MT Tecoil Polaris (RUS) - Environmental accident in the port of Hamina, 25.11.2017

M2017-03

FOREWORD

Based on section 2 of the Safety Investigation Act (525/2011), the Safety Investigation Authority decided to initiate an investigation into the environmental accident on M/T Tecoil Polaris in which about 500 litres of waste oil leaked into the sea. The waste oil was carried as cargo. The accident took place on 25.11.2017 in the oil port of Hamina. The purpose of safety investigation is increasing public safety, preventing accidents and incidents as well as mitigating damages caused by accidents. Safety investigations are not carried out to address legal responsibility.

Senior researcher Ilkka Kervinen was appointed investigation team leader. As members of the investigation team were appointed Licentiate of Technology Olavi Huuska and Naval Architect Niklas Rönnberg. Chief Marine Safety Investigator Risto Haimila was Investigation Leader.

The safety investigation examines the course, the causes and consequences of the events, the rescue operations carried out and the activities by the authorities. The investigation shall in particular examine whether safety has been sufficiently taken into account in the operation leading to the accident as well as in the design, manufacture, construction and use of equipment and structures that caused the hazard, or were endangered by the hazard. In addition, it will be claryfied whether the management, control and audit activities are properly organized and managed. Possible shortcomings in provisions and regulations concerning safety and the authorities are also clarified, if necessary.

The investigation report contains a description of the course of the accident, of the factors resulting in the accident and of the consequences of the accident. The report further contains safety recommendations addressed to the relevant authorities and other actors as measures needed to increase public safety, prevent new accidents and incidents, combat damage and to improve the efficiency of the operations of rescue- and other authorities.

The parties involved in the accident as well as the authorities responsible for oversight of the investigated accident's administrative sector are given the opportunity to give their opinion on the draft investigation report. These statements have been taken into account when finalising the investigation report. There is a summary of the statements at the end of this investigation report. Statements made by private individuals are, in accordance with the Safety Investigation Act, not released.

Senior Lecturer Peter Björkroth has translated the investigation report into English.

The investigation report, as well as a summary, is published on the Safety Investigation Authority's website, www.turvallisuustutkinta.fi .

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Investigation report 11/2018
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Cover photo: OTKES

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1 EVENTS

1.1 Course of Events

M/T Tecoil Polaris was carrying its cargo of waste oil for STR Tecoil Ltd to Hamina on 25.11.2017. The ship had loaded about 1800 tonnes of waste oil in Hull (Great Britain) in two batches, which, according to the master, had to be discharged separately. This was the first voyage with commercial cargo for the ship since year 2013, as the ship had been out of commission until docking in 2017 in Turkey.

A Port State Control inspection was performed in Hull on 15.11.2017 and no significant deficiencies were identified. On the same day the vessel left Hull. In the North Sea the vessel encountered heavy seas from time to time. The vessel berthed normally at the Hamina oil terminal jetty Ö3 on 25.11.2017 at 3.00 pm. During the discharging, about 500 liters of waste oil leaked onto the deck and partly into the sea from cargo hold nr 6's manhole.

Figure 1. Spilled oil in the water between the vessel and the quay. (Photo: OTKES)

During the inspection of the cargo, representatives of the vessel and STR Tecoil Ltd began to draw up a discharging plan. Due to language difficulties, it took longer than usual. In order to ensure safety, an STR Tecoil Ltd checklist was used. Segregation of cargo types is mentioned in the checklist but its impact on safe discharging of the cargo was not considered. Cargo quantity and quality was inspected by Saybolt Finland Ltd. The specified volume of the oil is based on the information that the cargo inspector received from the vessel with the cargo documents.[1]

[1] Handling of flammable liquids in the port. Safety Checklist vessel/berth. The list includes 60 points. The master of the vessel and the STR Tecoil's loading master have signed the list on 25.11.2017 at 16.00.

Table 1. Effect of temperature on the cargo volume. OTKES

		20˚C				15˚C	
Tank	**m³100%**	**m³ cargo**	**Filling %**	**Tonnes**	**Innage, cm**	**m³ cargo**	**Tonnes**
1	331,66	321,60	96,97	281,73	593	320,45	280,76
2	362,00	346,65	95,76	303,66	586	345,40	302,63
3	346,07	315,41	91,14	276,30	556	314,27	275,36
4	377,66	344,42	91,20	301,71	560	343,18	300,69
5	345,88	310,26	89,70	271,79	550	309,15	270,86
6	377,50	340,57	90,22	298,34	554	339,34	297,32
7	47,97	46,47	96,88	40,71	594	46,30	40,57
8	52,46	50,67	96,58	44,39	593	50,49	44,23
In total	2241,20	2076,05		1818,62		2068,58	1812,42

