.

2.2.7 Barrier Bridge Manning

According to chapter 9-4.3 SMS Master must always set a bridge watch to meet the prevailing conditions. There is different watch categories defined in the SMS depending on the prevailing conditions. In this situation when GLOBAL CARRIER was entering a port in restricted visibility the watch category should have been 2 or 3.

Factor in Barrier failure: Not sufficient numbers of team members on the bridge

Analysis: According to chapter 9-4.1 in the SMS, watch category 2 means there should be two licensed officers on the bridge and a dedicated lookout during the hours of darkness. Category 3 means there should be three licensed officers on the bridge and a dedicated lookout during the hours of darkness.

In this case the Chief Officer had to act as lookout on the bridge instead of monitoring the bridge instrumentation, because the watchman was on the forecastle preparing for the arrival and acted lookout there as according to the Master.

Because of this arrangement the chief officer had to move to a position on the bridge where he could not see the navigational equipments, and look for the buoy requested by the Master.

2.2.8 Barrier Use of navigational equipments

The correct interpretations of the data showed by navigational equipments are at all time crucial. Therefore it is important that more than one officer do the interpretation from several navigational equipments and compare the data with each other.

Factor in Barrier failure: According to the Master he made a possible misinterpretation on the radar picture and the electronic chart. The speed information was not easily monitored.

Analysis: The speed information is important during an approach in the archipelago in dense fog, were the reference points can't be seen. To have the speed information presented in several places will increase the situational awareness, in this case it was only possible for the Master to observe. One of the speed indication factors would have been the position of main engine control levers which are indicated in maneuvering speed and pitch settings. (see appendix 2)

Radar display range used by the Master was 0.75 NM which according to the Master could have been one of the reasons for misinterpretation the radar picture. The Master thought he had more space before approaching the harbour basin for the manoeuvre. The other radar beside the Master was on 1.5 NM range and not observed by anyone.

2.2.9 Barrier Bridge resource management

According to chapter 9-4.5 in the SMS there must be a free exchange of information between bridge team members. The conning officer must keep other bridge team members apprised of intended manoeuvres as fully as circumstances permits. In the event of the conning officer personally operating the bridge controls the practice of announcing the "order" to those present on the bridge must be adhered to. This is imperative to keep Bridge Team Members up to date with a developing situation.

Factor in Barrier failure:

There was no exchange of information between the bridge team members regarding navigation

Analysis:

The Master carried out the maneuvers without impressing them to the co-pilot. The chief officer was standing in a position on the bridge wing where he could not see the navigation equipments and therefore he was not able to challenge the Master about his decisions. Chief Officer acted as lookout more than a co-pilot. There was no pilot/co-pilot cooperation on the bridge.

2.2.10 Barrier Safe speed

In general there are no speed limits regulated by The Swedish Transport Agency in Swedish ports and fairways, unless set by the port-owners or the County Administrative Board. It is from situation to situation for the Master to judge what safe speed, keeping in mind the colregs.

Factor in Barrier failure: The speed of GLOBAL CARRIER was not reduced to safe speed at any time during the approach.

Analysis: “Normal” speed in the fairway according to an experienced pilot in good visibility with the type of vessel as M/V Global Carrier:

At the green buoy Ytterskärsgrundet the speed is reduced to half ahead and down to slow ahead just before passing the green buoy Betens S Grund. When passing Ljungskär the speed should be about 6 knots.

In dense fog the normal would be to start to slow down earlier, about 1 NM before the green buoy Ytterskärsgrunden, so that the speed when turning starboard into the narrow part of the fairway should be 10-12 knots and later reduced to about 6 knots when passing Ljungskär, as in good visibility.

2.2.11 Barrier Situational Awareness

Situation awareness is being aware of what is going on in the situation you are in, the position, the dynamic movement and competencies of the bridge crew. The situational awareness involves the interpretation of the information at the moment in order make right decisions. The decisions determine the course of actions. One has to understand the impact of the actions, both now and in the near future. Decisions based on the faulty situational awareness can lead to correct results only by chance.

There are three levels in the situational awareness, perception, comprehension and projection. Perception and comprehension onboard a ship is to understand what the position is of the ship at the moment in the fairway. Projection means where are we going with this speed and course and are there any hazards on the way.

Correctly done watch changeovers will transfer the relevant information from one watch to another.

