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MARINE SAFETY AND TRANSPORTATION

OF AMMONIA

by

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Dear Mr Chairman, ladies and gentlemen,

It's an honour and a privilege to be here and to address this distinguished audience.

As the subject of this paper already indicates, the presentation will cover two main issues, a general view about the Transportation of Ammonia, looking specifically at the supply/demand balance of the LPG ship segment used for Ammonia carriage. A second panel will cover the hazardous aspects of Ammonia transportation by sea ship.

One of the areas we distinct the Global Ammonia Fleet by is the Volume segment. Here I'm leaving out the segments, which are not employed in Ammonia trade, that is the VLGC, and the smaller Fully pressurized fleet. A second area is the type of ship, Fully Refrigerated (FR) or Semi Refrigerated (SR). The FR ship has a large cooling capacity and keeps it's Ammonia cargo at fully refrigerated condition, i.e. at –32.5° C and a vapour pressure below 250 MB, normally around 80 MB. The SR ship is capable to control the liquefaction by both temperature and pressure. She has a less powerful re-liquefaction plant and can maintain the Ammonia at liquid condition at –15 to –25° C with a vapour pressure of 4,5 to 5 Bar. A third division is per control. Here we see that for all segments, LGC, MGC and < 20K the traditional pools have the largest controls (varying from 40 to 60%). In the more individual control we find mainly trading houses and gas majors, such as Sonatrach, Geogas, Hyproc… An important distinction is the age of the gas fleet vs. the average age of the world fleet. The gas fleet is the second youngest fleet, following the container fleet. The Yara fleet is about 3 years younger the average gas fleet age.

The trade patterns are mainly known to you, but here we see a trend, leading to more long haul trades than before and this mainly led by larger price differentials between regions and cheaper shipping as a result of economics of scale, i.e. larger ships.

Looking at the several size wise segments we distinguish a same pattern, i.e. on all cases the majority of the control is taken by the pooling mechanisms. We see this pattern in all three segments. The balance of the segment is than mostly taken by individual operators, which are mainly trader based.

If we look a bit closer at the midsize segment, we notice a new building slice of about 18% of the existing segment. These ships will be delivered between end of 2005 and end of 2007. Obviously these ships will have a tremendous impact on the freights around the end of 2007. The 50K segment also is characterized by an enormous impact of the pooling mechanism, here the Bergesen Pool. Here again we see that the five new building ships will have a 20% part within the whole segment.

The second part of this paper is briefly dedicated to the hazardous aspects of the NH3 carriage and what can be done to avoid any outflow of product. In case of an outflow, it will all depend if the commodity will be under gaseous or liquid condition. Because of several types of ships used (fully refrigerated and semi refrigerated) in the Ammonia trade, we need to distinguish the possible outflow in relation to these ships. LPG and Ammonia tanks are never loaded above 98%, meaning that on top of every liquid face we will see a vapour face. A leak into an area containing vapour only will have the slightest effect possible. The cloud is slightly lighter than air and will therefore slowly rise, distancing itself from the ship with the wind. The cloud is invisible, meaning that someone could walk into such cloud without having noticed it. By heating up the vapour will subtract heat from the surrounding air. Another scenario is when the ship springs a leak in the liquid area. Here we will have part of the liquid ammonia that will be absorbed by the seawater, while another part will evaporate and have the same influence as the above scenario. The difference here is that we will get a larger cloud, heat will be drawn from both water as air and we will get formation of aerosols. This situation is more hazardous than the previous one mainly because of the larger outflow and the aerosols delaying the vaporization process.

The two next scenarios are based upon a semi ref ship; meaning that the vapour is kept at a pressure of 3.5 to 4.5 bar, if the product is not kept at fully refrigerated condition. Needless to say that because of the higher pressure we see more vapour and more liquid outflow and hence this becomes the most dangerous situation.

Above described situations need, although unlikely to happen, to be avoided at all cost. A number of regulatory frameworks allow operators to control the safety aspects on their fleet and allow the administrations to have a direct view and impact on the construction and equipment of the gas carrier. An important element and so far insufficiently explored is the industry self-regulation. The industry itself needs to provide adequate information and need to be transparent in its safety policy allowing the media and all interested parties to become a partner in the ammonia load, transport and discharge activities. The industry further needs to consolidate its efforts towards quality shipping and safety. By the industry I mean the whole gas industry, i.e. LPG, Ammonia, Petchem and LNG. The responsibility as a Charterer, clearly seen as co-ventures into the sea adventure, will no longer be ignored but nowadays the Charterer is, in case of accident, be held liable, jointly with the owner and the cargo interests and separately,

Within Yara we have set some minimum requirements for the ships sailing in and joining our fleet. Setting some requirements on our self in addition to the existing requirements, will have a financial impact but we believe that both as Charterer as Owner, we need to set a standard. I take this opportunity to appeal to the rest of the industry to pool not only the fleets but also the efforts towards Safety and Quality.