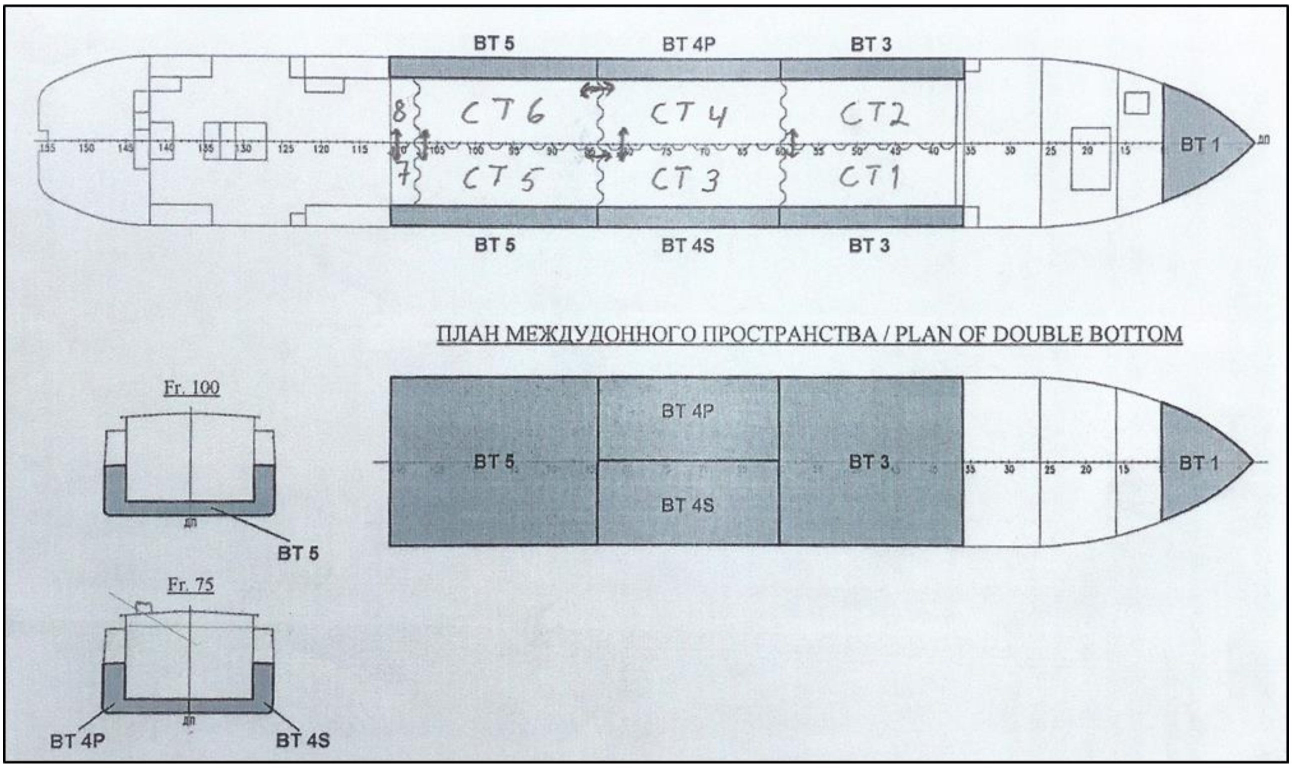

Figure 2. Tank arrangement on M/T Tecoil Polaris. BT is a ballast water tank and CT is a cargo tank. The arrows indicate the manually operated hatches in the bulkheads at the bottom of the tanks. The picture also shows the corrugated structure of the tank bulkheads. (Photo: OTKES)

The differences in volume between tank pairs are due to the asymmetrical structure of the centre bulkhead. The centre bulkhead is placed slightly to starboard from the centreline. The innage indicated in table 1 is the average height in centimetres from the tank bottom to the surface of the cargo. The table shows the load amounts at 20° C and 15° C. The difference in the cargo volumes caused by different temperatures was not relevant in this case. The team examined, on the basis of the data in the table, whether the observed listing of the vessel could have lead to cargo overflow from tank 6, but it was found impossible.

According to the master, the intention was to first discharge the cargo batch loaded in tanks 1, 2, 7 and 8. After this, the discharging would continue with the vessel's centre tanks 3, 4, 5 and 6. The vessel had been adjusted to an approximately two degree list to port, because the suction of the pumps is on the port side of the tanks. Discharging was started at 17.55 from tanks 7 and 8 by decreasing the liquid surface level by about one meter. This was done to prevent overflows from tanks 7 and 8 that the increase in aft trim, caused by discharging from tanks 1 and 2 would cause. The discharging continued normally from tanks 1 and 2 until at 22.00 a bang was heard and a deckhand reported that oil was flowing out onto the deck from the manhole of cargo tank 6. At this moment, the draught was 3,2 metres at the stern and 1,8 metres at the bow. The discharging was discontinued by stopping cargo pump 1. At the same time cargo pump 2 was started in order to lower the surface of the oil in cargo tank 6. A general alarm was issued on the vessel. Ballast water was pumped into ballast tank 4 SB in order to decrease the list. When the cargo surface level in tank 6 had decreased to 4,5 m, the pump was stopped. Enough oil escaped onto the piping deck, that some of it flowed over the low gutter into the sea between the vessel and the pier. The vessel contacted STR Tecoil and, via the ship's agent, the port. The vessel's aft moorings were loosened for locating the oil spill. The crew began to gather the oil that had accumulated on deck[2].

At 22.05 two STR Tecoil supervisors were changing shifts on the quay. The incoming and the outgoing supervisors noticed the crew on the vessel running on deck towards the aft of the vessel. They went to check the situation and found oil flowing over from the manhole of the aftmost tank on the port side of the vessel. The oil flowed onto the deck and from there into the water between the vessel and the quay. At the time of leakage, the vessel was trimmed by the stern and heeled about 50 cm from the horizontal towards the quay, i.e. to port[3]. 50 cm equals a heel angle of 4-5 degrees. This corresponds to an additional two-degree heel caused by the addition of about 32 tonnes in tank 6.

