



**DANISH MARITIME AUTHORITY**



**MARINE ACCIDENT REPORT  
DIVISION FOR INVESTIGATION OF MARITIME ACCIDENTS** ———

**DANICA SUNBEAM  
Accident to seafarers on 18 November 2009**

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**Case:** 200914389

The casualty report is available on our homepage: [www.dma.dk](http://www.dma.dk).

### **The Division for Investigation of Maritime Accidents**

The Division for Investigation of Maritime Accidents is responsible for investigating accidents and serious occupational accidents on Danish merchant and fishing ships. The Division also investigates accidents at sea on foreign ships in Danish waters.

#### **Purpose**

The purpose of the investigation is to clarify the actual sequence of events leading to the accident. With this information in hand, others can take measures to prevent similar accidents in the future.

The aim of the investigations is not to establish legal or economic liability.

The Division's work is separated from other functions and activities of the Danish Maritime Authority.

#### **Reporting obligation**

When a Danish merchant or fishing ship has been involved in a serious accident at sea, the Division for Investigation of Maritime Accidents must be informed immediately.

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## 1 Summary

General cargo ship DANICA SUNBEAM, engaged in a packet service between Miami and Haiti, was being towed in ballasted condition up Miami River.

During the towing, whilst the chief officer and one AB were restacking hatch cover pontoons on the tween-deck, a black out suddenly occurred on board.

As the light went out, the chief officer immediately left his work position on the tween-deck and headed for the open access hatch without taking into account that the after-most pontoon just had been removed by himself and the AB .

The AB shouted a warning to the chief officer about the open gap in the tween-deck, but the chief officer proceeded and fell through the gap 2.4 metres down onto the tank top in the lower hold.

The injured chief officer was rendered first aid by the ship's crew, which was followed up by paramedics from shore at the ship's berthing 20 minutes later.

The chief officer was hospitalized, but he perished from his injuries two days later.

## 2 Conclusion

### 2.1 Immediate causes (6.1)

#### Unsafe actions:

- The chief officer and one AB were restacking the tween-deck pontoons during the passage up the Miami River, when a black out occurred in the ship.
- The chief officer moved from his position in starboard side of the tween-deck at pontoon number 16 towards the place where the pontoon, still hanging in the cranes, had just been removed from the tween-deck making a gap to the lower hold.
- The chief officer immediately walked straight towards the access hatch as if he instinctively intended to hurry.

#### Unsafe surroundings:

The Investigation Division considers the surroundings on the tween-deck unsafe when restacking pontoons, because:

- One pontoon had been removed and thus created a wide open gap.
- No barrier / roping off with ridge rope were used whilst restacking the pontoons.
- The passage way along the ship's side, especially aft from the passage way to the platform, was difficult to use.

### 2.2 Contributory causes (6.2)

#### The safety system:

- No concrete precautions against fall into the lower hold were mentioned in the work place assessment.
- The problems with cooling water for the auxiliary engines that were previously experienced frequently during river passages had obviously not been solved effectively.
- The automatic monitoring of cooling water temperature on the auxiliary engines was insufficient giving no alarm for high cooling water temperature in due time.

### 3 Initiatives and recommendations

#### Preventive actions on board

Despite the fact that a previous work place assessment was made, concluding that it was safe to work with the pontoons when the ship was being towed up the Miami River, the incident and following investigation / evaluation and discussions on board concluded that following measures must be implemented as a result of the incident:

- *No movements of tween-deck pontoons to be made whenever the ship is moving by own power or being towed.*
- *Safety ropes (fixed in one end and a fireman's hook in the other) must for the future be used between individual web frames and gradually installed (hooked up) as tween-deck pontoons are moved away.*
- *Crewmembers always to bear a torch that can be used in emergency, when working in cargo hold with artificial lightning.*
- *Safety ropes only to be removed again when pontoons have been re-positioned.*
- *This report will be distributed to all ships in the fleet. Following requirements have been made to the ships performing this operation – updating of WPI (Work Place Instruction) for work with pontoons.*

#### Recommendations

Fall to a lower level is a very frequent type of accident to seafarers.

