



## Sorrento Ro-Ro Passenger Ship Incident Considerations

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### ABSTRACT

The fire occurred on board the ferry "Sorrento" served to alert the seafarers who manage this type of vessels about their safety in case of fire. The knowledge that other vessels, similar in design or kind, have had in recent times this type of accidents coupled with the fact that many of them serving at sea lines in Spain, leads the preparation of this paper where it seeks to influence in the chance of such incidents, as well as the determination of its original potential sources. In the end it is determined that it is necessary to take preventive measures, both by owners or operators running these ships as by part the Spanish maritime administration, in the same way that makes the aircraft industry when a plane has a noteworthy incident, otherwise it may spread unrest and distrust among the crews that operate this class of ship.

## 1. Introduction

The incident took place on board the RO-RO passenger ship "Sorrento" on her passage from Palma de Mallorca to Valencia, in addition to create the understandable alarm in the public opinion leaves open a number of questions that should worry the professionals whom govern and manage this type of vessel.

Are well known in the maritime sector the risks that are present in the operation of ROPAX<sup>1</sup> vessels, among which it is necessary to stand out; their operational project limitations, stability, small freeboard, yield restrictions in adverse weather conditions, cargo loading and lashing, opening procedures for doors and ramps and location of the collective life-saving appliances.

The concern should be greater, if possible, by the Spanish national operators of such vessels, whenever another similar ship to the "Sorrento", the "Norman Atlantic", suffered a identical incident in late December 2014 in Adriatic Sea waters, that is to say alone four months earlier, when she realized a

passage between the ports of Patras, in Greece, and Ancona, in Italy, in this case with loss of humans lives, to what it should be necessary added the fact that at present there are several ships of the same class and analogue design that the above victims are working on various shipping lines with origin and/or destination Spanish ports, as "Albayzin", "Scandola", "Tenacia", "Norman Asturias", "Visemar One", "Nápoles" and "Sicilia".

In view of the foregoing, a professional cannot for less that questions the reasons for which the incidents discussed have taken place, despite the fact of being expert in the inherent risks that the operational management that this type of ships involved.

It is difficult to study in depth the coincidence of the incident without having access to the ship and to the official documentation, and without being expert researchers in maritime accidents, the work falls within the scope of the corresponding official investigation commission, which will be in this case the CCISM<sup>2</sup> from the Italian *Ministero della Infrastrutture dei Trasporti*, assisted by the CIAIM<sup>3</sup>, collegiate body of the Spanish Ministry of Development.

This paper aims to highlight the parameters, normatively required, that seem to us, at first glance, have been important

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<sup>1</sup>Roll-on Roll-off vessel capable of carrying passengers.

<sup>2</sup>Commissione Centrale di Indagine sui Sinistri Marittimi

<sup>3</sup>Comisión Permanente de Investigación de Accidentes e Incidentes Marítimos

in the development of the incident, in an attempt to expose features that can mean the possibility that similar incidents, related to the fire on board, may occur in roll-on roll-off passengers vessels, which are;

- ROPAX vehicles cargo open spaces design<sup>4</sup>.
- Automatic detection and fire alarm systems.
- Fixed extinguishing systems for pressurized water spray or mist.
- Provision and availability of portable and mobile extinction systems.
- Dangerous goods segregation.

## 2. Design Of Permanent Openings In Cargo Spaces

The reason to look at the side openings of the vehicle decks in the shell plating of the "Sorrento" class ships, is the fact that in the first images released of the incident can be seen the output of smoke whitish appearance by the same ones, which means that the incipient fire was burning freely, which is no less worrying.

The smoke from a fire in a confined space, due to their volatility, is always located above the air, accumulating in the ceiling, and then after go down toward the inner bottom plating at it cannot leave the confinement.

In the event of an outbreak of a fire in a RO-RO cargo ship deck it is obvious that the generated smoke will look for a difference of density that facilitates a convection movement, i.e. less dense smoke upward and the more dense down, and easily can be found where side plating has side openings.