The STR Tecoil supervisor contacted the port and then the STR Tecoil duty officer. After this, the supervisor requested the chief officer of the vessel to discontinue the discharging. Shortly after this, the warehouse manager again asked why the pump was still running. The chief officer told that the running pump was a ballast water pump with which they were adjusting the vessel's position. Later it became clear that the discharging pump had not been stopped at that time, but that it was stopped only at 23.17 when the issue was ascertained again. At this point, about 575 tonnes of cargo had been discharged. The STR Tecoil supervisor called for a vacuum truck to the quay at 22.26.

At about 22.30, the vessel's crew could level the vessel and the oil spill into the sea ceased. There was oil on the vessel's deck, floating between the vessel and the quay, as well as a bit at both ends of the quay. At approximately 23.00 hours STR Tecoil's duty officer and the operative manager of the port authority, together with two other persons from the port authority, arrived at the site. It was realised that the emergency services had not yet been alerted. The supervisor called the emergency number at 23.08. Rescue department units arrived on the scene at 23.20, and took over the management of oil spill response actions. The vacuum truck arrived to the quay at 0.00, and the suction of the oil from the water surface between the ship and the quay, was commenced.

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[2] The vessel's summary of the accident.

[3] STR Tecoil, Report of the oil spill on the M/T Tecoil Polaris during discharging.

Figure 3. Manhole of tank 6 from which the oil came onto the deck and further into the sea. (Photo: OTKES)

Pumping was stopped only after STR Tecoil ensured the issue at 23.17. The emergency services gave permission to continue discharging at 00.15. The discharging continued until approximately 05.30 and continued again at 05.50. The whole cargo had been discharged at 12.00. At 03.00, the crew had cleaned up the oil from the deck and its structures. On November 26, 2017, a Border Guard vessel took a sample from the sea. No significant concentrations of oil were found in the sample.

The Finnish Transport Safety Agency (Trafi) did a Port State Control inspection[4] and decided to detain the vessel until the technical deficiencies leading to the oil spill would be repaired. On re-inspection on 27.12.2017, the Finnish Transport Safety Agency released the vessel. The vessel, however, remained in port.

In the report of the vessel and the shipowner of 18 December 2017, it is stated that the crew did not comply with certain sections of the loading instructions. These sections do not follow the numbering of the instructions provided to the investigating team. In the description of the accident it is said that the leak came from a manhole in cargo tank 6, but in the conclusions it is stated that the leak was from an open manhole in a slop tank. In order to prevent similar accidents in the future, the shipping company will introduce, among other things, development of accident scenarios and responses to them. The topic will also be included in the familiarisation for crew members. The shipping company also replaced the master and the entire crew.

The Russian classification society (RS) noted several shortcomings in the investigation that followed the accident[5]. The elimination of the shortcomings is a prerequisite for continuing

4 Report of Inspection in Accordance with the Paris Memorandum of Understanding on Port State Control. Finnish Transport Safety Agency Inspection Report 8883290-20171126-v5.pdf.

5 "Report on survey of the ship inspected by Port or Flag State Authorities" Nro 17.60171.260. The classification society submitted the report on the inspection as the Port State Authority.

the operation of the vessel. The shipping company had to make an investigation into the reasons for the events and come up with a plan in order to prevent similar accidents. The shortcomings were to be corrected by 12.12.2017. The classification society report states, among other things, that the crew had prepared only partly for the cargo operations, cargo systems had not been tested, and the order of the discharging operations had not been clearly presented in the instructions on the vessel. The classification society further states that the poor condition of the ship and the shipping company's inadequate control of rendering the vessel into working order after the long stoppage resulted in the oil spill. Among other things, the seal of the manhole of cargo hold 6 was found to be in poor condition. At the classification society's demand, all manhole seals were replaced.

The vessel's classification certificate and all certificates in accordance with international conventions issued by the classification society remained in force. In addition, the vessel had passed an inspection by the maritime safety authorities ten days prior to the accident. The purpose of this investigation is to identify the factors that enabled the accident to occur even if the vessel had valid certificates issued by the flag state and the classification society and was found to be seaworthy.

1.2 Alarms and countermeasures

Neither in the hearing of the master, nor in the investigations on site, did it become evident that anyone from the crew had heard an overfill alarm. The vessel crew's countermeasures were a little out of the ordinary. For example, crew members carried cargo, in buckets, from one tank to another. In the field investigation, it was found that the vessel's oil spill gear had been exhausted.

The emergency procedures by the authorities in connection with the accident went according to the instructions. The rescue units managed to isolate the oil around the ship with oil booms and to recover the oil, mainly with suction vehicles.

Notice about the oil spill came to the attention of the port authorities at 22.09, after which an inspection tour to oil berth Ö3 was made. It was found that the vessel and the shipping company already had called for suction gear that now was on its way to the scene. The port authorities informed the emergency centre and the Kymenlaakso Rescue Department was on the scene shortly after that. The Kymenlaakso Rescue Department launched a ship oil spill response action on 25.11 at 23.17 and ended the operation on 28.11 at 12.25.

It was decided that the oil would be sucked from the sea with a suction vehicle. The Emergency Department was to review the situation the following morning and to give more detailed instructions, if necessary. The port authorities called on the vessel or the shipowner to submit a statement to the Centre for Economic Development, Transport and the Environment.

1.3 Consequences

The weather conditions limited the spreading of the oil to the absolute vicinity of the vessel and quay, where it later also was closed in with oil booms. The accident did not result in personal or property damage. The Finnish Transport Safety Agency detained the vessel when technical defects were detected. The Finnish Transport Safety Agency approved the corrective measures made by the vessel 32 days after the detention.