One out of three serious and very serious accidents to seafarers investigated by the Division for Investigation of Maritime Accidents is a matter of a fall from one level to a lower level.

- The Investigation Division recommends Erria A/S to ensure that safety precautions against fall to a lower level – and other safety precautions against occupational accidents – are thoroughly and repeatedly talked over on board each ship in the company.
- The Investigation Division recommends Erria A/S to consult Seahealth Denmark with a view of getting consultative assistance in enhancing the safety awareness on board the ships. Reference is made to Sector Specific Guidance “*Fall Arrest Systems*” and “*Getting Around Safely*” published by Seahealth Denmark.
- The Investigation Division recommends Erria A/S to ensure that a proper alarm of high cooling water temperature on diesel engines is signalled with due interval before an automatic stop of the auxiliary engine.

### 4 The investigation

The Division for Investigation of Maritime Accidents has received a report from Erria A/S with factual information about the ship, voyage, accident, crew, work place assessments, statements etc.

The Division for Investigation of Maritime Accidents has received statements from the master, the oiler and the AB working together with the chief officer.

## 5 Factual Information

### 5.1 Accident data

Type of accident (the incident in details)	Fall from tween-deck to lower hold
Time and date of the accident	18 November 2009, 1111 hours
Position of the accident	25°47' N – 8°14' W
Area of accident	Miami River
Injured persons	Chief officer severely injured and subsequently perished

### 5.2 Navigation Data

Stage of navigation	Towing in narrow waters
Port of departure	Gonaives, Haiti
Date and time of departure	14 November 2009, 1430 hours
Depth of the time of the accident	2.9 metres
Pilot on board	No

### 5.3 Weather data

Wind – direction and speed	Variable, 6 m/sec.
Sea	Calm
Visibility	Good
Light/dark	Daylight

### 5.4 Ship data

Name	DANICA SUNBEAM
Home port	Nakskov
Call sign	OUID2
IMO No	8701260
Owners	H. Folmer & Co. (Managing owner)
ISM responsible operator/owner	Erria A/S
Register	Danish International Ship Register
Flag State	Denmark
Construction year	1988
Type of ship	General cargo
Tonnage	1087 GT
Classification society	Bureau Veritas
Length	66.80 metres
Engine power	588 kW
Area served	All seas
Regulation	Notice from the Danish Maritime Authority A and B

## 5.5 The Crew

Number of crewmembers	6
Number of officers certified to act as bridge watch	2
Watch on the bridge	2-shift
Minimum Safe Manning	4
Occupation on board the ship at the time of the accident (crewmembers relevant to the accident)	Age, Citizenship, Certificate of Competency, other certificates, training.
Master	56 years of age, Danish citizen, certified as a "master restricted", 22 years of employment in this company, of this the latest 8 years in this ship
Chief officer	68 years of age, Danish citizen, certified as a "master restricted", 18 years of employment in this company, of this the latest 8 years in this ship
Able bodied seaman	39 years of age, Filipino citizen, 1 year of employment in this company, of this 1 month in this ship

## 5.6 Narratives

### The ship's passage

DANICA SUNBEAM has been engaged in a packet service between Miami and Haiti for three years.

On 14 November 2009 at 1430 hours, the ship departed from Gonaives, Haiti, in ballast bound for Miami River.

On 18 November 2009 at 0930 hours, the ship arrived at Miami pilot ground and took pilot.

At 1000 hours in Miami turning basin, the pilot disembarked and tugs were made fast fore and aft for towing the ship astern to terminal 3600, Miami River.

The ship was towed at a speed of 3 – 3½ knots. For safety reasons and quick intervention by the duty navigator the main engine was kept idling with the pitch propeller disengaged, but ready for being engaged if necessary.