On the other hand, it is undoubted that the above large openings or "gills" even assuming that they have bars, facilitate, in greater or lesser extent, a contribution of oxygen to the fire, which along with the remaining fuel, heat and the generated chain reaction, will involve the progressive increase of the same.

If the design of the vessel, as it is in the case of the "Sorrento" class, the above mentioned openings, in special category spaces, start from a position practically under the neuralgic center of the ship, which is the navigational bridge, it cannot help but be expected that the output smoke, due to the increase of the fire that they contribute to create, impinge directly on the wheelhouse, being able to disable it as a center to coordinate the emergency.

The peculiarity of RO-RO vessels lies mainly in that its design is adapted to the type of traffic and load which are specifically used, but what turns to be clear is that it may not interfere in the ship's operation capacity, and less in the event of an emergency.

<sup>4</sup>Open ro-ro spaces are those ro-ro spaces that are either open at both ends or have an opening at one end, and are provided with adequate natural ventilation effective over their entire length through permanent openings distributed in the side plating or deckhead or from above, having a total area of at least 10% of the total area of the space sides.

Figure 1: Smoke coming through the "Sorrento" side openings



Source: <http://www.periodistadigital.com/imagenes/2015/04/30/llamas.jpg>

It is in the chapter II-2<sup>5</sup> of the SOLAS<sup>6</sup> Convention where it specifically regulated the peculiarities of the ventilation design of this type of vessel, establishing that "*vehicle, special category and ro-ro spaces shall be adequately ventilated*"<sup>7</sup>.

Should be noted that, as well as regulations stops properly in RO-RO ships ventilation systems, does not do the same when dealing with the "*permanent openings*" practiced in the outer plating of this type of vessels or on the "*semi-enclosed*" decks.

The SOLAS specifically addresses the "*permanent openings*"<sup>8</sup> in the side plating, the ends or deck-head of the space shall be so situated that a fire in the cargo space does not endanger stowage areas and embarkation stations for survival craft and accommodation spaces, service spaces and control stations in superstructures and deckhouses above the cargo spaces.

One of the SOLAS chapter II-1<sup>9</sup> sections it's about "*openings in the shell plating below the bulkhead deck of passenger ships and the freeboard deck of cargo ships*"<sup>10</sup> demanding that "the number of openings in the shell plating shall be reduced to the minimum compatible with the design and proper working of the ship", but nothing similar is specified for those practiced above the main deck.

Among the special requirements laid down in SOLAS is set "*natural ventilation shall be provided in enclosed cargo spaces intended for the carriage of solid dangerous goods in bulk, where there is no provision for mechanical ventilation*"<sup>11</sup>.

In general, construction standards<sup>12</sup> establish that shell plating openings should not be performed in sheer strake<sup>13</sup> but, if operational requirements make it necessary, may be accepted openings representing less than 20% of the strake's length. Special considerations are required for higher dimensions.

<sup>5</sup>Construction - Fire protection, fire detection and fire extinction.

<sup>6</sup>Safety Of Life At Sea Convention

<sup>7</sup>SOLAS - Chapter II-2 - Regulation 20.1.3

<sup>8</sup>SOLAS - Chapter II-2 - Regulation 20.3.1.5

<sup>9</sup>Construction - Structure, subdivision and stability, machinery and electrical installations

<sup>10</sup>SOLAS - Chapter II-2 - Regulation 15

<sup>11</sup>SOLAS - Chapter II-2 - Regulation 19.3.4.3

<sup>12</sup>Lloyd's Register Rules and Regulations - Design Principles and Constructional Arrangements - Main hull structure.

<sup>13</sup>Strake above the ship's side that binds the shelter deck (sometimes the main) covered by the gunwale angle.

Its position is mediated by different considerations such as, the "angle of flooding"<sup>14</sup> of the ship or by the measures required by the marine Administration which certifies the vessel.