2 BACKGROUND INFORMATION

2.1 Scene of accident, equipment and systems

Vessel and cargo

MT Tecoil Polaris was built in 1990 in Volgograd and refurbished in 2004. The ship was refurbished for the current owner Tecoil Shipping PVT.[6] in Istanbul, Turkey, in 2017. The vessel's home port is St. Petersburg and its classification society is the Russian Maritime Register of Shipping (RS).

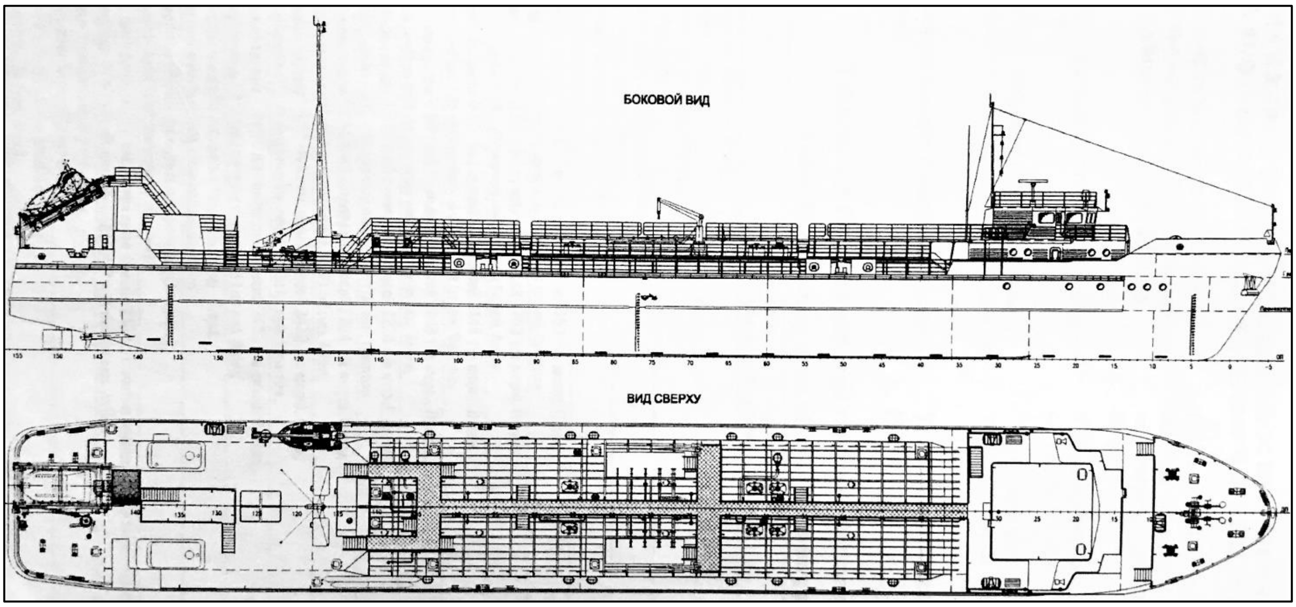

Figure 4. MT Tecoil Polaris, general drawing. (Photo: Russian classification society)

The vessel is intended for carriage of oil products in rivers and seas. It has six large cargo tanks and two small slop tanks that have been modified for cargo. The flashpoint of the oil products is to be above 60 ° C. The total tank capacity is 2241.2 m^3 and the tanks have steam heating. The vessel's length overall is 86.70 m, its maximum width 12.20 m, and depth 5.96 m. The draft in sea water is 4.18 m with a displacement of 3916 t and a dead weight of 2821 t. [7] [8] [9]

[6] Limited liability company (in Russia:OOO). Homeport St. Petersburg (Russia)
[7] Slop tanks are for collecting waste oil or oily water.
8 The maximum filling limit of tanks is 98 % of the maximum volume.
9 The information is taken from the documents obtained from the vessel and the vessel details obtained from RS.

Figure 5. The vessel's piping deck viewed from the stern. (Photo: OTKES)

The combined nominal output of the vessel’s two cargo pumps is 300 m³/ h (a 150 m³/ h) and the auxiliary pump's is 80 m³/ h. The operating of pumps and valves is carried out from the deck of the vessel.

Cargo pump 1 is located at the aft corner of cargo tank 2 and cargo pump 2 at the aft corner of cargo tank 6. The auxiliary pump, pumps from tank 8. The cargo handling gear allows discharging of cargo with any pump from all port side tanks. The tank pairs are combined for discharging by opening the hatches on the bottom of the tanks.