A signal man from the towing company was onboard to assist and guide the tugs during towing the ship up the narrow river.

This was the normal procedure for the ship when navigating up Miami River.

### Work on the tween-deck and the black out.

As a normal ship routine the chief officer and one AB (able bodied seaman) were re-stacking the tween-deck pontoons during the passage up the Miami River by the use of electric cranes (pulleys). The hatch covers on the main deck were still closed.

The chief officer was operating the electric crane in the starboard side while the AB operated the crane in the port side.

Restacking of the forward seven pontoons to the centre of the tween-deck had been completed, and they had just started from the aft with pontoon number 19 moving forward to a position at pontoon number 16 when, at 1110 hours, a black out suddenly occurred (see picture on page 12).

According to standard routine for the duty officer, the master immediately hurried from the bridge to the engine room and started auxiliary engine number 1 to re-establish the power supply.

### **The accident**

As soon as the lights in the cargo hold went out due to the black out, the chief officer left his position at the starboard side of the tween-deck aft and headed straight for the day light from the access hatch at the aft end of the hold.

The AB noticed that the chief officer was moving in the darkness towards the light and shouted out as a warning: "*Chief it is open!*"

At that time, the chief officer was only one step from the gap to the lower hold just made by moving the pontoon number 19.

However, the chief officer continued towards the light and consequently fell through the gap 2.4 metres down onto the tank top.

There is no evidence explaining why the chief officer chose the direct way towards the access hatch.

### **Assistance, evacuation and consequence**

The AB hurried to the gap where the chief officer had fallen down and looked down, but he could not see anything in the dark lower hold. He hurried out from the tween-deck and found the master in the engine room and informed him about what had happened. It was then 1112 hours.

The master hurried to the lower hold through the aft entrance and found the chief officer lying on the tank top aft. The ship's oiler had already arrived at the lower hold and was holding the chief officer's head.

The master returned to the bridge and fetched a neck collar and a blanket and had the AB to bring it down into the lower hold for the oiler to fit the neck collar on the chief officer while he arranged for assistance.

The chief officer was rendered first aid, his head was supported by a pillow and he was covered with a blanket.

The tug boat signal man being present on the bridge informed that assistance by a helicopter would take 20 minutes, and the ship's continued passage to the terminal would take the same time.

The master decided to proceed to the terminal.

During the passage contacts were made to the ship's agent. Miami Fire Brigade and Miami Harbour were alarmed via the tugboats' and the ship's agent and medical assistance was immediately requested to stand by when the ship was alongside.

When the ship arrived at terminal 3600, the Fire Brigade and paramedics were standing by on the quay.

On request from the master the oiler collected the chief officer's torch, portable VHF-set and his key and brought these items to the master.

The chief officer was conscious, when he was taken ashore by the use of the ship's gear and the Fire Brigade's stretcher at 1140 hours and brought to hospital.

On 20 November 2009, the chief officer perished on the hospital as a result of his injuries.

### ***5.7 Reason for the black out***

DANICA SUNBEAM had been in this charter for three years. This voyage was no. 43. Due to narrow water, restricted space for manoeuvring and to the protection of wildlife in the river water the ship is always being towed astern all the way up the Miami River, which normally takes two hours.

Up to 1½ year ago the ship had numerous black outs due to silt/dirt/plastic being raised from the river bed by the heavy thrust from the tug pulling aft. Since then the ballast pump has been used for providing cooling water when the ship was being towed up the Miami River.

This has proved successful hitherto, as no other black out has been experienced until this time. Thus the problems with blocked cooling water to the auxiliary engines during river passages were believed being solved.

A subsequent check of auxiliary engine number 2 proved no faults. It is therefore assumed that this black out was caused by debris impeding the inlet to the cooling water system as previously in spite of using a bigger pump (the ballast pump).