In SOLAS, chapter II-2, part F<sup>15</sup>, it is established that when the projects and safety regulations differ from the policy prescriptions of the Convention, a technical report will be prepared, according to the guidelines/[16]SOLAS - Chapter II-2 - Regulation 17.3 and Guidelines on alternative design and arrangements for fire safety (MSC/Cir.1002). prepared by the IMO<sup>17</sup>, to be evaluated and approved by the marine Administration. In view of previously exposed, this seems to be the case of the "Sorrento", which classification society, should have prepared the mentioned report to be able to develop some "permanent openings" in the shell plate that to all lights were going too far from regulations.

Figure 2: Evidence of major deformation of the "Norman Atlantic" starboard structure due to heat and wind effect



Source: DIGIFEMA

In a recent presentation<sup>18</sup> at the annual conference of *Interferry Association*, the Marine Research Division Chief of DIGIFEMA<sup>19</sup>, Fabio Croccolo, aimed that the spread of fire in the case of the "Norman Atlantic" was mainly due to the existence of large openings located on the sides of the ship, in the semi-opened decks, as well as the aft opening of the number 4 deck which allowed the step of strong wind gusts in the interior of the deck, stimulating the fire (the prevailing wind reached 43 knots).

Mr. Croccolo mentioned that among the recommendations that will include the final report of the "Norman Atlantic" incident will be incorporated the claim that in ROPAX vessels new constructions, no "semi-open" cargo spaces for vehicles will be incorporated. It transcended also that the reasons why the fire spread rapidly was the design of the ship emphasizing that

the same did not allow the shooting of many smoke detectors placed in the ceiling of the affected vehicle decks, because the smoke "plume" did not reach them because the wind effect in the hold.

The air passing through the open decks could, according to the investigators, have affected the fire detection systems, as well as have reduced the effectiveness of the water sprinkler systems used to extinguish the fire.

Therefore, in the case of the "Sorrento", the open design of several decks could have acted like a chimney and have accelerated the spread of fire.

Figure 3: Fire results in the case of "Norman Atlantic" (left) and "Sorrento" (right), where it can be seen that the second suffered far more damage, even though the fire started on the same deck (No. 4) and the meteorological conditions were more favorable in the second case



Source: DIGIFEMA

### 3. Automatic Fire Detection Alarm Systems

As a general rule it should be mentioned that RO-RO passenger ships cargo spaces shall be fitted with a fixed fire detection and fire alarm system<sup>20</sup> or with a sample extraction smoke detection system that comply with the requirements established in the FSS<sup>21</sup>.

Such systems will be able to enter into action at any time without the need that crew put them in operation and will not be used for any other purpose, although it can afford to close fire doors and similar functions from the control panel.

With regard to the system detectors it is established that they will come into action due to the effects of heat, smoke or other combustion products, or any combination of these factors, it must be certified that the heat detectors begin to work before the temperature exceeds of 78oC, but not until it has exceeded 54oC. In case of smoke detectors, is set to begin work before the thickness of the smoke exceeds 12.5% of darkening per meter, but not until it has exceeded the 2%, when they are installed in stairways, corridors and escape routes, while in RO-RO cargo decks will be the maritime Administration's responsibility fix the sensibility limits.

It is also mandatory that these vessels with any required fixed fire detection and fire alarm system with manually operated call points shall be capable of immediate operation at all times. Manually operated call points complying with the FSS Code shall be installed throughout the accommodation spaces, service spaces and control stations. One manually operated

<sup>14</sup>Means an angle of heel at which openings in the hull, superstructures or deck houses, that cannot be closed weather-tight, immerse. Small openings through which progressive flooding cannot take place need not be considered.

<sup>15</sup>Alternative design and arrangements.