Factor in Barrier failure:

The loss of situational awareness was the result of lacking preparedness when entering the harbour. There was no proper briefing and no clear distribution of duties of the personnel on the bridge.

Analysis: There were two watch changeovers during the approach in the archipelago in addition to the Masters take over of the command. There is no evidence how the change over procedures was carried out between the officers. The Master's awareness of the position was probably lost when he made a misinterpretation of the radar picture and the electronic chart. This should not have been crucial if his actions had been properly monitored. The position was not discussed by the officers on the bridge. All officers on the bridge as well as the first officer on the forecastle thought the ship ahead was in the fairway, they did not know it was alongside.

The high amount of weekly working hours for the Master and chief officer may have caused cumulative fatigue and this can decrease the concentration on the duties.

3 CONCLUSIONS

The root cause for the accident can be considered to be the poorly implemented SMS routines onboard which can be seen in all the barriers. The SMS for GLOBAL CARRIER is comprehensive including all the barriers that would have prevented this accident. Because all of the barriers failed it ended up in loss of situational awareness for the Officers on the Bridge. Due to loss of the situational awareness the safe speed was forgotten.

The Master and the Chief Officer navigated in dense fog without outside references which made them dependent on the navigational equipment. There was no chance to react on the high speed spontaneously by watching passing objects. Since there were no reactions on the speed they proceeded with full ahead deep in to the harbour.

The Master expected some ice in the Oxelösund archipelago and therefore the speed was not reduced in the first place when entering the archipelago.

Since there was no speed limit in the fairway or in the voyage plan, the speed judgment was left for the Master alone. Even when there is no speed limit in a fairway the safe speed must always be considered.

There was no communication between the Master and the chief officer on the bridge. The lack of communication is an indication of poorly implemented bridge resource management onboard.

There have been several accidents in recent years which have had rather similar factors as this accident such as lack of bridge resource management and insufficient voyage plan and/or execution and monitoring of the same. These factors have crucial significance especially when navigating in restricted waters such as archipelago. Applicable codes, guidelines and standards recommended by the IMO, administrations, classification societies and maritime industry organizations have been recognized and taken into account more widely in the tanker sector than in the dry cargo sector. These IMO, ICS, OCIMF and other guidelines have been available over a decade and are widely proven to increase safety in case properly implemented. The proper description and implementation of the before mentioned guidelines is not lonely enough as the compliance of the same should also be properly monitored by the Master and the company. In addition to the internal audits, one of today’s monitoring methods could be to collect recordings from the VDR to monitor the bridge resource management.

4 ACTIONS TAKEN

The ship management company operating GLOBAL CARRIER made their own investigation according to SMS. Below the findings and the corrective actions as result:

Critical factor 1. The first Critical factor was the speed related to the visibility. In the limited visibility at the event, lower speed might have prevented the collision or, at least, reduced the damages.

Critical factor 2. Lagging of the Transas in combination of misunderstanding scale of radar meant that bridge crew assessed their position wrongly.

Possible Immediate Causes:

The ice situation demanded more engine power. When getting in to the harbour where there was less ice, more engine power gave more speed.

The misunderstanding of radar picture and Transas lagging, causing late reduction of the speed.

Possible System Causes:

One PSC can be that the communication on the bridge was insufficient. More communication between the Master and the Chief Officer might have highlighted the high speed earlier.

Corrective actions for Critical factor 1.

In order to avoid too high speeds in the future approaching harbor or slow speed passages, speed limits should be decided for certain fixed land marks i.e. Vinterklasen 10 kn.

Corrective actions for Critical factor 2.

“Co-pilot system” to be adopted at bridge. This means the person in command always, loud and clear, tells his intentions and that the person second in command repeats it.

Both corrective actions to be implemented before 1.1.2011 by the Master.

5 RECOMMENDATIONS

The Safety Management System is well prepared and the outcome is rather comprehensive. Part of the applicable codes, guidelines and standards recommended by the IMO, administrations, classification societies and maritime industry organizations has been taken into account.

The investigators recommend that:

The Management company should consider how to improve the implementation of the Safety Management System, concerning the bridge team work, risk assessment, voyage planning and monitoring of these by the management.