### ***5.8 Normal work procedure and Work Place Assessment***

The ship was holding a work place assessment on board named "Work Place Instructions" for removing pontoons by the use of fixed installed pulleys and by the use of the derricks as well:

#### ***Moving of Tween-deck Pontoons by KETI pulleys***

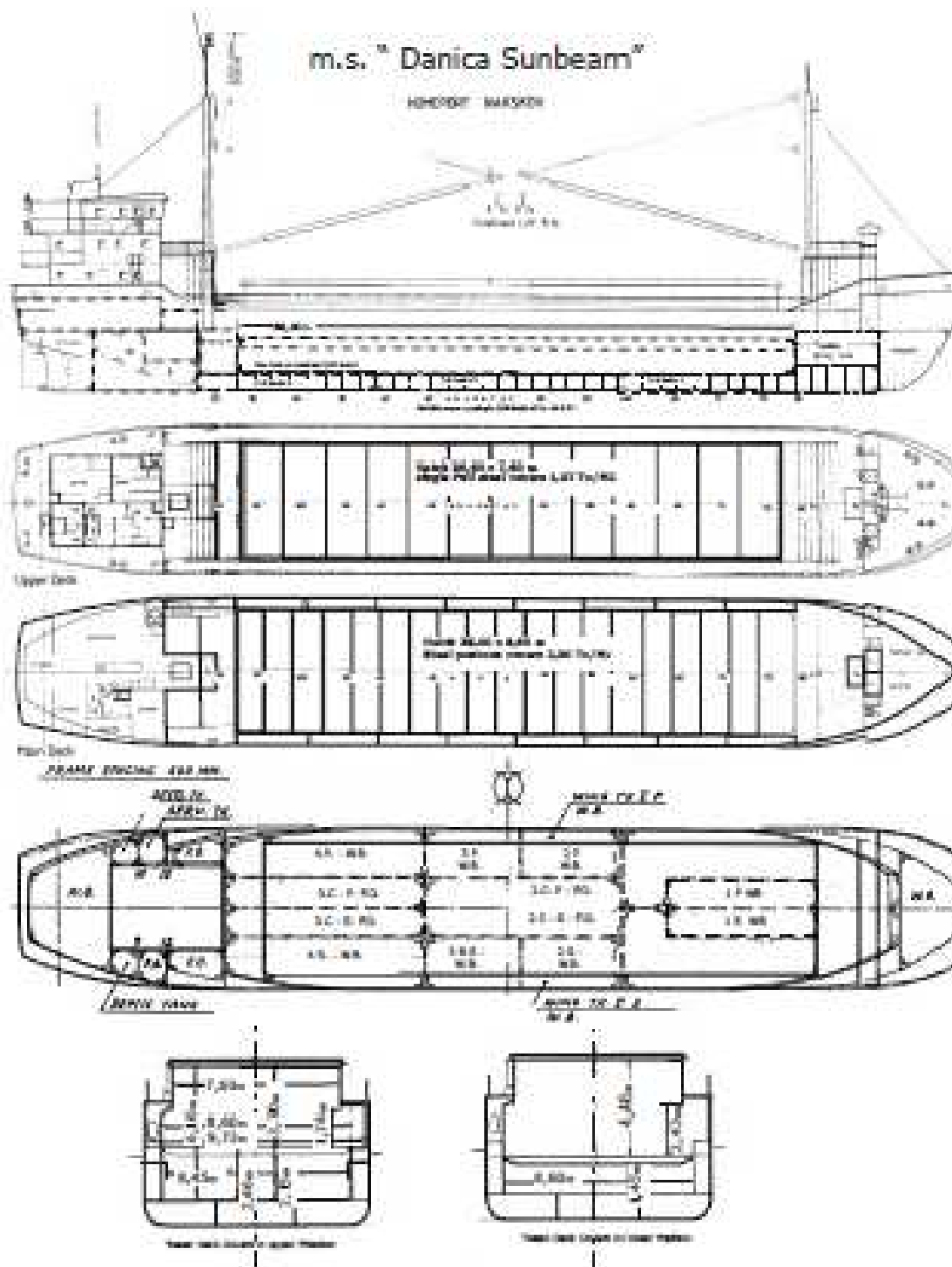
*Purpose: To inform about the safe moving of tween-deck pontoons by KETI pulleys*