<sup>17</sup>International Maritime Organization

<sup>18</sup>Recover from <http://maritime-executive.com/article/interferry-reviews-fire-safety-lessons>

<sup>19</sup>Italian Direzione Generale per le Investigazioni Ferroviarie e Maritime

<sup>20</sup>SOLAS - Chapter II-2 - Regulation 7.6

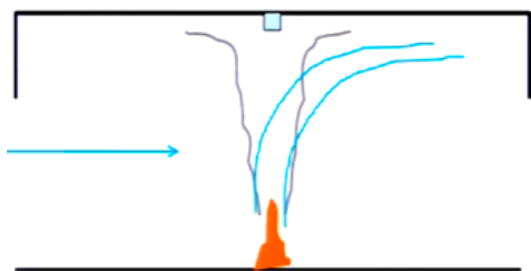
<sup>21</sup>IMO International Code for Fire Safety Systems Code

call point shall be located at each exit. Manually operated call points shall be readily accessible in the corridors of each deck such that no part of the corridor is more than 20 m from a manually operated call point<sup>22</sup>.

In any case, the system must be able to indicate in which section has entered into action a detector or manually operated call point in the alarm control panel, placed in the navigational bridge or other manned main control.

In the case of the *"Sorrento"*, the affected decks were protected by smoke detectors, which as it has been discussed in advance could not be activated by enough anticipation, because the smoke "plumes" did not reach them because the prevailing relative wind in the open cargo spaces. That is to say, if the above mentioned system was covering the RO-RO "semi-opened" deck, as is required by regulations in force, the airflow through it could mean that the established darkening limits were not reached, with briefness, so that the smoke detectors did not enter into action.

Figure 4: Smoke "plume" movement due to transverse wind in a "semi-opened" deck



Source: DIGIFEMA

#### 4. Fixed Pressure Water-Spraying And Water-Mist Fire-Extinguishing Systems

According to regulations<sup>23</sup>, "Each open ro-ro space having a deck above it and each space deemed to be a closed ro-ro space not capable of being sealed, shall be fitted with an approved fixed pressure water-spraying system for manual operation which shall protect all parts of any deck and vehicle platform in the space, except that the Administration may permit the use of any other fixed fire-extinguishing system that has been shown by full-scale test to be no less effective".

The requirement that the system must be manual makes necessary that the pump and its controls are installed outside the space or spaces protected to avoid that the system becoming inoperative.

In the present case, it does not seem that the system with which the ship must be equipped was running long. Studying the numerous published photographs of the incident in no case

water coming out from deck scuppers are appreciated, normatively<sup>24</sup> required to ensure the stability of the ship in case of operation of fixed fire-extinguishing water pressure system, providing a rapid water discharge to the outside.

The official report will clarify the above point, but it is still less worrisome if the system could not have been effective for the action that it was intended. Well for inefficiency, inability to drive it manually, to be obstructed the access to its controls, or due to the incompetence of the crew members in charge of its shot.

According to the known data of the preliminary investigation of the *"Norman Atlantic"* case, in her *"Muster list"* it was established that the valves of the drencher system's had to be managed by the first engineer, and in fact he did so, but subsequently was found that those which were open were those covering number 3 deck and not those covering number 4, which it was where the fire began, the mentioned error, of course due to the emergency hurries, meant that the response of the water systems will not serve to extinguish the fire.

In the case of the *"Sorrento"*, it is confirmed, as Fabio Crococolo stated, that the activated drencher system valves, for the first deck affected by the fire, were the right ones, but that his action was not enough to extinguish the fire, which is a practical test that both systems were insufficient for the needs of the vehicle decks.

#### 5. Provision And Availability Of Portable And Mobile Extinguishing Systems

It is known that vessels must be provided of portable and mobile means for extinguishing fires as first barrier to prevent the spread of the fire on board.

Portable fire extinguishers shall be provided at each deck level in each hold or compartment where vehicles are transported. These extinguishers will be distributed on both sides of the space and the separation distance between one and another shall not exceed 20 m. At least one portable fire-extinguisher shall be located in every cargo space access<sup>25</sup>.