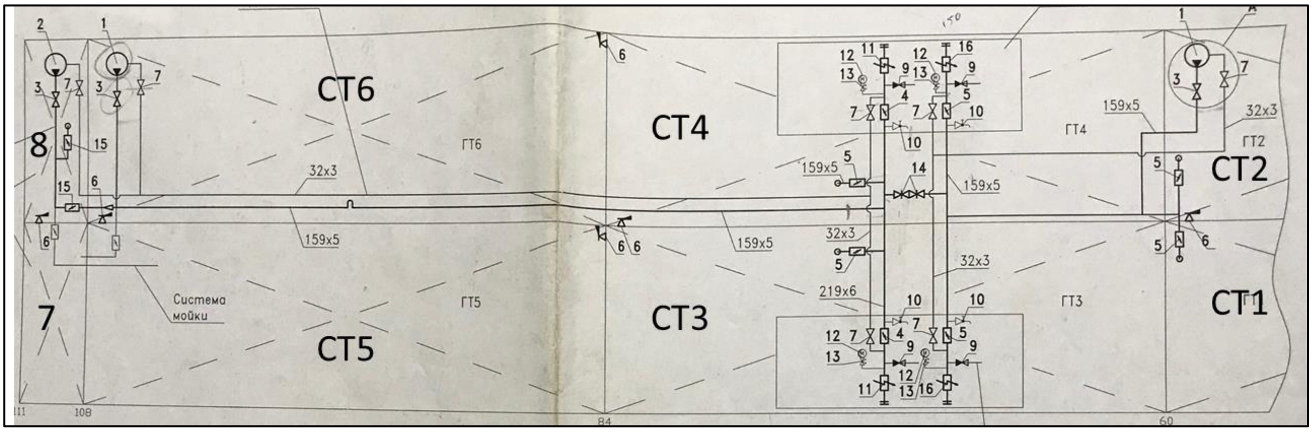

Figure 6. The vessel's piping arrangement. Number 1 indicates the cargo pumps, number 2 the auxiliary pump and number 6 the openable hatches in the bottom of the tanks. (Photo: OTKES)

The cargo tanks are equipped with surface level alarms with indicating lights on the navigating bridge. The alarm limits are 95 and 98 percent of the tank volume. The sound of the alarm can be heard throughout the vessel.

The vessel carried two different kinds of oil quality. One of the waste oil batches was in tanks 1, 2, 7 and 8, and the other in tanks 3, 4, 5, and 6. According to the vessel's logbook, 1795,43 tonnes of cargo had been loaded.

Figure 7. Cargo tank surface level alarm panel. (Photo: OTKES)

2.2 Conditions

According to the vessel's logbook on 25.11.2017, the seawater temperature was 8°C, the air temperature 6°C, the wind was from the East 8-10 m/s and the wave height was 20-40 cm. In the early morning, according to the Finnish Border Guard, the wind direction was 101°, speed 7 m/s and the air temperature was 4,4° C. The discharging of the cargo took place during darkness, using the port's and vessel's floodlights for illumination.

2.3 Persons, organisations and safety management

The vessel had a crew of 12 persons. The master had 30 years of experience as master. The chief officer had 3 years of experience in his position and he was responsible for cargo handling. An AB was on deck and safety watch duty. This was the first voyage with cargo on this vessel for the whole crew.

The safety management system provided by the shipping company for safety investigation purposes, [10] entered into force after the accident on 9 January 2018. The same applies for the ship-specific safety management system for loading[11]. The investigators did not have access to the versions of the safety management system that were valid when the accident occured.

The shipping register had issued a provisional safety management certificate to the vessel on 5 October 2017 on the basis of an audit carried out on board the vessel. The shipping register had audited also the shipping company's safety management system and found it to be in conformity with the international ISM Code and issued a certificate on that. [12] [13]

According to the instructions given to the vessel, the cargo batches had to be discharged separately, which was exceptional. In addition, this was the vessel's first voyage with cargo with the current owner. The risks associated with discharging in the port of Hamina had been reviewed by the help of a checklist, but the additional problem, resulting from discharging the two batches separately, had not been dealt with. The vessel's own loading instructions, including instructions for separate discharging of two batches, have not been obtained for this investigation.

Around 10 vessels discharge at the STR Tecoil's Hamina Terminal every year. The discharging was monitored on behalf of STR Tecoil by a cargo supervisor following the instructions in the company's safety management system.[14] For oil spills STR Tecoil has an oil spill prevention plan and various accident scenarios.

2.4 Activities of the authorities

MT Tecoil Polaris is classified by the Russian classification society (RS) and uses the Russian Federation flag. In this case, the classification society had a full mandate from the flag state to carry out the international and national surveys under the responsibility of the flag state.

The vessel was originally built for river and sea traffic. It had been transporting waste water 2009-2017. No major refittings were made in connection with the latest docking. The five-year classification was completed on 29.9.2017 in the shipyard in Istanbul (Turkey). The vessel has been issued a classification certificate and other certificates based on international conventions for the next 5-year period. The vessel was assigned the classification mark[15], which describes its structural characteristics and cargo to be carried.

The ship left Turkey in ballast and the first cargo after the docking and re-classification was taken in Hull, where also an expanded Port State Control was carried out under the Paris MOU inspection system. Six observations were issued to the vessel. The observations did not cause the vessel to be detained. They addressed, inter alia, the radio equipment, the magnetic compass, the fuel system and the causeway.

After the oil spill, a Port State Control was carried out in Hamina on 26 November 2017, when 7 observations were issued to the vessel. One of the observations was on the manhole's gasket and led to the vessel being detained. The classification society carried out an inspection on 27-28 November 2017 on board and remarked, e.g., on the operation of the safety management system and the technical condition of the ship. The vessel and the shipping company

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10 Main Company Management Manual, Code 1.1 SMS. Tecoil Shipping Ltd, Moscow
11 Safety Management System, Cargo Manual, Code 3.1-2 SMS. Tecoil Shipping Ltd, Moscow
12 Interim Safety Management Certificate
13 Document of Compliance 23.11.2017
14 STR Tecoil Guide TA 200 Discharging of Vessel and its annex "Instructions for Safety and Pipeline Monitoring".
15 KM ⋆ L4 R2-RSN oil tanker (> 60 ° c) (ESP) (L4 at d ≤ 3.0 m)

completed the corrective measures and the Port State Authority (Trafi) approved the vessel for traffic again on 27.12.2017.

Maritime safety is monitored for example with Port State controls. One measure that can be taken in a Port State Control is detention. This measure is taken to ensure that observed significant shortcomings are corrected. Detention causes financial losses for the shipping company.