Helsinki, July 4, 2011

Micael Vuorio Juha Sjölund

LIST OF SOURCES

Marine Casualty Report

Marine Declaration and attachments

SMS Bridge procedures

Interview records

ICS Bridge procedure guides

COLREGS

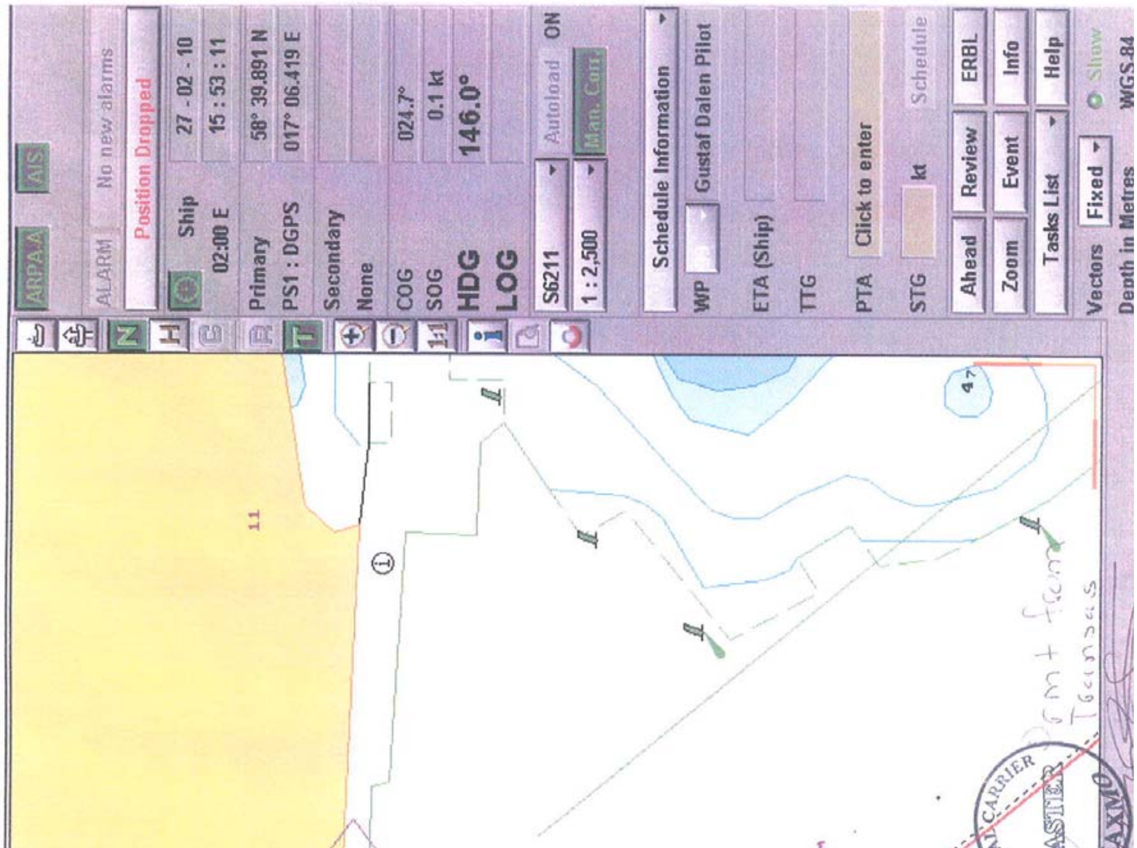
VTS/ AIS Recordings

Extracts from the electronic chart

Reports of rescue operations

Environmental information from Swedish Meteorological and Hydrological Institute

Appendix 1/1(1)

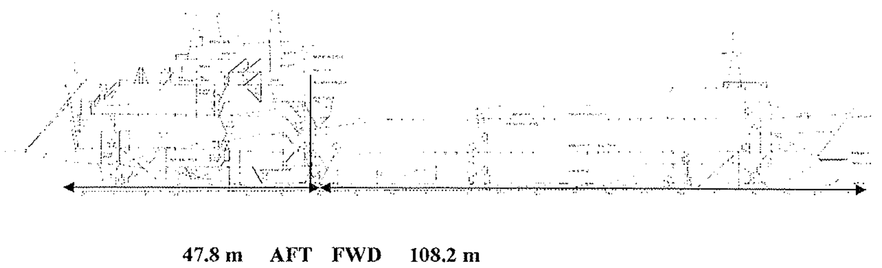


Bilaga 2

Pilot Boarding Card

m/v GLOBAL CARRIER

Ships Name	:	*Global Carrier*		**Date**	:		
Call Sign	:	*O J L A*		IMO No	:	*7528647*	
Gross Tonnage	:	*13117*	ton	Displacement	:	*14690*	ton
Net Tonnage	:	*3935*	ton	L.O.A	:	*155.5*	m
B.O.A	:	*21.2*	m	L.p.p	:	*137.2*	m
Max height from WL *Draft (7.0 m)*	:	*39.0*	m	Max Draft	:	*7.30*	m