Furthermore, all RO-RO spaces and special category spaces intended for the carriage of vehicles that carry fuel in its tanks for their own propulsion, will be provided: at least with three water-fog applicators, and a portable foam applicator unit complying with the provisions of the FSS Code, provided that at least two such units are available in the ship for use in such RO-RO spaces<sup>26</sup>.

The *"Sorrento"* must be equipped with a system that would allow throwing immediately one effective jet of water from any of the fire hydrants placed in an interior location, which will also ensure a continuous supply of water by the automatic activation of one of the fire pumps, of the three that should have the ship.

The question is whether the fire-fighter brigades that were established in the ship *"Muster list"* could access to the deck

<sup>22</sup>SOLAS - Chapter II-2 - Part C - Regulation 7.7

<sup>23</sup>SOLAS - Chapter II-2 - Part G - Regulation 19.3.9

<sup>24</sup>SOLAS - Chapter II-2 - Part G - Regulation 20.6.1.4.1.1

<sup>25</sup>SOLAS - Chapter II-2 - Part G - Regulation 20.6.2.1

<sup>26</sup>SOLAS - II-2 - Part G - Regulation 20.6.2.2



fire stations, where they would be find the fire-fighter outfits (that consist of a set of personal equipment and a breathing apparatus) that would allow them the intervention to deal with the fire.

Figure 5: Current status of one of the affected decks of the "Sorrento"



Source: DIGIFEMA

We refer again to the photos of the event, in which there is not appreciated that any crew member was provided with the above mentioned equipment. It is true, that they could have removed it before proceeding to the lifeboats, but at least it might warn some element such equipment.

It is necessary to question if the crew was able to access the ship's deck hydrants, where the fire started, to carry out the extinction works for which should be formed. In a passenger ship as the "Sorrento" fire hoses, in addition to required nozzles and fittings, should be located next to each hydrant of any RO-RO or vehicle space in which latter case two jets shall reach any part of the space, each from a single length of hose<sup>27</sup>.

It is not the first time that ship's fire brigades cannot access to portable and mobile existing fire extinguishing means on RO-RO ferries decks due to the physical impossibility that represents the little space between stowed vehicles in them and the locations of such equipment.

It is confirmed<sup>28</sup> that in the case of the "Sorrento", as in the "Norman Atlantic", the fire-fighters brigade had serious difficulties in gaining access to the source where the fire originated because of the narrowness of the passage between the vehicles stowed on affected deck.

## 6. Dangerous Goods Segregation

ROPAX ships have the possibility of transporting different types of cargo, usually by rolled means; containers or pallets which can contain dangerous goods, what gives rise to the need to take the proper precautions of this type of transport.

The dangerous goods transport regulation, as SOLAS establishes, it is the International Marine Dangerous Goods Code, known as IMDG Code, which sets how these goods will be loaded, stowed and fastened in a securely and appropriate manner and that, those goods that were incompatible with others will need a on board segregation.

Periodically occur on board the vessels incidents and accidents related to this type of transport. It is physically impossible

to review individually all the load units that are shipped because the cost that would imply, in fact according to various sources less than 2% of them are properly inspected, so that it can be assumed that many of these units do not have the appropriate stowage, segregation and lashing to the grouped load that they transport, which can lead to the initiation of fires.

One of the best known cases of fire on board initiated by dangerous goods Indonesian ROPAX ship "Levina 1" that in February, 2007 caught fire, hours after her departure from Jakarta, with official losses of 51 lives.

The final official report of the incident<sup>29</sup> concluded that the fire started in a truck, which was transporting premix<sup>30</sup> gasoline jerry cans and which was in the vehicle deck. The crew members reported that when they tried to extinguish the fire with water, it increase its ferocity. Also reported that they had problems to gain access to the decks hydrants and mobile equipment due to the narrowness of the available space, since whole deck was occupied by vehicles.