*Responsible: Master/Mate is responsible for the safe working when moving the tween-deck pontoons*

*Description:*

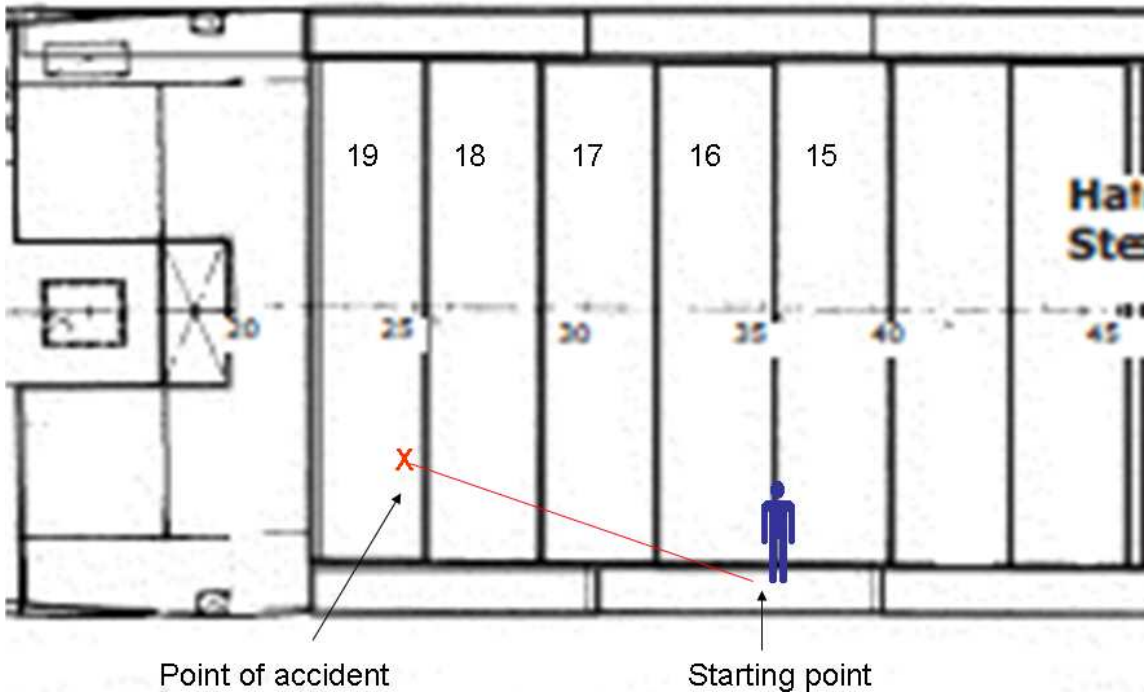
- *When uncovering the pontoons always start from the ends and stack in the middle.*
- *When covering always start from the centre.*
- *When engaging hook from KETI pulley make sure it is correctly engaged.*
- *When lifting pontoon make sure to follow each other – pontoon horizontally.*
- *When moving forward/aft make sure to move at same speed – always eye contact with the other operator.*
- *When the ship has a small list the operator on the low side is to be 25cm ahead in the moving direction in order to pass the WEB frames.*
- *When passing the WEB frames take special care not to get squeezed between pontoon and WEB frame.*
- *When placing pontoon in tween-deck make sure to lower at equal speed not to get pontoon jammed before it reach resting position – watch where you place your feet.*
- **ALLWAYS WEAR PERSONAL SAFETY PROTECTION**
- **ALLWAYS BEWARE OF THE OPENING TO THE LOWER HOLD**
- **ALLWAYS THINK SAFETY**

