



Bundesstelle für Seeunfalluntersuchung
Federal Bureau of Maritime Casualty Investigation
Federal Higher Authority subordinated to the Ministry of Transport
of Transport and Digital Infrastructure

Investigation Report 496/15

Serious Marine Casualty

**Fire in the cargo hold of the
multipurpose ship VENTURA
off the canal locks
at Kiel-Holtenau
on 18 December 2015**

29 November 2019

This investigation was conducted in conformity with the Law to improve safety of shipping by investigating marine casualties and other incidents (Maritime Safety Investigation Law – SUG). According to said Law, the sole objective of this investigation is to prevent future accidents. This investigation does not serve to ascertain fault, liability or claims (Article 9(2) SUG).

This report should not be used in court proceedings or proceedings of the Maritime Board. Reference is made to Article 34(4) SUG.

The German text shall prevail in the interpretation of this investigation report.

Issued by:
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1 SUMMARY

The Antigua and Barbuda-flagged multipurpose ship VENTURA was sailing from Liepaja in Latvia to Casablanca in Morocco on 18 December 2015. The VENTURA was carrying almost 4,811 mt of sugar beet pulp with no added molasses. She passed Kiel lighthouse at 1100. Smoke was noticed on board at about 1200 and the fire alarm then triggered. The regional vessel traffic service (VTS) centre was notified and it assigned the VENTURA an emergency mooring off Vossbrook on the Kiel Firth.

Kiel Fire Service deployed a firefighting unit (FFU) on board to investigate. The Central Command for Maritime Emergencies (CCME) was notified of the ship fire promptly by Waterway Police (WSP) Kiel and formally took charge of coordinating the incident in the early evening. The VENTURA made fast in Kiel Ostuferhafen port at 2100. Part of the cargo was subsequently unloaded onto the pier using a dredger belonging to the port and extinguished there by the Kiel Fire Service. Both the VENTURA's cargo hold and cargo were damaged by the accident. Neither people nor the marine environment were affected.

2 FACTUAL INFORMATION

2.1 Photograph of the ship

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Figure 1: Photograph of the VENTURA

2.2 Ship particulars

Name of ship:	VENTURA
Type of ship:	Multipurpose ship
Flag:	Antigua and Barbuda
Port of registry:	Saint John's
IMO number:	9312729
Call sign:	V2GM2
Owner (according to Equasis):	Erwin Strahlmann GmbH & Co. KG
Owner:	Erwin Strahlmann GmbH & Co. KG
Year built:	2006
Shipyard:	Niestern Sander Reparatie B.V./830
Classification society:	Bureau Veritas
Length overall:	106.15 m
Breadth overall:	14.40 m
Draught (max.):	6.15 m
Gross tonnage:	3,870
Deadweight:	5,698 t
Engine rating:	2,700 kW
Main engine:	MAK 9M25
(Service) Speed:	11 kts
Hull material:	Steel
Hull design:	Double hull, double bottom
Minimum safe manning:	9

2.3 Voyage particulars

Port of departure:	Liepaja, Latvia
Port of call:	Casablanca, Morocco
Type of voyage:	Merchant shipping/ international
Cargo information:	Sugar beet pulp with no added molasses
Manning:	9
Draught at time of accident:	D _f 5.95 m, D _m 6.01 m, D _a 6.07 m
Pilot on board:	Yes
Canal helmsman:	No
Number of passengers:	0

2.4 Marine casualty or incident information

Type of marine casualty:	Serious marine casualty, fire
Date, time:	18 December 2015, 1155 ¹
Location:	Approaching the locks at Kiel-Holtenau
Latitude/Longitude:	φ 54°23.0' N λ 010°11.2' E
Ship operation and voyage segment:	Estuary trading
Place on board:	Cargo hold
Human factors:	Not clearly identifiable
Consequences:	Cargo hold and cargo damaged

Extract from the official electronic navigational chart (ENC) 516200,
Federal Maritime and Hydrographic Agency (BSH)

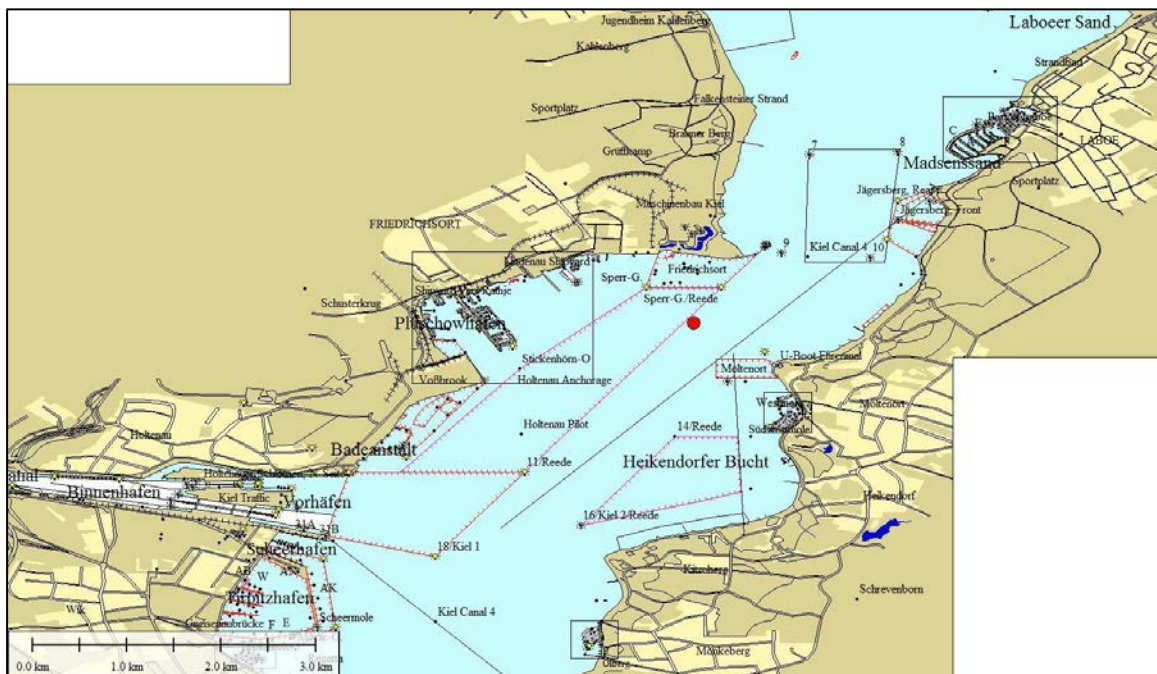


Figure 2: Navigational chart

¹ All times shown in this report are local = UTC+1.