An absence of supervision was established in the loading and stowage of the flammable material classified as dangerous goods, as well as in its handling in port, blaming the carrier and the shipping company for not having done it.

The investigation revealed that no inspection of the cargo documents was carried out, prior to departure. The ship's masters, as well as four other crew members, were the subject of a criminal prosecution for negligence.

Some weeks after the "Sorrento" fire, the Spanish police (Guardia Civil) and transportation inspectors of the Government of the Balearic Islands intercepted four tons of dangerous goods aboard 14 trucks arrived from the peninsula to the port of Palma de Mallorca. The goods were concealed or shielded between the declared load, the seized substances being sulfuric acid, corrosive liquids or trichloroisocyanuric acid<sup>31</sup>.

Cannot be generalized, but it is certain that due to the administrative complexity presents the load of dangerous goods aboard of this type of the ship, similar deficiencies to those already discussed continue to occur very often in our ports, mainly due to the easements that imposes this type of transport in RO-RO passenger ships.

It must be said also that the inherent risks of spill, leak or mixture of dangerous goods carried by sea in packaged form are much higher in small or medium size ships, as the ferries that make regular routes in our country, since the movements of yaw, balance, sway, heave, surge, roll or pitching are much more common.

Then receives singular importance the strict control of the dangerous goods that are stow on board in order to avoid undesirable effects due to the breach of the conditions of the carriage normatively established for them. Both the shipping companies and the RO-RO vessels deck officers, should be made aware on the need to establish random checks, not only on the papers that

<sup>27</sup>SOLAS - Chapter II-2 - Part C - Regulation 2.1.5.1

<sup>28</sup>Recover from <http://maritime-executive.com/article/interferry-reviews-fire-safety-lessons>

<sup>29</sup>Recover from [http://kemhubri.dephub.go.id/knkt/ntsc\\_maritime/Laut/2007/Laporan\\_KI](http://kemhubri.dephub.go.id/knkt/ntsc_maritime/Laut/2007/Laporan_KI)

<sup>30</sup>High-octane fuel type with high specific flammability for high-end vehicles.

<sup>31</sup>Recover from: <http://www.ciutat.es/portada/sucesos/item/20805-interceptan-4-toneladas-de-mercancias-peligrosas-en-el-puerto-de-palma>

accompanies the mentioned goods but also of the proper load units, with intention of dissuading transporters and freighters to introduce in the ships not declared dangerous goods, a fact that is very common in our ports.

## 7. Other Considerations

In addition to the previous, what is known from the previous investigation of the "*Norman Atlantic*" case, which can be assimilated in certain points to the one that will be held for the "*Sorrento*", it must be considered themes taken out in the same that in one way or another could affect the present case. So in the first case, have transcended<sup>32</sup> among others, that:

- **There were trucks that were not properly lashed.**
- **Two different crews were coexisting on board.**

An Italian and an another Greek, generating problems of understanding, little integration (only a small number of crew managed an adequate level of English to be understood) and a manifest lack of familiarization with the ship, as the second one had only made three voyages before the incident.

- **There was not clear delineation of responsibilities and obligations.**

Between the ship-owner (Italian) and the charterer (Greek) procedures had not been established in accordance with the ISM<sup>33</sup> Code, as is normatively required.

- **It was noted the presence of not authorized persons on the vehicle decks during the navigation.**

There is even talk that truck drivers and/or stowaways could light fires on vehicle decks to protect themselves from the prevailing cold.

- **The fire crashed collective rescue systems.**

Which remained inoperative due to the heat and flames that came through the side openings, close to the starboard lifeboat deck, burned them (starboard MES<sup>34</sup>, liferafts and lifeboats could not be used).