2.5 Rescue organisations and operational capability

The rescue department's response plans have been developed in accordance with the guidelines and risk analysis in the Operational readiness planning guide, laid down by the Ministry of the Interior (Ministry of the Interior publications 21/2012).

In the response planning a rescue unit and its tasks have been determined for each operation area. The chemical terminals in the Port of HaminaKotka have been classified as risk targets. The requirements for rescue operations in risk targets are taken into account in the training, in the acquisition of special equipment, in emergency plans, in drills and in alarm instructions.

2.6 Recordings

An discharging graph showing the discharging operation for the terminal was acquired for the investigation. From the graph the discharging pressure and time could be read off.

2.7 Acts, regulations, instructions and other documents

Oil tankers in international traffic must comply with the SOLAS and MARPOL conventions regarding ship safety and avoidance of oil spills. The international safety management system is also part of the SOLAS convention. The STCW Convention regulates the manning of the vessel. Other requirements can be found in e.g. the Ballast Water Management Convention and the COLREGs. A ship in international traffic must also, in most cases, be classified by a classification society and have valid certificates for required surveys. In addition, the flag state may have its own requirements regarding safety and manning of vessels.

Oil tankers are also often subject to the oil companies' own rules. Such rules are, for example, the OCIMF[16], the SIRE[17] and the TMSA[18]. These rules are monitored by surveyors representing the oil companies. MT Tecoil Polaris did not have such certificates.

Vessels are generally constructed according to the rules of a classification society. The vessel orderer or shipyard can choose which classification society's rules to follow when building the vessel. The classification society can also be changed during the vessel's life cycle. Classification societies have developed rules for constructing and monitoring vessels. In addition to this, they carry out audits on the basis of the requirements in international conventions. The major classification societies are members of the umbrella organisation IACS, that also monitors the activities and quality of the societies' services. The ownership arrangements for the classification societies vary from states to trusts and private shareholders. In most cases, the societies' operation is business based, and they compete with each other for clients.

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[16] OCIMF, the Oil Companies International Marine Forum, is an international organisation for oil companies to secure and improve the safety of tankers.

[17] SIRE, Ship Inspection Report, is a risk assessment tool for tankers, developed by the OCIMF.

[18] TMSA, Tanker Management Self Assesment, a tanker self-monitoring and development tool developed by the OCIMF. The TMSA has been integrated into the SIRE system since 2017.

In Finland the operation of a port or loading- or discharging quay, intended for merchant shipping and suitable for merchant vessels of more than 1 350 tonnes, must have an environmental permit under Section 28:1, point 12 a, of the Environmental Protection Act (86/2000). These environmental permits are granted by the Regional State Administrative Agencies. The prerequisites for the permits are that the port undertakes to prevent and combat serious accidents causing environmental pollution and to carry out risk assessments to identify these potential events.

The environmental permits for the port of HaminaKotka were last issued in 2015 and are in force. The port is also certified in accordance with the ISO 14001:2015[19] environmental management system.

STR Tecoil has certified quality and environmental management systems in accordance with the ISO 9001 and ISO 14001 standards. The company's quality and environmental management systems are based on the company's oil refining activities, but does not include the criteria for approval or quality level of sea transport equipment. The operations are also subject to an environmental permit and the environmental permits are in force.