2.5 Shore authority involvement and emergency response

Agencies involved: VTS Kiel Traffic, WSP Kiel, CCME, Kiel Fire Service, Kiel Harbour Master's Office

Resources used: Kiel Fire Service FFU, coastal boat and patrol boat from WSP Kiel

Actions taken: Shifted to Kiel Ostuferhafen port, cargo partially unloaded by port operations personnel and extinguished by Kiel Fire Service on the pier

3 COURSE OF THE ACCIDENT AND INVESTIGATION

3.1 Course of the accident

The Antigua and Barbuda-flagged multipurpose ship VENTURA cast off from the port of Liepaja in Latvia at 1800 on 16 December 2015 to set sail for Casablanca, Morocco. The ship had 4,900 t of sugar beet pulp with no added molasses in pellet form stowed in her two cargo holds.



Figure 3: Sugar beet pulp in pellet form

The bridge was manned by a pilot, who was on board for the planned voyage through the Kiel Canal on 18 December 2015, the master and a helmsman. The chief officer noticed smoke coming out of cargo hold 1 when he proceeded to the forward manoeuvring station at 1155 as the ship was approaching the canal locks at Holtenau. The smoke was not visible from the bridge.

The pilot immediately notified the VTS, which forwarded this preliminary report to the WSP. The WSP then notified the CCME's Maritime Emergencies Reporting and Assessment Centre (MERAC). The master informed the person responsible for emergencies at the owner.

Kiel Fire Service was informed about the state of play at 1245 but not put on standby at that point.

With the approval of the port authority, the ship's command took the decision to drop anchor at the Holtenau roadstead at 1315. During the voyage there, the ship's firefighting team was assembled on the fore section. The firefighting team monitored the cargo hold temperatures at fifteen-minute intervals and attempted to locate the source of the fire with respiratory protection. The police boat NEUMÜHLEN was at the scene and forwarded this information to the WSP station as well.

The assumption that the fire would extinguish on its own because the cargo hold was completely filled turned out to be erroneous. The temperatures measured in the cargo hold continued to rise. The ship's command signalled at about 1430 that it would not be possible to gain control of the situation without shore-based assistance. The harbour master requested the WSP to mobilise a team of firefighters and take them to the ship. The coastal patrol boat FALSHÖFT picked up a FFU from Kiel Fire Service, which had been requested for a fact-finding mission via the CCME, at 1532 at the buoy yard in Holtenau and transferred it to the distressed vessel. According to the mission report, it arrived there at 1558.

The WSP control centre asked a turbo-prop aircraft (DO228) from the German armed forces, which was on a planned surveillance flight on the Baltic Sea route, to fly over the VENTURA and use its thermal imaging camera to assist with the assessment of the situation. The heat development at the bow was shown clearly and confirmed by the DO228. The findings were forwarded to Kiel Fire Service (or its FFU).

In the meantime, two firefighting teams from the fire service had begun the investigation on the distressed vessel. Similar to the forward entrance of hatch 1 heavy smoke billowed out after the first bolt of a hatch cover was loosened. The hatch cover was closed again immediately.

At about 1700, the fire service's operational command instructed the crew to discharge CO₂ into hatch 1. This instruction was not implemented immediately because the master had not received clearance from the owner, however. It was not possible to establish the reasons for this subsequently.

The fire service was of the opinion that watertight integrity should be maintained until the ship made fast at a berth so as to partially unload and extinguish the cargo there on the pier.

At 1723, VTS Travemünde submitted an assumption request to the CCME, which after the assumption of overall command of the operation now coordinated all further measures officially. Up until this point, the CCME had constantly monitored the progress of the operation, liaising with the VTS and Kiel Fire Service's emergency situation office by phone.

At 1740, cargo hold 1 was flooded with CO₂. However, the temperature did not drop over the following two hours. Instead, a caramelised substance escaped from the second cargo hold, leading to the conclusion that heat must have transferred to the adjacent hatch.

After it was established that the cargo did not constitute dangerous goods, the Harbour Master's Office assigned the VENTURA Berth 4 in Ostuferhafen port at 1747. The ship made fast at 2100 with the assistance of a tug.

In the meantime, all necessary preparations were made for unloading and extinguishing the affected cargo at the berth. The crew opened the hatch with the help of the ship's gantry crane. The smouldering cargo was then unloaded directly onto the pier by means of a grab crane, where it was extinguished by the fire service. The operation was reported as completed at about midnight.



Figure 4: Fire service fighting the fire



Figure 5: Extinguished cargo

3.1.1 Other measures

After Kiel Fire Service had completed the extinguishing work, the VENTURA's crew took charge of the fire watch until the next morning. The operation was discontinued at 0900 after another fire check. The Ship Safety Division (BG Verkehr) issued a prohibition on continuing on 18 December 2015.

3.2 Investigation

The WSP informed the Federal Bureau of Maritime Casualty Investigation (BSU) about the accident at 1327 on 18 December 2015. A BSU staff member visited the ship on 19 December 2015 after consultation with WSP Kiel. In addition to two officers from the WSP, one surveyor from the Ship Safety Division (BG Verkehr), one from the DNV GL classification society and two inspectors from the owner were on board. The damage to the ship and cargo was assessed as minor. The temperatures in the hatch were so low that even the rubber seals on the hatch covers had not been damaged.