Number of Rudders	:	2	Type	:	Twin-connected
Number of Propellers	:	2	Type	:	Variable Pitch
Type of Main Engines	:	2 x NKK-Pielstick 12 PC2-5V			*Note!! Outward turning*
Power	:	2 x 7800 bhp (15600 bhp/11544 kw)			
Bow thruster	:	1 x Kawasaki-Escher Wyss CP			
Power	:	1000 bhp			

Maneuvering Speed		Pitch	Knots
Full Ahead	:		
Half Ahead	:		
Slow Ahead	:		
Dead Slow Ahead	:		
Dead Slow Astern	:		
Slow Astern	:		
Half Astern	:		
Full Astern	:		

Max Rudder Angle
40°
Time for Hard-over to hard-over
14,5 sec

Draft, fwd : ________ m *Draft, aft* : ________ m *Draft, mean* : ________ m

Pilot's Signature : ____________________

11.6.2004 ***Approved by Captain***

M.V. GLOBAL CARRIER

TURNING CIRCLES

FULL LOAD LEFT

MAXIMUM ADVANCE 528M
MAXIMUM TRANFER 558M
DIAMETER OF TURN 432M

FULL LOAD RIGHT

MAXIMUM ADVANCE 542M
MAXIMUM TRANSFER 574M
DIAMETER OF TURN 458M

HALF LOAD LEFT

MAXIMUM ADVANCE 337M
MAXIMUM TRANSFER 458M
DIAMETER OF TURN 360M

HALF LOAD RIGHT

MAXIMUM ADVANCE 380M
MAXIMUM TRANSFER 421M
DIAMETER OF TURN 310M

STOPPING DATA

CRASH STOP: TIME 2min16sec DISTANSE 768M

C.P.P: TIME FROM FULL AHEAD TO FULL ASTERN 32sec

CRASH STOP FROM ½ AHEAD: TIME 1min 12sec. DISTANCE 268M

INERTIA STOP: TIME 3min02sec DISTANCE 955M

MANOVERING SPEEDS AND PITCH SETTINGS

AHEAD

ORDER	SPEED	PITCH SETTING	BLADE ANGEL
FULL	14,5	5,2	15,5
HALF	9,5	3,4	9,5
SLOW	6,0	2,0	5,0
D. SLOW	3,8	1,0	2,0

ASTERN

ORDER	PITCH SETTING	BLADE ANGEL
FULL	4,5	14,5
HALF	3,0	9,0
SLOW	2,5	7,0
D. SLOW	1,5	4,0

WARNING

THE RESPONSE OF GLOBAL CARRIER MAY BE DIFFERENT FROM THAT LISTED ABOVE IF ANY OF FOLLOWING CONDITIONS UPON WHICH THE INFORMATION IS BASED ARE VARIED :- 1/ CALM WEATHER. 2/ NO CURRENT. 3/ DEEP WATER CONDITIONS; WATER DEPTH AT LEAST TWICE VESSEL DRAFT. 4/ CLEAN HULL. 5/ INTERMEDIATE DRAF OR TRIM.