## 5.9 Scene of the accident on board the ship



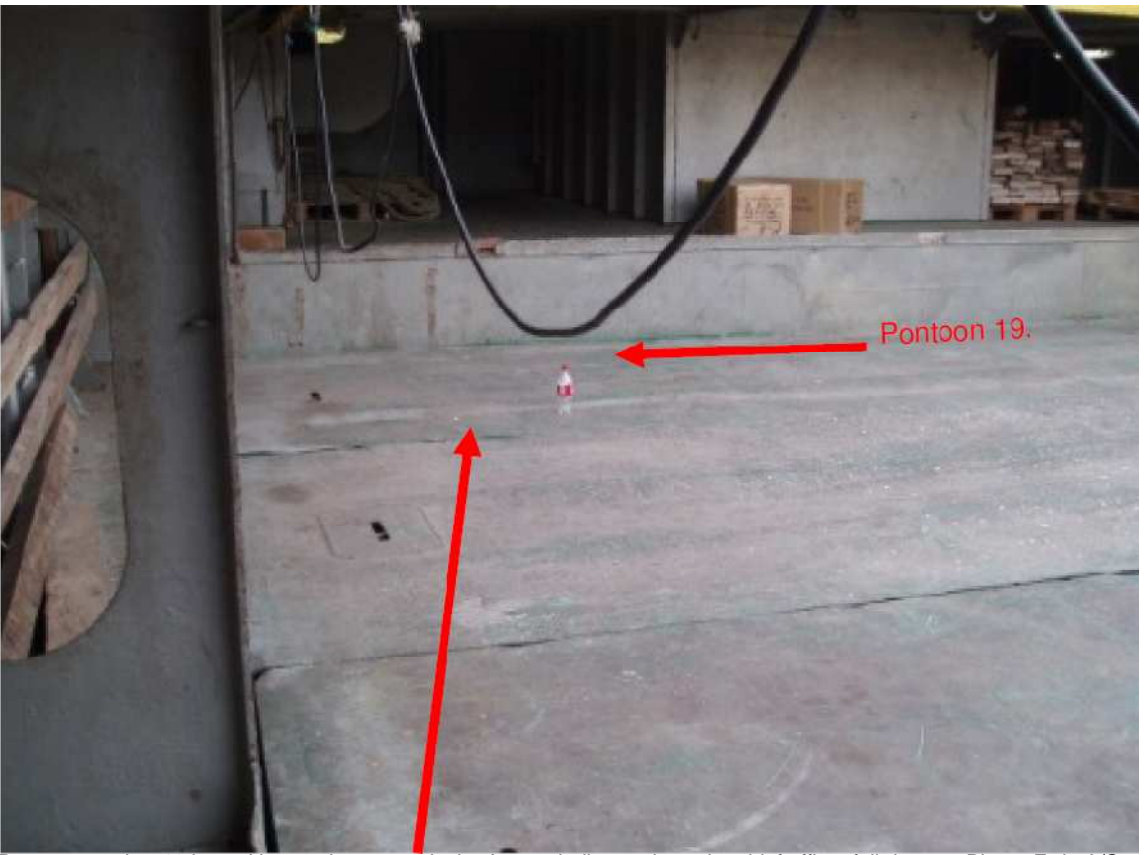
General arrangement

Source: ERRIA A/S

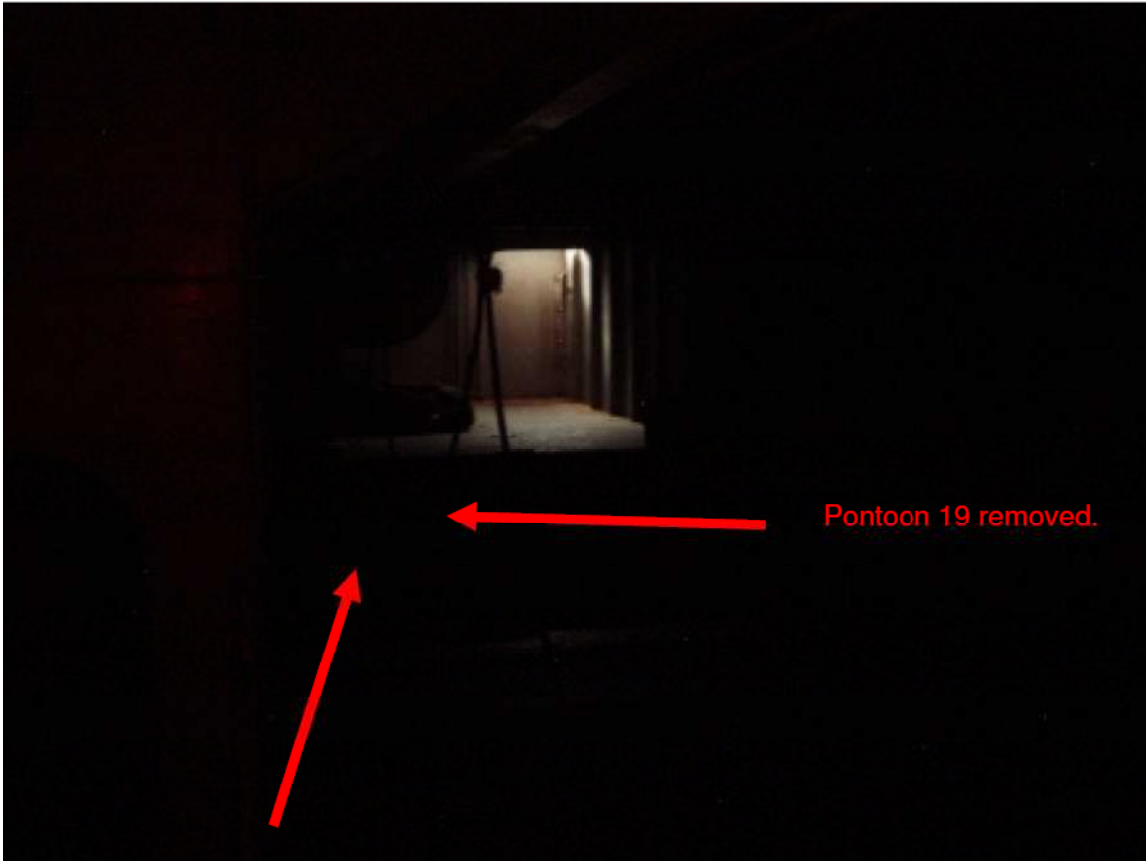


Detail from the general arrangement, tween-deck aft

Source: Erria A/S



Pontoon number 19 in position on the tween-deck. Arrows indicate where the chief officer fell down. Photo: Erria A/S



Pontoon number 19 in position, lights turned off. Arrows indicate where the chief officer fell down. Photo: Erria A/S



Tween-deck and passage way, starboard side.

Photo: Erria A/S



Passage way and web frame after mounting new ridge ropes with snap hooks

Photo: Erria A/S



KITO crane (pulley) for removal/shifting pontoons

Photo: Erria A/S



Tween-deck seen from port side, pontoon number 19 is closed

Photo: ErriaA/S

### ***5.10 Passage arrangement on the tween-deck***

On the tween-deck there are passage ways of 0.8 metre in breadth at each side. Passing on the passage ways is impeded by web frames with manholes (photos on pages 11 and 13).

Aftermost the manhole in the web frame is blocked and on the tween-deck aft a longitudinal and a transverse beam makes the passing from the passage way to the platform more difficult and even risky when pontoon number 19 is removed.

No ridge ropes were used on the tween-deck prior to the accident.