Both spontaneous ignition of the cargo and external ignition were regarded as possible causes of the fire. None of those present was able to determine or rule a cause out precisely at this point. For this reason, the expert Dipl. Ing. Lars Tober was commissioned with the task of investigating the circumstances and conditions responsible for the outbreak of the fire.

3.2.1 Spontaneous ignition of the cargo as one possible cause of the fire

The spontaneous ignition of cargo occurs after self-heating and the spontaneous ignition temperature, which is lower than the material in question's ignition temperature in certain cases, being exceeded. Spontaneous ignition is possible when self-heating processes take place under heat accumulation conditions such that the heat release rate is greater than the heat dissipation rate. This causes the temperature within the cargo to rise and heat release is accelerated until ignition. A distinction is generally made between chemical and biological spontaneous ignition and self-heating according to the type of heat release. With this cargo, biological spontaneous ignition would be possible.

When considering the severity of the damage, it is evident that there are areas on the leading edge of cargo hold hatch 1 which have been more strongly affected by the effects of the fire and adjacent areas which are either affected less or not at all. The following figures document the aforementioned facts:



Figure 6: Fire damage on the starboard leading edge of cargo hold 1

Fire damage can be seen below and on the starboard hatch lighting's protective grating.



Figure 7: Area fouled by soot above the cargo and hotspot on the wing tank



Figure 8: Smouldering fire range up to 2 m below the cargo hold light

It is worth noting that the smouldering fire was limited to a relatively small part of the cargo. Accordingly, the conditions prior to ignition may have developed over an extended period. It seems that the smouldering fire was only starting to develop when the increase in temperature (or smoke development) was detected. For example, the 50 °C found at the cargo hold hatch corresponds to the self-heating temperature of organic materials. The assumed spontaneous ignition and ensuing smouldering fire has a temperature of 250-270 °C in the case of sugar beet pulp. These temperatures also correlate with the damage patterns on the cargo hold walls.

The 50 °C was measured outside the hatch. When a fire occurs, an external source of ignition normally ignites combustible material in the presence of oxygen, where the former provides the necessary ignition energy. However, in the specific case of spontaneous ignition, the ignition energy is not introduced from the outside but supplied by the actual combustible material. Rather than happening suddenly, spontaneous ignition is usually preceded by noticeable self-heating, which may involve various exothermic (heat releasing) biological, chemical and physical processes. If these exothermic reactions release more heat than the combustible material can dissipate, then this leads to a temperature rise in the material, e.g. as a result of heat accumulation. Since the reaction rate and consequently also the heat released during such reactions usually increase as the temperature rises, the self-heating process is accelerated as a result. If the combustible material's ignition temperature is ultimately exceeded, a glowing fire occurs, which then turns into an open flaming fire when the surface is reached.

The cargo's moisture content is another factor that supports the assumption of spontaneous ignition. According to the cargo documents or the 'Form for Cargo Information for Solid Bulk Cargoes', the cargo's moisture content was 11.3%. The maximum moisture limit for this cargo is specified at 12%. This certificate is dated 14 December 2015. No other samples of the cargo, in particular that from the open troughs, were taken after it stopped raining. However, it is reasonable to assume that there was higher moisture ingress into parts of the cargo.

Water ingress during the passage due to non-tight hatch covers or condensing water on the cargo hold walls or in the area of the fire close to the side tanks (ballast water) is also possible.

The extent to which the cargo absorbed additional moisture could not be clarified subsequently.

Material	Conditions
Aluminium	Powder or shavings, impregnated with water or oil
Cotton	Impregnated with oils or fats
Cottonseed oil	On large surface, e.g. sawdust
Petrol bone fat extracts	On large surface, e.g. sawdust
Red lead	Powder impregnated with varnish
Lignite	Heaped
Alkaline metal carbides	Humidity effects
Iron	Powder impregnated with oil or after reduction annealing
Iron sulphides, metal sulphide	Caused by corrosion, contact with water
Fibres, rag, wool	Impregnated with oil or grease
Fish meal	In sacks
Alkaline iron oxide for the purification of gas	From bog ore with organic sulphur compounds in contact with air
Granular coke	Without ageing in contact with air
Rubber residues	Chips with impurities
Chaff, hay	If contaminated and with humidity
Hemp oil	On large surface, e.g. sawdust
Lumber, wood flour	With moisture
Hessian sacks	Impregnated with oil
Burnt lime	With moisture
Linseed oil	On large surface, e.g. sawdust
Organometallic compound	Elements of the 1st to 3rd group of the periodic table in contact with air
Rapeseed oil	On large surface, e.g. sawdust
Castor oil	On large surface, e.g. sawdust
White phosphorus	Contact with water or air
Oakum	With moisture
Zinc, magnesium	Powder or chips
Sugar beet pulp	With moisture and heaped

Figure 9: Substances susceptible to spontaneous ignition²

² Quoted by: Bussenius, Wissenschaftliche Grundlagen des Brand- und Explosionsschutzes [scientific principles of fire and explosion protection].



Figure 10: Photographs of the cargo taken at 1544 local time on 15 December 2015

3.2.1.1 Classification of the cargo as per the IMSBC Code

The Maritime Safety Committee of the International Maritime Organization (IMO) adopted the IMSBC Code to ensure the safe transport of solid bulk cargoes by sea. IMSBC stands for 'International Maritime Solid Bulk Cargoes Code'. It has been mandatory since 1 January 2011 and was introduced so as to better control and classify unknown solid bulk cargoes without listed properties or hazard classification. The manufacturer or shipper of the solid bulk cargo must conclude a tripartite agreement with the flag States and ports involved.

Sugar beet pulp with no added molasses does not constitute dangerous goods within the meaning of the transportation provisions. In accordance with Section 1.5 of the IMSBC Code (MSC.318(89)), a certificate of the competent national authority (Ship Safety Division (BG Verkehr), Hamburg) is available for the product. It states that the product is classified as 'SEED CAKE (non-hazardous) – Group C'.

Group C consists of those cargoes which are neither liable to liquefy (Group A) nor to possess chemical hazards (Group B).