3 ANALYSIS

3.1 Analysis of the events

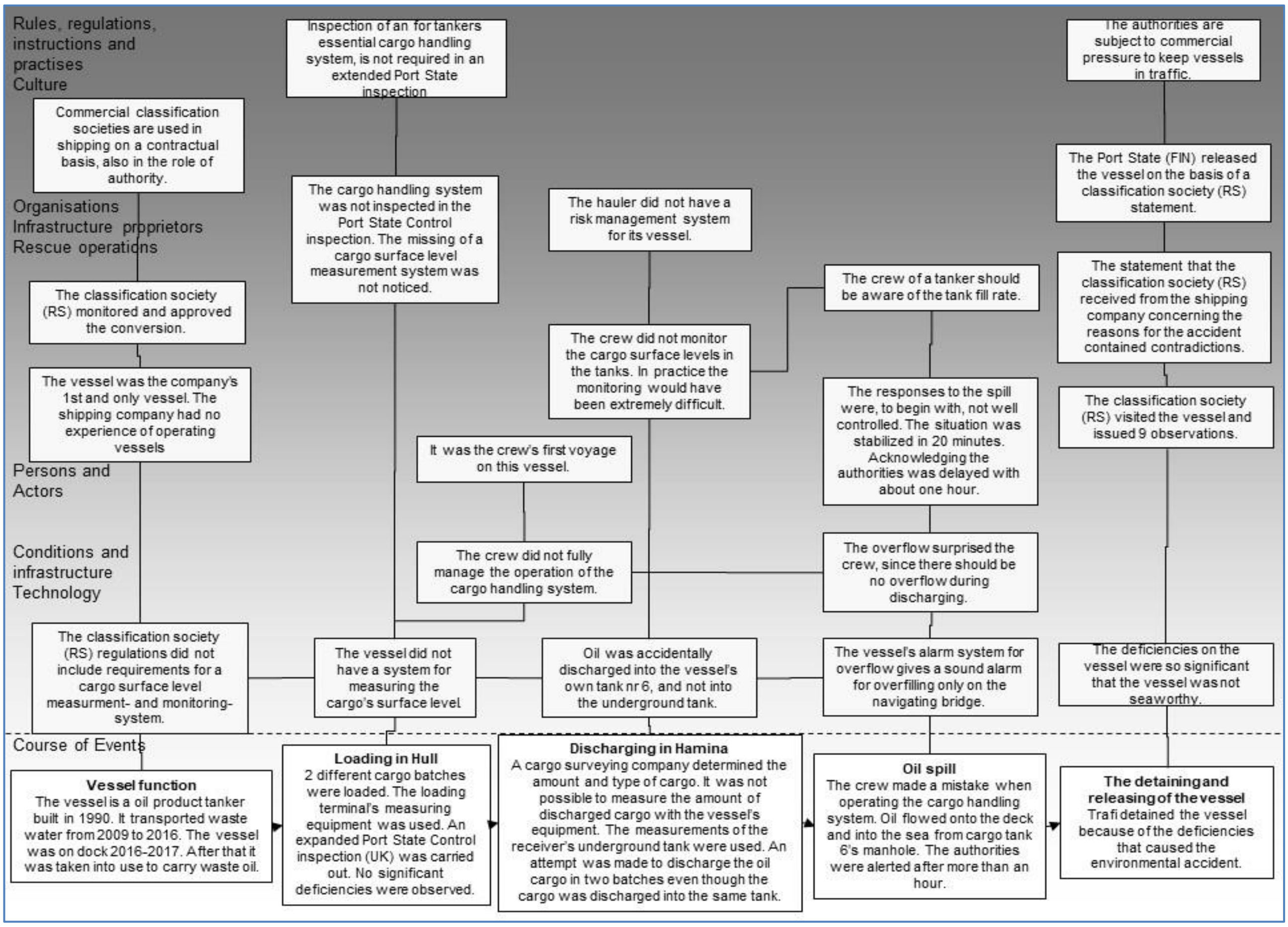

Figure 8. Accimap diagram

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[19] ISO 14001:2015, an international frame of reference for an environmental management system

3.1.1 The change in the vessel's mode of use

The underlying parties of STR Tecoil Ltd decided to secure a steady logistical flow of raw material by sea for their Hamina refinery. They decided to buy a used tanker and refurbish it to fit the new mode of use. The purchased vessel was the Russian MB Roschem-1. It was refurbished into conformity with the Russian flag state and the Russian classification society provisions in a Turkish shipyard during the year 2017. The owners did not have any shipping experience. Instead they hired the Russian ship management company NT Shipping Company Ltd, to in practice manage the operation and manning of the vessel. As haulier, STR Tecoil Ltd did not have an effective risk assessment process for introducing a new supply chain. A decisive decision was to omit own independent supervision and to fully trust the supervision of the ship management company, the flag state, and the classification society. After the docking was completed and after approval for the vessel's condition by the classification society, the vessel embarked on its first voyage carrying cargo.

3.1.2 Loading in Hull

The first voyage carrying cargo for the renewed MT Tecoil Polaris was from Hull to Hamina. In Hull the vessel was subject to an expanded Port State Control in which only minor observations were issued. In the control it did not come to light that the vessel had no system for measuring the level of the cargo surface, as cargo handling operations are not part of an expanded Port State Control. The measuring of the surface level during loading of the vessel was based on soundings made through an open manhole or relied on using the loading facility's equipment.

3.1.3 Discharging in Hamina

The discharging of MT Tecoil Polaris was a new event at Hamina Terminal. Because of this, and because of language difficulties, the planning of the discharging took more time than usual. The discharging was carried out in two batches, which resulted in significant pressure on the crew of the vessel, as it was their first voyage, carrying cargo, on this vessel. The investigation revealed that the discharging of the cargo in two batches was due to commercial causes. Discharging the cargo as one single batch would have been easier and safer, since it ended up in the same underground tank. Without a functioning surface level measurement system it is very difficult to monitor the discharging of the vessel and requires, on top of everything, opening of manholes. It was agreed between the terminal and the vessel, that the amount of discharged cargo would be determined on the basis of the underground tank's measurements.

3.1.4 The oil spill

The crew responded to the problems only when oil started to flow onto the deck. It was not possible to identify all factors resulting in the overflow of cargo tank 6 in this investigation. In the analysis it was concluded that one of the valves in the cargo handling system had been left completely open, or partially in the wrong position, when changing the tank to be discharged. The overflow from cargo tank 6 could be stopped after about 20 minutes. The measures taken by the vesel's crew to prevent the overflow were unconventional at first. When the rescue department units arrived at the scene, the crew carried oil with buckets from tank 6 to tank 5. Notification to the rescue department was delayed by about one hour, although it was almost instantaneously given to the port and the terminal. The alarm procedures were not known, or there were problems with communication.

3.1.5 Detaining the vessel

The Finnish Transport Safety Agency detained the vessel after identifying major structural deficiencies in the Port State Control inspection. The Port State Control authority established that structural deficiencies are a matter for the classification society and called for the Russian classification society. The classification society that earlier had certified the vessel after the docking in Turkey, inspected the vessel and issued it nine observations. Most of them were given for poor technical maintenance of the ship. One classification society observation was a call to find out the causes of the accident and steps to be taken to prevent recurrence of the accident.

The shipping company statement about the causes included contradictions. On the basis of the statement, the classification society stated that everything was in order and informed the Port State authority that the detention could be terminated. Based on this, the Port State authority released the vessel.