ASP

DATE: 14.6.2009

PASSAGE PLAN

GLOBAL CARRIER

Voy:
MAX DRAFT

7,30	FROM:	Turku	GMT +2
	Via:	Haapaluoto	
	TO:	Oxelösund	GMT +1

PUBLICATIONS	
Sailing Directions	NP 18, NP 19, NP 20
Admiralty List of Radio Signals	VOL 6 (2)
Admiralty List of Lights	VOL C
Admiralty Tide Tables	
Tidal Stream Atlas	
Mariner's Handbook	
Routeing Chart -	

CHARTS		
FIN	190	
FIN	26	
FIN	25	
FIN	24	
FIN	27	
BA	2297	
BA	2222	
BA	2362	
BA	3147	
BA	3218	

COMMUNICATIONS	
PORT CONTROL	TURKU PORT CONTROL VHF CH 12
	VTS OXELÖSUND VHF CH 09
PILOTS	VTS OXELÖSUND VHF CH 09
VTS	ARCHIPELAGO VTS VHF CH 71
	VTS OXELÖSUND VHF CH 09

	NAVIGATIONAL AIDS
A.	RADAR , ARPA
B.	GLOBAL POSITIONING SYSTEM (G.P.S.)
C.	VISUAL BEARINGS
D.	NAVTEX
E.	ECHO SOUNDER

STEAMING TIME PILOT TO PILOT		
KNOTS	Days	Hours
18,00		8,0
17,00		8,5
16,00		9,0
15,00		9,7

NAVAREA	WARNING	CHART AFFECTED

AREA	T. OR P. NOTICE	CHART AFFECTED

ADDITIONAL INFORMATION

ADM 3218 & 2362 (Oxelösund) positions to be corrected 0-03 min N and 0-20 min E before plotting

Watch Category 1	One licensed officer on the bridge and a dedicated lookout during the hours of
Watch Category 2	Two licensed officers on the bridge and a dedicated lookout during the hours of
Watch Category 3	Three licensed officers on the bridge, helmsman and a dedicated lookout during the hours of darkness

PREPARED BY : Deck Officers K. Backlund & K-H Björklöf

APPROVED BY:

MASTER 1 [signature] 2 [signature]
CH. OFF 1 [signature] 2 [signature]
1st OFFICER 1 [signature] 2 [signature]
2nd OFFICER 1 [signature] 2
EXTRA 1 2

GLOBAL CARRIER MASTER MAXMO

Copy of Passage Plan

Appendix 4/2(3)

ASP

GLOBAL CARRIER PASSAGE PLAN	Turku Haapaluoto to Oxelösund	START DATE START TIME

WP	S/H	LOCATION	Lat	Long	Co	Dist	To go	Tot Dist	Spd	ETA
0	533	Turku Satama	60°26,28' N	22°12,88' E	0	0,0	213,4	0		
1	534	Linnanaukko	60°26,07' N	22°12,73' E	199°	0,2	213,2	0,2		
2	535	Pikisaari N	60°25,94' N	22°12,24' E	242°	0,3	212,9	0,5		
3	536	Pikisaari	60°25,84' N	22°11,97' E	232°	0,2	212,7	0,7		
4	537	Pikisaari S	60°25,77' N	22°11,80' E	228°	0,1	212,6	0,8		
5	538	Kansanpuisto	60°25,64' N	22°11,51' E	227°	0,2	212,4	1,0		
6	539	Jänissaari	60°25,31' N	22°10,45' E	238°	0,6	211,8	1,6		
7	540	Pikku-Pukki	60°25,31' N	22°09,69' E	271°	0,4	211,4	2,0		
8	541	Pukinsalmi	60°25,29' N	22°09,40' E	261°	0,2	211,2	2,2		
9	542	Arvinsilmä	60°25,23' N	22°08,83' E	257°	0,3	210,9	2,5		
10	543	Iso-Pukki	60°25,16' N	22°08,48' E	249°	0,2	210,7	2,7		
11	544	Saksa	60°24,92' N	22°07,95' E	228°	0,4	210,3	3,1		
12	545	Kuuva	60°24,74' N	22°07,70' E	215°	0,2	210,1	3,3		
13	546	Brödragrund	60°23,98' N	22°07,00' E	204°	0,8	209,3	4,1		
14	547	Rajakari	60°22,56' N	22°06,21' E	195.5°	1,5	207,8	5,6		
15	548	Orhisaari	60°16,94' N	22°01,13' E	204°	6,2	201,6	11,8		
16	549	Kaskisgrundet	60°14,97' N	21°48,95' E	252°	6,4	195,2	18,2		
17	550	Kyrkogårdsgrund	60°13,43' N	21°45,62' E	227°	2,3	192,9	20,5		
18	559	Lövskär N	60°13,27' N	21°42,69' E	264°	1,5	191,4	22,0		
19	560	Lövskär S	60°13,15' N	21°42,58' E	207°	0,1	191,3	22,1		
20	561	Rödbådan	60°12,18' N	21°42,12' E	193°	1,0	190,3	23,1		
21	562	Anskär	60°11,39' N	21°42,33' E	173°	0,8	189,5	23,9		
23	564	Pärnäinen	60°09,50' N	21°41,78' E	188°	1,9	187,6	25,8		
24	565	Kopphäll	60°07,33' N	21°40,60' E	195°	2,3	185,4	28,0		
25	566	Fagerholm	60°06,18' N	21°41,77' E	153°	1,3	184,1	29,3		
26	567	Lang Ljusskär	60°02,75' N	21° 40,92' E	187°	3,5	180,6	32,8		
27	568	Basskubb	60°00,81' N	21° 41,93' E	165°	2,0	178,6	34,8		
28	569	Rödharu	59°58.40' N	21° 41,96' E	180°	2,4	176,2	37,2		
29	570	S of Flatö	59°55.47' N	21° 38,17' E	213°	3,5	172,7	40,7		
30	571	Norparskarsten	59°52.89' N	21° 31,11' E	234°	4,4	168,3	45,1		
31	572	Bokullasten	59°51.11' N	21° 24,56' E	242°	3,7	164,6	48,8		
32	573	Eglonskär	59°50.31' N	21° 23,82' E	205°	0,9	163,7	49,7		
33	574	Knivskär	59°48.86' N	21° 20,15' E	232°	2,4	161,3	52,1		
34	575	Utö SW	59°45.77' N	21° 21,08' E	171°	3,1	158,2	55,2		