The IMSBC Code states that this cargo must be kept as dry as practically possible and must not be handled during precipitation. It also states that the shipper shall provide the master with appropriate information on the cargo sufficiently in advance of loading to enable the precautions which may be necessary for proper stowage and safe carriage of the cargo to be put into effect. Such information must be confirmed in writing and by appropriate shipping documents. With regard to the transportation of sugar beet pulp with no added molasses, information on the moisture content and moisture limit must be declared by means of a certificate.

The transportable moisture limit has been specified as 12% for this cargo and means that this is the maximum moisture content of the cargo that is considered safe for transportation on ships. If it is found that the cargo has a higher moisture content, then it is strongly recommended that the cargo only be transported if the ship is specially built or equipped. The ultimate decision as to whether cargo may be loaded and transported always rests with the master. In the case of the VENTURA, the cargo's moisture content was 11.3%. According to the cargo documents, this value was certified on 14 December 2015 and applies to the entire cargo at that time. No further samples were taken during the loading operation, in particular after precipitation.

3.2.1.2 Weather conditions at the port of loading and during the voyage

Ship

According to the master's account and the notes made in his statement of facts, poor weather conditions prevailed in the Liepaja area on the day of arrival. For example, the channel leading to the port was closed between 0330 and 0900 local time on 14 December 2015 (13-15 m/s) due to strong wind. The loading operation was interrupted from 0415 to 0440 and from 0545 to 0635 on the following day due to rain. The crew of the ship closed the hatches during those periods. No measures were taken ashore to protect the sugar beet pulp, which was to be loaded from open troughs, from rain.

Harbour master

The harbour master of Liepaja's weather log is only available in the national language. It is attached to this report (Annex 8.3). The information provided only concerned the prevailing wind conditions but not any precipitation. The information concerning the closure of the channel due to strong winds corresponds with that provided by the master.

Report by Germany's National Meteorological Service (DWD)

The official weather report commissioned by the BSU for the Liepaja area largely confirms both the harbour master and the master's information on wind strengths and precipitation. The measurements and observations of the surrounding stations were available to the DWD as a basis for the report. Ship reports from this area were also taken into account. Analyses of the DWD from Offenbach and Latvia's weather service were used for the account of the weather situation.

3.2.2 Cargo hold light as another possible cause of the fire

Each of the VENTURA's cargo hold hatches are equipped with four cargo hold lights (see Figure 11: Position of the cargo hold lights). The control panel is in the cargo office. The cargo hold lights can only be switched on or off in pairs using a key switch. A green indicator light shows the respective operating status. On the day of the survey by the BSU staff member, the position of the key switches of all four cargo hold light pairs was on zero, equal to off (see Figure 12: Control panel for the cargo hold lights).

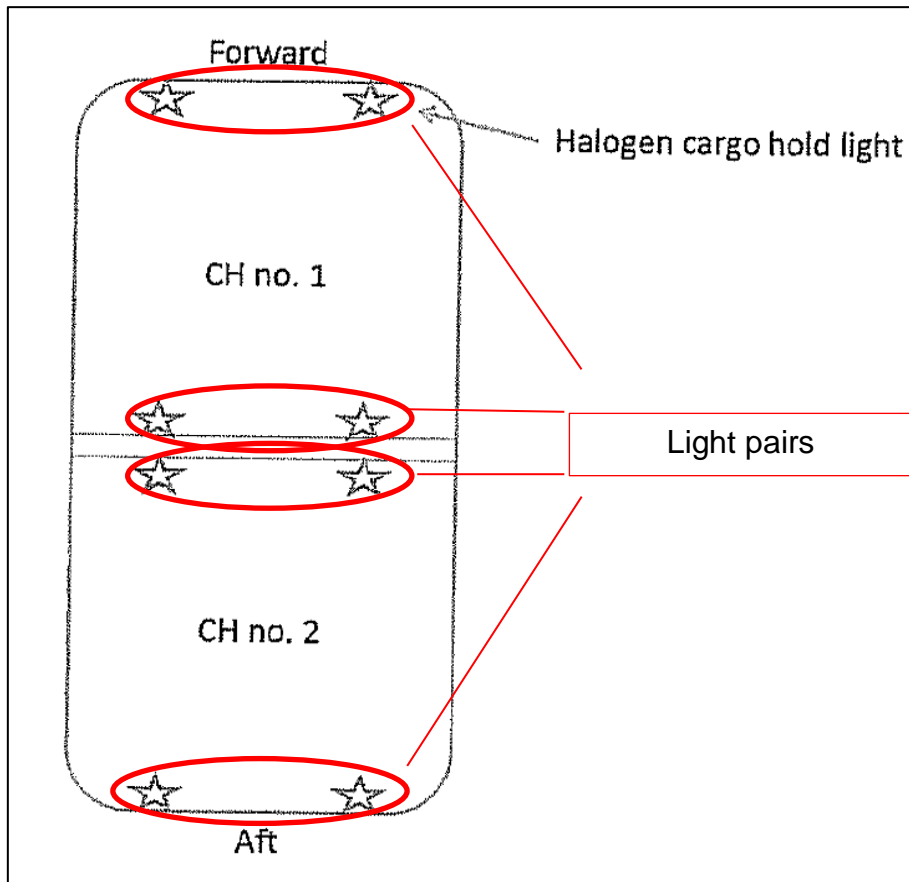


Figure 11: Position of the cargo hold lights



Figure 12: Control panel for the cargo hold lights

3.2.2.1 Defective cargo hold light as a direct source of ignition

The cargo hold light located above the hot spot on the forward starboard side of cargo hold 1, which is one possible cause of the fire, was examined thoroughly. Although this was within the range of the highest thermal load, the cargo hold light was still fully functional. There was no damage to the reflector, glass or cables. The cargo hold light pair could be switched on and off. This means that a defective cargo hold light can be ruled out as the cause of the fire with certainty.