In "*Norman Atlantic*" temperatures of 1000o C were reached, so the steel decks softened. The evidences points to that in the "*Sorrento*" higher temperatures were achieved, what is confirmed by the larger deformations of the superstructures after the fire, mainly in the section placed aft and under the bridge which shows that in the area there should be had reached temperatures that got spoiled or merge the various steel grades of her superstructures.

It can be assumed that in that particular zone, located immediately to the aft-port side structure of the bridge, due to

Figure 6: Current status of one of the "Sorrento" upper decks



Source: DIGIFEMA

the state of collapse that the building material presents there would be substances or flammable materials which contributed to magnify the effect of fire because the final results were more destructive than in the "*Norman Atlantic*" case. In the presentation of the DIGIFEMA chief at the 40th annual Interferry conference<sup>35</sup>, was also highlighted the problems that presented the "*Norman Atlantic*" VDR<sup>36</sup> (black box) to obtain the stored data. It was found that the computer was not sufficiently protected to withstand the suffered high temperatures, in fact only have been recovered the audio recordings, but the hard drive data could not be collected to date<sup>37</sup>. In the case of the "*Sorrento*" has not transcended the status of the VDR, but in view of the above mentioned will have to be the worst, given the state of the upper deck, where generally this equipment is located, presented an aspect more distressing than in the first case.

Perhaps the accident of the "Sorrento" has been the last straw that has led the classification an certification society RINA<sup>38</sup> to launch its most important safety initiative for ferries.

Finally, it should be noted that not always fires that occur on RO-RO vessels vehicle decks end badly. As sample serves the case of the RO-PAX ship "*Volcan de Taburiente*", owned by a Spanish shipping company which performed the voyage from the port of Los Cristianos and San Sebastián de la Gomera in the Canary Islands, that in April of last year suffered a fire in one of her vehicle decks<sup>39</sup>, in this case a closed deck, which was conveniently extinct by her crew. The origin of the fire seems to be that it was a short circuit in cooling unit of a truck.

## 8. Conclusion

From our external view, we consider that probably it should not be possible to determine practice and clearly, i.e. where and

<sup>35</sup>Copenhagen, october 3-7, 2015

<sup>36</sup>Voyage Data Recorder

<sup>37</sup>Currently the court is considering refer it to the manufacturer to attempt recovery

<sup>38</sup>RINA - Press Release - 28/05/2015  
(<http://www.rina.org/en/news?item=102>)

<sup>39</sup>Díaz Lorenzo, J.C. (2014). La tripulación del ferry "Volcán de Taburiente" evito el desastre. Blog del acontecer marítimo. Recover from: <https://delacontecerportuario.wordpress.com/2014/04/28/la-tripulacion-del-ferry-volcan-de-taburiente-evito-el-desastre/>

<sup>32</sup>Recovered from <http://maritime-executive.com/article/interferry-reviews-fire-safety-lessons>

<sup>33</sup>International Safety Management Code

<sup>34</sup>Marine Evacuation System

Figure 7: Most affected sides by fire. Up: "Norman Atlantic" starboard side. Down: "Sorrento" port side



Source: Up: [http://www.corriere.it/foto-gallery/cronache/14\\_dicembre.30/norman-atlantic-relitto-visto-vicino-abec125c-9055-11e4-a207-f362e6729675.shtml](http://www.corriere.it/foto-gallery/cronache/14_dicembre.30/norman-atlantic-relitto-visto-vicino-abec125c-9055-11e4-a207-f362e6729675.shtml)  
Down: <http://www.elmundo.es/comunidad-valenciana/2015/05/11/5550de4ee2704e3e3b8b4579.html>

why, the cause of the fire that devastated the "Sorrento" decks, due to the high temperatures reached in the "semi-opened" decks where the fire was initially detected, caused such damage, with deformed metal structures, which to establish any conclusions will be at least complicated. In any case, we must wait for the official report.