3.2 Analysis of the activities of the authorities

In the emergence of an accident, the actions of the authorities as well as of the classification society play a central role. In this investigation the classification society is considered to be comparable with the authorities. The vessel had been refurbished, it had been classified and it had passed a Port State inspection, even though there was no equipment on board with which it would have been possible to reliably monitor the cargo surface level or temperature of the cargo tanks without opening manholes. Classification society rules do not require them.

Based on the analysis, there were discrepancies in the operation of the classification society. When the docking ended, the classification society issued MT Tecoil Polaris provisional certificates to commence traffic. Provisional certificates are valid for a maximum of six months after which the vessel must comply with classification society and flag state regulations. When the classification society inspected the vessel in Hamina about a month later, it found that the vessel's equipment had been poorly maintained.

4 CONCLUSIONS

The conclusions include the causes of an accident or incident. Cause refers to the various factors underlying the event and the immediate and indirect factors affecting it.

1. The underlying parties of STR Tecoil Ltd acquired a used oil tanker to secure the raw material transport to the Hamina refinery and the vessel's operation was outsourced to a ship management company.

   Conclusion: *The owners of the vessel did not have enough experience of shipping in order to ensure safe operation of the vessel.*

2. The Port State inspection did not pay attention to the possible inadequacy in the vessel's cargo-handling equipment.

   Conclusion: *Cargo handling systems are not part of the agenda in expanded Port State inspections.*

3. The vessel did not have a fixed surface level measuring system on board. Neither did it have a transferable surface level measuring system, which is the minimum requirement in the ISGOTT Guide[20] The vessel had only an overflow alarm system. The system was not required in the RS's rules.

   Conclusion: *The vessel had no possibility to monitor the surface level in the cargo tanks without opening a cargo tank's manhole.*

4. The cargo was discharged in two batches, but into the same underground tank. Thus, separating the batches would not have been necessary in practice. Discharging the cargo in two batches on the vessel's first cargo voyage increased pressure on the crew and called for more precision.

   Conclusion: *For commercial reasons it was planned to discharge the cargo in two batches, even if it in this case would have been safer to discharge the cargo in only one batch.*

5. Measures to fight the overflow were immediately initiated by the crew, but the emergency number 112 was contacted only about one hour later. The joint dealing with the discharging plan between the crew and the terminal took a long time due to language problems.

   Conclusion: *As a result of the communication difficulties between terminal and vessel, the vessel's crew had not internalised the alarm procedures.*

6. One corrective action of the shipping company was to replace the company's manager, the vessel's master and crew.

   Conclusion: *Replacing all staff at the same time is likely to make it more difficult to develop the safety culture further, as well as to find out the causes of an accident.*

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[20] ISGOTT, International Oil Tanker and Terminal Safety Guide, an international manual on the safety of tankers and oil terminals.

5 SAFETY RECOMMENDATIONS

5.1 Supplementing international agreements

Item number 6, Cargo operations, is in the list of vessel items to be checked during an Expanded Port State inspection. The objects to be checked under "Cargo operations" are not further defined. In practice, the Port State inspector chooses the objects to be checked on the basis of his professional competence.

The Safety Investigation Authority recommends, that

The Finnish Transport Safety Agency, as the Finnish public authority in the IMO, should act in order to supplement international agreements, so that the requirement concerning criti-cal cargo handling equipment, such as cargo surface measurement systems, would be extended to include all oil- and chemical-tankers. [2018-S10]

The cargo surface level measurement system is necessary in order for the vessel to be able to perform cargo operations safely without having to open cargo tank manholes.

5.2 Cargo surface level measuring systems

In practice, the vessel can receive provisional certification and start operation without having an appropriate cargo surface level measurement system.

The Safety Investigation Authority recommends, that

The International Association of Classification Societies, together with the classification societies, specifies the rules for the systems for cargo surface level measuring. Tankers must have appropriate systems for measuring the cargo surface level before they are granted temporary licences to start operating. [2018-S36]

The systems for cargo surface level measurement are essential for safe operation of tankers.

5.3 Measures taken

The shipping company has replaced the company's top management and the vessel's crew. In addition, the maintenance measures required by the classification society to be done on the vessel, such as replacing the rubber seals in the cargo tanks' manholes, have been completed.

Helsinki 30 August 2018

Risto Haimila | Ilkka Kervinen | Olavi Huuska

Niklas Rönnberg

REFERENCES

Written sources

Rasmussen, J. & Svedung, I. (2000) Proactive Risk Management in a Dynamic Society. Karlstad, Sweden: The Swedish Rescue Services Agency.

Investigation material

1) Site investigation materia and fotos

2) Weather information

3) Interviews

4) Technical specifications of the vessel

5) Resque services notes and reports

6) Port state inpection reports

7) RS's report

8) Company SMS documentation

A SUMMARY OF STATEMENTS RECEIVED ON THE INVESTIGATION REPORT DRAFT

The draft investigation report was sent for review to the Finnish Transport Safety Agency, the Russian classification society, STR Tecoil Ltd and Tecoil Shipping Ltd. The contents of the statements received by the deadline are presented below.

The Finnish Transport Safety Agency stated that a requirement for a cargo surface measurement system is not included in the regulations concerning Port State Controls in the Paris Memorandum of Understanding. The Finnish Transport Safety Agency further stated that it is active in IMO working groups regulating maritime safety issues. In addition, the statement drew attention to the terminology.

The Russian classification society drew attention mainly to the technical details in the investigation report. RS also brought to the attention of the investigation team, that it has called for a withdrawal of the Port State Control inspection note. In addition, the statement underlined the shortcomings in the maintenance of the technical systems of the ship.