Figure 13: Starboard cargo hold lights

3.2.2.2 Thermal discharge from the cargo hold light as an indirect source of ignition

As already discussed, only two cargo hold light pairs can be switched on or off at the same time. However, the overall damage pattern indicates that the fire started on the starboard side below the forward cargo hold light. Another assumption is that this cargo hold light constitutes an indirect source of ignition. According to the report commissioned by the BSU, the Powerplug halogen spotlights installed (output: 400 W) reach a surface temperature of 400-500 °C during operation, which is also the cargo's ignition temperature. The crew stated that the cargo hold lights were not in operation, however. It has not been possible to clarify whether they were switched off during the entire loading operation or only shortly before the relevant cargo depth was reached.



Figure 14: Port cargo hold light

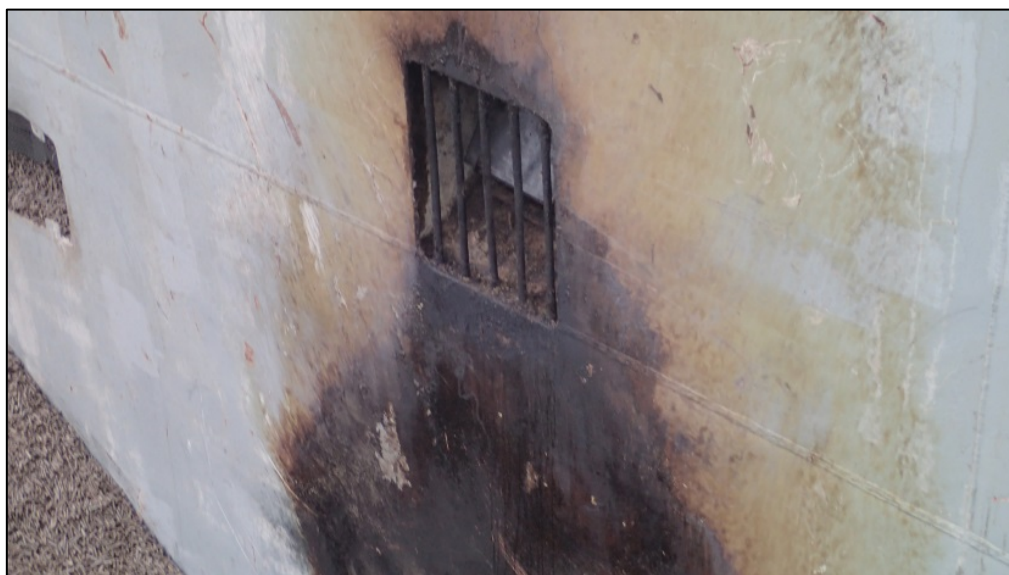


Figure 15: Starboard cargo hold light

3.2.3 Additional information

3.2.3.1 VENTURA

The VENTURA is a multipurpose single-decker (no tween deck and usually used for bulk transport). She has two cargo hatches of the same size, which can be closed using pontoon-type hatch covers that can be picked up or set down using the ship's gantry crane. The ship is also equipped with two movable transverse bulkheads, which can be installed at different positions within the cargo hold.

3.2.3.2 Crew

The ship's crew comprised eleven people at the time of the accident. Eight of them were Philippine nationals, two were Polish nationals and one was a Lithuanian national.

3.3 Firefighting – conclusions and facts

The course of the shore-based organisation is described and the firefighting measures taken considered below. The chronological sequence and corresponding activities are listed.

- 1155 on 18 December 2015: Chief officer reports smoke coming out of cargo hold hatch 1 as the ship is approaching the canal locks at Holtenau
- 1215: The ship's firefighting team proceeds to hatch 1
- 1225: After liaising with the authorities, the VENTURA shifts to the Holtenau roadstead to anchor there
- 1300: MERAC notifies CCME
- 1315: Temperature measurements at hatches 1 and 2 by the crew; VENTURA reaches the anchorage
- 1330: Temperature measurements every 15 minutes
- 1415: CCME alerts the Kiel FFU in the course of administrative assistance for VTS Travemünde
- 1430: Temperatures at hatch 1 not dropping; extinguishing the fire not possible
- 1558: FFU Kiel reaches the distressed vessel
- 1620: The fire service attempts to gain access to the cargo hold
- 1635: A turbo-prop aircraft (DO228) from the German armed forces flies over the VENTURA and takes pictures with a thermal imaging camera
- 1700: The operational commander of the fire service requests the use of the CO₂ system in hatch 1
- 1720: Preparations on board to flood hatch 1 with CO₂
- 1723: The local commander of Kiel Fire Service gives VTS Travemünde an assessment of the situation and subsequent course of events as well as a possible firefighting attempt. The VTS then submits an assumption request to the CCME orally
- 1740: CO₂ is discharged into the hatch from 23 bottles. Increased heat developments and carbon monoxide values are still measured
- The temperature in cargo hatch 1 does not drop even after the discharge of CO₂
- 1747: After it is established that the cargo does not constitute dangerous goods, the Harbour Master's Office assigns the VENTURA Berth 4 in Ostuferhafen port
- 1850: Start of the main engine; VENTURA leaves the anchorage
- 2100: VENTURA reaches the prepared berth unassisted
- 2200: Firefighting starts. Some 150 t of sugar beet pulp are unloaded onto the pier and extinguished by the fire service with water
- 2300: Overall command of the operation handed over to Kiel Fire Service at the scene
- 0004 on 19 December 2015: Kiel Fire Service completes the extinguishing work
- 0900: After another fire check, the operation at the scene is discontinued

It was found during the investigation of the accident that the period between the fire (1200), alerting of the VTS (1230) and ultimate arrival on board of a FFU from Kiel Fire Service (1600) was greater than expected. Consequently, in addition to the mission logs already provided by WSP Kiel, Kiel Fire Service and the CCME, additional logs were requested (Integrated Regional Control Centre South in Kiel, VTS Travemünde, more detailed log from the fire service). The times in all logs were cross-checked. It is evident that there was no clear command and control at the scene for an extended period.