### ***5.11 Rest hours***

During the 17 days prior to the accident, the chief officer had 12 hours of rest each day as an average.

On the day before the accident, the chief officer had 10 hours of rest, and on the day of the accident, he had 4 hours of rest (from 0400 till 0800) before he began working.

### ***5.12 External investigation***

On 21 November 2009, US authorities carried out a drug test on all officers and crew members on board the DANICA SUNBEAM.

None of the tests proved signs of drugs.

## 6 Analyses

### 6.1 Immediate causes (6.1)

#### **Unsafe actions:**

The chief officer and one AB were restacking the tween-deck pontoons during the passage up the Miami River, when a black out occurred in the ship.

As soon as the lights in the cargo hold went out, the chief officer left his position at the starboard side of the tween-deck aft and headed straight for the access hatch at the aft end of the hold.

There is no evidence explaining why the chief officer moved from his position on the tween-deck without delay.

One possible reason might be that the chief officer intended to assist the master as quick as possible because of the black out.

The Investigation Division notes that the accident occurred because the chief officer moved from his position in starboard side of the tween-deck at pontoon number 16 towards the place where the pontoon, still hanging in the cranes, had just been removed from the tween-deck making a gap to the lower hold.

There is no evidence explaining why the chief officer chose to go the direct way towards the access hatch instead of using the passage way at starboard side.

However, using the passage way was more time consuming and aftermost the passage way was practically impossible to use without risk when the pontoon number 19 was removed.

The chief officer must have known by his own experience that it was more difficult and time consuming using the passage way than walking straight across the tween-deck pontoons.

The chief officer was holding a VHF-set and a torch. He did not use the VHF-set to contact the master to hear if he needed any assistance, nor did he use his torch even though the cargo hold had become dark.

The chief officer proceeded towards the access hatch even though the AB shouted a warning about the open gap.

The Investigation Division notes that the chief officer immediately walked straight towards the access hatch as if he instinctively intended to hurry.

#### **Unsafe surroundings:**

Prior to this accident, the chief officer had been doing this work a great number of times.

Prior to this accident, it was considered safe to restack the pontoons whilst the ship was being towed up the river.

The main deck hatch cover had not been opened whilst the ship was being towed up the river.

At the time of the accident, there was no instruction to use a ridge rope.

The Investigation Division considers the surroundings on the tween-deck unsafe when restacking pontoons, because one pontoon had been removed and thus created a wide open gap and the surroundings on the tween-deck unsafe because no barrier / roping off with ridge rope were used whilst restacking the pontoons.

The Investigation Division considers the surroundings on the tween-deck unsafe because the passage way along the ship's side, especially aft from the passage way to the platform, was difficult to use.

## 6.2 Contributory causes (6.2)

### The safety system:

The work place instruction stated among other things:

- *When uncovering the pontoons always start from the ends and stack in the middle.*
- *ALLWAYS BEWARE OF THE OPENING TO THE LOWER HOLD*

Besides that the Investigation Division notes that no concrete precautions against fall into the lower hold were mentioned in the work place assessment.

The problems with automatic stop of auxiliary engines during river passages were believed being solved, because no such black outs had occurred for 1½ year.

However, the auxiliary engine in service stopped automatically and caused a black out during this river passage.

No technical reason for the automatic stop of the auxiliary engine was revealed other than insufficient cooling caused by silt/debris might have impeded the cooling water inlet.

The Investigation Division notes that the problems with cooling water for the auxiliary engines that were previously experienced frequently during river passages had obviously not been solved effectively.

No alarm was signalled in due time before the automatic stop of the auxiliary engine for high cooling water temperature.

The cooling water problem was not realized before the auxiliary engine actually stopped automatically causing a black out. Thus the crew had no indication that a black out was about to occur.

The Investigation Division considers the automatic monitoring of cooling water temperature on the auxiliary engines insufficient.