ASP Group
Co & Dist Table

GLOBAL CARRIER MASTER MAXMO

of Passage Plan

V-NAV-005

Appendix 4/3(3)

GLOBAL CARRIER PASSAGE PLAN			Turku Haapaluoto to Oxelösund			START DATE START TIME				
WP	S/H	LOCATION	Lat	Long	Co	Dist	To go	Tot Dist	Spd	ETA
35	576	Utö Pilot	59°44.60´ N	21° 20,69' E	189°	1,2	157,0	56,4		
36	577	Formansbådan	59°42.50´ N	21° 20,00' E	189°	2,1	154,9	58,5		
37	578	VTS Report 12 NM	59°34.72´ N	21° 17,41' E	190°	7,9	147,0	66,4		
38	579	WP 38	59°32.00´ N	21° 16,50' E	190°	2,8	144,2	69,2		
39	580	Landsortsdjupet	58°40.70´ N	18° 30,00' E	239°	99,7	44,5	168,9		
40	581	Gustaf Dalén Pilot	58°37.27´ N	17° 28,10' E	264°	32,4	12,1	201,3		
41	582	Norra Kränkan	58°37.32´ N	17° 23,07' E	271°	2,6	9,5	203,9		
42	589	Forsbergsgrund	58°36.84´ N	17° 19,90' E	254°	1,7	7,8	205,6		
43	585	Grässkären	58°36.69´ N	17° 13,96' E	267°	3,1	4,7	208,7		
44	586	Grässkärsrevet	58°36.80´ N	17° 12,56' E	279°	0,7	4,0	209,4		
45	587	Ytterskärsgrund	58°37.81´ N	17° 09,60' E	303°	1,8	2,2	211,2		
46	590	Oxelösund	58°39.51´ N	17° 06,95' E	321°	2,2	0,0	213,4		

Copy of Passage Pl

TraFi

Comments

Päiväys/Datum/Date 31st March 2011

Dnro/Dnr/Ind.No. TRAFI/6357/07.01.00/2011

Viite/Referens/Ref Request for comments 24th February 2011

Accident Investigation Board
Risto Repo / Martti Heikkilä
Sörnäisten rantatie 33 C
FIN-00500 Helsinki, Finland

Finnish Transport Safety Agency's comments to AIB's investigation report C2/2010M regarding the collision betweeen the M/V GLOBAL CARRIER and the M/V ECOSTAR G.O. in Oxelosund, Sweden.

We would like to thank you for the opportunity to became acquainted with the final draft of the report and for the possibility to give comments with regard to the recommendations.

I have carefully read the final draft of the report and the conclusion is that Finnish transport safety agency does not have any comments regarding to the safety recommendation presented in this final draft of the report.

Juha-Matti Korsi
Senior adviser, Inspections Division