There is definitely a need for improvement in respect of shortening the period between alerting and arrival at the distressed vessel. The one and three-quarter hours resulted from the fact that the entire FFU, including equipment and roll-off containers, went to the VENTURA to assess the situation. A sub-unit with commensurately reduced equipment (personal protective equipment and measuring devices) would have been more appropriate early on for the fact-finding mission. In the case of the VENTURA, the running time would have been about 30 minutes and with a small FFU probably not much more.

4 ANALYSIS

4.1 Investigations of the WSP

WSP Kiel's on-scene investigation began when the VENTURA arrived at Ostuferhafen port and all its findings have been made available to the BSU. It was not possible to secure VDR data. Although the master had enabled data storage, there was no storage medium in the device. According to the owner's statement, this was not reinstalled on the ship during or after the last annual survey by a service engineer.

4.2 Investigations of the public prosecutor's office

The public prosecutor's office in Kiel did not initiate proceedings in this case because there was no initial suspicion of a criminal offence.

4.3 BSU

After completion of the investigations the BSU was able to rule out the assumption that the starboard cargo hold light triggered the fire as a direct source of ignition. The cargo hold light and bulb installed in it were clearly not defective.

That the light may have triggered the fire due to thermal discharge remains a possibility. It was not possible to establish whether the cargo hold lights were switched on during loading and if so, when they were switched off. The BSU's expert suggested that the cargo may have slipped through the protective grating into the light niches, causing a thermal encapsulation there. However, this raises the question as to why a hot spot did not form around the port side light, too. After all, the two lights can only be switched on or off together.

It is reasonable to assess the presumption of spontaneous ignition due to the maximum moisture content being exceeded as more probable, but this could not be clearly demonstrated. This would have required more samples from those parts of the cargo located in the upper area of the wing tanks (location of possible condensation) and from the area where the fire originated below the starboard cargo hold light. Since it was precisely this part of the cargo that the fire service extinguished on the pier, it was no longer possible to determine the actual moisture content subsequently, however.

5 CONCLUSIONS

Based on all the information available, the BSU concludes that it is not possible to clearly determine the cause of the fire. However, there is reason to believe that the cargo's maximum moisture content was partially exceeded due to the effect of rain when the sugar beet pulp was loaded from the open troughs. This in turn can form the basis for possible spontaneous ignition. The master failed to request additional samples of the affected cargo units or to exclude them from loading, as required by the IMSBC Code. There was no information to the owner or write-down in the bill of lading, either.

6 SAFETY RECOMMENDATIONS

The following safety recommendations do not constitute a presumption of blame or liability in respect of type, number or sequence.

6.1 Strahlmann (the owner)

The Federal Bureau of Maritime Casualty Investigation recommends that the owner, Erwin Strahlmann GmbH & Co. KG, advise the masters and chief officers in its employ of the need to comply with the regulations laid down in the IMSBC Code.

6.2 Strahlmann (the owner)

The Federal Bureau of Maritime Casualty Investigation recommends that the owner, Erwin Strahlmann GmbH & Co. KG, advise its ship's command to the effect that if solid bulk cargo is loaded from open troughs or the like, which are not protected ashore from any type of precipitation, new samples must be taken in respect of the moisture content and that parts of the cargo must be excluded from loading if required limit values are not met.

6.3 Strahlmann (the owner)

The Federal Bureau of Maritime Casualty Investigation recommends that the owner, Erwin Strahlmann GmbH & Co. KG, advise its ship's command that the niches in which cargo hold lights are located should be sealed when solid bulk cargo is loaded above them so that it cannot pass through their protective grating and come into direct contact with the lights. This would rule out the possibility of a direct or indirect source of ignition originating from cargo hold lights that were not switched off or defective.

7 ACTIONS TAKEN

With regard to possible improvements in the size of the FFU as a fact-finding team, the fire service has already taken appropriate measures to gain a quicker overview of similar accidents in the future. A 'FFU Small' has been implemented, for example. The BSU is not issuing safety recommendations for this reason.

8 SOURCES

- Enquiries of WSP Kiel
- Written explanations/submissions
 - Ship's command
 - Owner
- Testimonies and statement of facts³
- Opinion of Dipl.-Ing. Lars Tober
- Navigational chart, BSH
- Official weather report, DWD
- Documentation from the Ship Safety Division (BG Verkehr)
 - Guidelines and codes of practice
- VTS mission logs
- CCME mission logs
- Kiel Fire Service mission logs
- WSP Kiel mission logs
- Final report of Integrated Regional Control Centre South
- P&I report
- Investigation report of Strahlmann (the owner)

³ _


9 ANNEXES

9.1 Extract from DWD report

The report contains the weather conditions for the period 1500 CET (1400 UTC) on 14 December 2015 to 2200 CET (2100 UTC) on 16 December 2015.

Note: The Annex below contains the DWD shipping forecasts published for 14, 15 and 16 December 2015. The sea area of the central Baltic (marked red) must be considered, in particular.


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 Reference WV 13/64.30.16-20/53_16




Deutscher Wetterdienst
 Wetter und Klima aus einer Hand

Text attachment:
 Extract from shipping forecast for 14, 15 and 16 December 2015 for the central Baltic region

Sea areas in North Sea and Baltic Sea shipping forecast.
 Current report available at www.dwd.de/seewetter



Extract from shipping forecast 14/12/2015 1444
 Weather:
 Low 990 Barents Sea tracking north-east. Low 1008 west of Malangen, deepening, rapidly tracking north-east, extensive high 1027 eastern Europe, strengthening somewhat. Wedge 1025 southern Sweden, 1020 southern Norway, 1015 south of Iceland, strengthening. Low 1015 Forties, tracking east and later south-east. Stormy depression 985 south-west of Ireland, weakening, tracking north somewhat. Another stormy depression 978 Azores, deepening, tracking north-east.
 Forecast valid until tomorrow morning:
 German Bight:
 Southern winds about 5, veering west, decreasing somewhat, later light wind, hazy in places, sea 1.5 metres.
 South-western North Sea:
 Southerly winds 4, decreasing 3, hazy, sea 1 metre.
 Ijsselmeer:
 Southerly winds 3 to 4, decreasing somewhat, hazy, sea 0.5 metres.
 Fisher:
 Changing directions 4 to 6, later east 5, sea 2 metres.
 Dogger:
 South-west to west 4 to 5, later light wind, hazy in places, sea 1.5 metres.
 Forties:



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Figure 16: Extract from DWD report

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Deutscher Wetterdienst
Wetter und Klima aus einer Hand



Changing directions 4 to 6, later east 5, hazy in places, sea 1.5 metres.
 Viking:
 Shifting winds 2 to 3, east to south-east 4 (southern part), sea 1.5 metres.
 Utsira:
 East about 4, southern part 6 in places, sea 1.5 metres.
 Skagerrak:
 Shifting winds 2 to 3, veering north-east, increasing somewhat, sea 1 metre.
 Kattegat:
 Southerly winds 3 to 4, temporarily increasing somewhat, veering east, sea 0.5 metres.
 Belts and Sound:
 Southerly winds 3 to 4, temporarily increasing somewhat, veering east, sea 0.5 metres.
 Western Baltic:
 Southerly winds 3 to 4, temporarily increasing somewhat, later changing directions, hazy in places, sea 0.5 metres.
 Southern Baltic:
 South-easterly winds 2 to 3, increasing 4, hazy in places, sea 1 metre.
 Bodden waters east:
 Southerly winds 2 to 3, increasing 4, hazy in places, sea 0.5 metres.
 South-eastern Baltic:
 North-west 4 to 5, slowly abating, hazy in places, sea 1.5 metres.
Central Baltic:
 North-west 4 to 5, decreasing about 3, veering west, initially shower squalls, sea 1.5 metres.
 Northern Baltic:
 North-west 5, decreasing 4, veering west, shower squalls, sea 1.5 metres.
 Gulf of Riga:
 North-west 5, decreasing 4, veering west, shower squalls, sea 1.5 metres.
 Engl. Channel (western part):
 South 5 to 6, decreasing 4, hazy in places, shower squalls, sea 2.5 metres.
 Engl. Channel (eastern part):
 South 5, decreasing 4, hazy in places, shower squalls, sea 1.5 metres.

Extract from shipping forecast 15/12/2015 1440

Weather:

Low 985 Barents Sea, weakening somewhat. Low 1012 Norwegian Sea (northern part), deepening, tracking south-east. Extensive high 1030 eastern Europe, strengthening somewhat. Wedge 1025 Svínoy, 1015 Iceland weakening, swinging east. Shallow low 1023 Mecklenburg, filling. Stormy depression 984 south-west of Ireland, weakening, tracking north. Stormy depression 972 north-west of the Azores, weakening somewhat, slowly tracking east. Tonight new low 999 Ireland, weakening, tracking east.
 Forecast valid until tomorrow morning:
 German Bight:
 South-east about 4, increasing 5 to 6, hazy in places, fog patches (south-eastern part), sea 2.5 metres increasing.
 South-western North Sea:
 South-east 4, increasing 5 to 6, veering south, hazy in places, sea



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Figure 17: Extract from DWD report

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Deutscher Wetterdienst
Wetter und Klima aus einer Hand

2 metres increasing.
Ijsselmeer:
South to south-east 3, increasing 5, sea 0.5 metres.
Fisher:
East 5, veering south-east, increasing 6, sea 2 metres increasing.
Dogger:
South-east 3, increasing 6 to 7, sea 2.5 metres increasing.
Forties:
East to south-east 5 to 6, increasing 7, sea 3 metres.
Viking:
South to south-east 4 to 5, increasing 7, sea 2.5 metres.
Utsira:
South-easterly winds 5, increasing 6 to 7, sea 2.5 metres increasing.
Skagerrak:
Easterly winds 3 to 4, veering south, increasing somewhat, sea 1 metre.
Kattegat:
East 3 to 4, veering south, increasing somewhat, sea 0.5 metres.
Belts and Sound:
East 4, veering south-east, hazy in places, sea 0.5 metres.
Western Baltic:
East about 4, veering south-east, hazy in places, sea 1 metre.
Southern Baltic:
East 3 to 4, slowly veering south, hazy in places, sea 1 metre.
Bodden waters east:
East 4, slowly veering south, hazy in places, sea 0.5 metres.
South-eastern Baltic:
Shifting winds 2 to 3, later south-westerly winds about 3, sea 0.5 metres.
Central Baltic:
West 4, north-eastern part 5, shower squalls, sea 1 metre.
Northern Baltic:
West 5, 4 at times, later increasing 6, shower squalls, sea 1.5 metres.
Gulf of Riga:
West 4 to 5, increasing 6, shower squalls, sea 1.5 metres.
Engl. Channel (western part):
South 5 to 6, veering south-west, temporarily increasing 7, hazy in places, shower squalls, swell 5 metres increasing.
Engl. Channel (eastern part):
South 5, veering south-west, increasing 6 to 7, hazy in places, shower squalls, sea 2.5 metres.
Extract from shipping forecast, 16/12/2015 1141
Weather:
Low 1011 Karelia, tracking south-east. High 1034 Ukraine, strengthening somewhat. Wedge 1025 southern Norway, 1016 north-west of Lofoten, swinging east. Low 994 west of the Faroe Islands, tracking north.
Extensive stormy depression 978 at about 48 north 30 west, filling.
Secondary low 982 at 53 north 23 west, deepening strongly, tracking north-east. Spain high wedge 1000 Cornwall, swinging east.
Forecast valid until tomorrow morning:
German Bight:
South-east to south 6, veering south-west, decreasing somewhat, hazy in places, sea initially 2.5 metres.
South-western North Sea:
South to south-west 5, hazy in places, sea 1.5 metres.
Ijsselmeer:
South-east 4, 5 at times, veering south-west, sea 0.5 metres.
Fisher:
South-east 6 to 7, veering south-west, decreasing 4, sea 2.5 metres.



ANFORDERUNG
AN ERKENNTNIS

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Figure 18: Extract from DWD report

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Deutscher Wetterdienst
Wetter und Klima aus einer Hand



Dogger:
Southerly winds about 5, decreasing somewhat temporarily, hazy at times, sea 2.5 metres.