In the incident of "Norman Atlantic", the previous investigation points in that direction. Other similar cases, such as the "Lisco Gloria", also of Italian construction and similar design, that suffered another fire on board in Baltic waters in 2010, the investigation<sup>40</sup> carried out by Germans and Lithuanians, concluded that the cause could not be identified accident due to the high level of destruction that presented the deck where the fire started, which took weeks in cooling down.

Therefore, in our opinion, in the case of the "Sorrento" may be established presumably only possible causes of the origin of the fire, between which we dare to aim:

- **Ship electric supply system failure**

For example, a bad connection of a refrigeration unit to the vessel main electrical system, a lack of cables for these connections, which makes to keep operating those units that the engine of the truck remain operational or an abnormal demand of electrical supply on the part of trailer.

- **Refrigerated cargo unit defect**

It is known that one of the greatest risks of fire aboard of a RO-RO vessel deck are the refrigeration units (powered by electrical cables or independent diesel-oil units).

- **Transported vehicle deficiency**

Both the old vehicles, such as the new, may suffer some type of breakdown, fault or spill on board during the voyage, on the decks where they are stowed, which can lead to the start of a fire by short circuit, auto-inflammations of gases (for example, those issued by damaged batteries) or spills of fuel liquids contained in their storage tanks. Another option may be the charge of electric cars on board of this type of vessel during their passages.

- **Presence of unauthorized persons on vehicle decks during navigation**

This can, simply with the lighting of a cigarette, cause the star of a fire.

- **Dangerous goods lack of segregation or shifting during the voyage**

It seems not the case, but any movement of loads, for example due to lack of lashings, could cause mixing of incompatible substances that could self-ignite.

- **Sabotage**

We would not be too alarmist, but at this point it should be necessary to remember the case of the "Scandinavian Star", ferry which in 199 caught fire in the Baltic causing the loss of 158 lives, questioning still today the origin of the fire, in fact in 2014 the case became reopen by the Norwegian police. Prior to the disaster the three ships of the serie had suffered fire on board, without the ship-owners or maritime authorities grant them the importance they deserved in order to correct the defects that could lead finally to disaster.

It is significant that when an airship suffers an incident, by insignificant that it could be, then begins a immediately process of investigation that even goes so far as to immobilize the entire fleet of the same plane series up to determining the causes and necessary corrections, it suffices to recall the stoppage<sup>41</sup> of the Australian company Qantas Airbus A380 fleet (six aircraft) after detecting a fault in an engine of one of its units, in contrast when an incident takes place in a ship that puts human lives in risk there do not refer similar cases of paralyzation of fleets.

In Europe, since 2008 there have been aboard large ROPAX ships with similar design to the one that concerns us, fires that have meant the total loss of them, for example as in the case of the "UND Adriatic" (2008), severe damage, "Lisco Gloria", "Commodore Clipper" (2010) and "Sorrento" (2015), and loss of human lives, as happened in the incident of "Norman Atlantic" (9 deaths, 19 missing and 2 more dead persons during the towing operation), as well as other of less entity like the event of the "Volcan of Taburiente".

Remembering that worldwide fire is the third cause of loss of large vessels, after the collision and sinking, the precedents

<sup>40</sup>Recover from: <http://www.bsu-bund.de>

of the series of ROPAX ships constructed with similar design to the "*Sorrento*", the fact that several of them underway along our waters and what that has been stated in this paper, we believe that both the owners or operators of this type of ship, as our marine Administration should take good account and measure on the already confirmed defects, not only in the design (side openings and "*semi-opened*" decks), but on the effectiveness of the firefighting fixed systems (placement and performance of the smoke detectors and their necessary replacement for heat detectors in certain areas, drencher systems response and control, location and access routes to the portable and mobile firefighting means in vehicle decks, etc.), not only in order to try to prevent an incident similar to the "*Sorrento*", but also in order to anticipate the normative changes that will take place in the near future due to the worrying increase, in recent years, of incidents related to the fire in this type of vessel.

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