Forties:
South-east 7, veering south to south-west, decreasing about 5, hazy at times, sea initially 4 metres.

Viking:
South-east about 7, veering south to south-west, decreasing 5, hazy at times, sea initially 5 metres.

Utsira:
South-east 6 to 7, veering south, decreasing about 5, hazy at times, sea initially 4 metres.

Skagerrak:
South-east about 5, slowly veering south-west, decreasing about 4, hazy at times, snow squalls (northern part), sea 1.5 metres.

Kattegat:
South-east about 5, later veering south-west, decreasing 3 to 4, hazy at times, sea 1.5 metres.

Belts and Sound:
South-east 5, later veering south-west, decreasing somewhat, hazy at times, sea 1.5 metres.

Western Baltic:
South-east 5, slowly veering south-west, temporarily decreasing 4, hazy at times, sea 1.5 metres.

Southern Baltic:
Southerly winds 4, increasing 5, hazy in places, sea 1.5 metres.

Bodden waters east:
South-east 4, temporarily increasing 5, later veering south-west, hazy in places, sea 1 metre.

South-eastern Baltic:
South-west to south 3 to 4, increasing 5, hazy in places, snow squalls (eastern part), sea 1 metre.

Central Baltic:
West about 5, temporarily decreasing 3 to 4, veering south, later hazy, snow squalls (eastern part), sea 1.5 metres.

Northern Baltic:
West 6, decreasing 4 to 5, veering south-west to south, later hazy, snow squalls in places, sea initially 2 metres.

Gulf of Riga:
South-west to west 5 to 6, decreasing somewhat, later veering south, later hazy, snow squalls in places, sea 1.5 metres.

Engl. Channel (western part):
South-west to south 4 to 5, increasing 6, hazy in places, swell 4 metres.

Engl. Channel (eastern part):
South-west 6, temporarily decreasing 4 to 5, veering south, sea 3.5 metres.



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Figure 19: Extract from DWD report

9.2 The harbour master of Liepaja's weather log for 14 to 16 December 2015

2016. g. 05. oktobrī
Nr. 8. G. / 127.

TAIB vadītājam
Aigaram Krastiņa kgam.

Uz Jūsu 2016. g. 04. oktobra e--vēstuli

Par laika apstākļiem Liepājas ostā.

Atbildot uz Jūsu vēstuli, sniedzam informāciju par meteo apstākļiem Liepājas ostā no 14.12.2015. - 16.12.2015.

Laika posms	vēja virziens	vēja ātrums m/sek
1	2	3
14.12.2015.		
00.00 – 02.00	WNW - NW	10,8 – 12,2
02.00 – 04.00	WNW - NW	12,2 – 13,0
04.00 – 08.00	NW	13,0 – 14,0
08.00 – 10.00	NW	12,6 – 12,5
10.00 – 12.00	WNW - NW	12,5 – 10,9
12.00 – 16.00	WNW	10,8 – 8,4
16.00 – 20.00	W - WNW	8,4 – 6,2
20.00 – 24.00	W	8,4 – 4,6
15.12.2015.		
00.00 – 08.00	W- NW- SE	4,6 – 6,0 – 2,5
08.00 – 16.00	SE – S - W	2,5 – 4,0 – 7,2
16.00 – 24.00	W	7,2 – 9,4
16.12.2015.		
00.00 – 08.00	W- WSW	9,4 – 9,9
08.00 – 16.00	WSW - W	9,4 – 10,2 – 8,8
16.00 – 20.00	W - WSW	8,8 – 7,8

16.12.2015. m/v "VENTURA" izgāja jūrā no 66.piestātnes plkst. 18.33

Piebilde: Ostas noteikumi : " Loču kanālā un Tirdzniecība kanālā kuģu kustība atļauta līdz vēja stiprumam 12 m/sek.


Liepājas ostas kapteinis  P.Gudkovs

Figure 20: Harbour master of Liepaja's weather log

9.3 Form for Cargo Information for Solid Bulk Cargoes


FORM FOR CARGO INFORMATION for Solid Bulk Cargoes	
<i>Shipper: Transit Service Agency Ltd., Brivibas 123, Liepaja, Latvia for and on behalf of Interfeed B.V Etten-Leur, The Netherlands</i>	Reference number(s) B/L Nr. 1
Consignee: TO ORDER	Carrier: <i>mv VENTURA</i>
Name/means <i>mv VENTURA</i> Port/place <i>Liepaja, Latvia</i> Of transport Of departure	Instructions or other matters
Port/place of destination: <i>CASABLANCA or JORF LASFAR, MOROCCO</i>	
General description of the cargo (Type of material/particle size)* <i>RUSSIAN UNMOLASSED SUGARBEETPULP PELLETS, IN BULK</i> *For solid bulk cargo	Gross mass(kg/tonnes) General cargo Cargo unit(s) <i>Bulk cargo 5.000,000 mt MAX</i>
Specification of cargo* <i>Russian Unmolassed Sugarbeetpulp pellets, in bulk</i>	
Stowage factor <i>abt 57'</i>	
Angle repose <i>14°</i>	
Trimming procedures <i>"NO"</i>	
Chemical properties* if potential hazard <i>Group "C"</i>	Transportable moisture limit : <i>12%</i>
*IMO class, UN No. or C No. And Ems No. <i>"NO"</i>	Moisture content at shipment : <i>11,3%</i>
Relevant special properties of the cargo The cargo non hazardous	Additional certificate(s)* Certificate of moisture content and transportable moisture limit Weathering certificate Exemption certificate Other (specify)* *if required
Declaration I hereby declare that the consignment is fully and accurately described and the given test results and other specifications are correct to the best of my knowledge and belief and can be considered as representative for the cargo to be loaded.	Name/status, company/organization of signatory <i>Transit Service Agency Ltd.</i> Place and date <i>14.12.2015.</i> Signature on behalf of shipper 

Figure 21: Form for Cargo Information for Solid Bulk Cargoes