

Prepared Remarks

Controlling Marine Air Emissions

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- A few recent headlines:

Health risks of shipping pollution have been 'underestimated', one giant container ship can emit almost the same amount of cancer and asthma-causing chemicals as 50m cars, study finds, The Guardian, April 9, 2009.

U.S. Proposes to Slash Harmful Ship Emissions along the Nation's Coastlines to Save Lives, EPA press release March 30, 2009.

EPA proposes cuts in air pollution from foreign ships, LA Times, March 31, 2009.

Cutting ship fuel sulphur may save 45,000 lives, Lowering the sulphur content of fuel used in shipping could prevent upwards of 45,000 premature deaths a year by reducing exposure to fine particles. American Chemical Society Journal Environmental Science & Technology, June 3, 2009

Global Warming Reopens the Northwest Passage, Time Magazine, September 17, 2009.

Ships are a major source of global warming pollutants, The Indian, January 1, 2008.

Cars contribute most to global warming, while ships have cooling effect, ANI, January 28, 2008.

- One can agree or disagree with these headlines; in fact, the last two addressed the results of the very same study. However, in a world where perception is reality, there is intense and continued pressure on the governments of the world to do as much as possible to minimize the negative contribution of human activities on the natural environment and the world's

climate. That pressure is all encompassing – affecting all industries, including shipping.

- As a consequence it is probable that the upcoming Copenhagen meeting will be merely a stepping stone in an on-going attempt by governments to limit the release of Green House Gasses and other air pollutants. On December 7th, representatives from the nations of the world will gather in Copenhagen for COP15 – the United Nations Climate Change Conference. Over the following 11 days, they will attempt to hammer out a new global climate treaty to replace the existing Kyoto Protocol which, although agreed in 1997, did not enter into force until early 2005.
- For shipping, Copenhagen is only one of three places it must watch, the others being London, Brussels, and Washington. It is unfortunate that the current energy efficiencies of this industry, and the improvements that have resulted from the economies of scale and technical innovations that have been developed and become commonplace over recent years, will count for little. Our industry is attracting particular scrutiny as it has been predicted that the volume of Green House Gas emissions produced by shipping will increase 150-200 percent as a result of increased global trade by 2050. At present, if shipping were considered a nation, it would already be one of the top ten GHG producers.
- We are entering a new race with a fresh starting line. How did we get to this point? It has occurred in steps, the pace of which has simply quickened over the past decade.

Step #1: Limiting emissions to protect the ship and its crew

- Marine air emissions have been around since steam engines were first installed on ships in early part of the 19th Century. Initially, these early engines were inefficient and dirty; used only sporadically in conjunction with sail. In time, the reliability and efficiency of steam engines increased and replaced sail for main propulsion. Steam engines began to be used to power cargo handling equipment and hotel services. Steam engines also began to be used to pump liquid bulk cargoes, thus facilitating the development of the tanker.
- As these advances became commonplace, there was recognition of a need for controlling air emissions from ships. The initial focus of government and class was to find ways to reduce emissions of flammable, hazardous and noxious vapors from cargo or fuel. At this point, controlling marine air emissions was a safety issue, both to prevent fires and explosions and to limit personnel exposure for health reasons.

Step #2: Reducing emissions to address local air pollution problems

- In 1955, Congress enacted the first *Air Pollution Act*. The Act declared that air pollution was a danger to public health and welfare, but preserved the "primary responsibilities and rights of the States and local government in controlling air pollution." The Act put the federal government in a purely informational role.
- This law's invitation to states and localities to act was tested against ships quickly. In 1957, the City of Detroit brought criminal charges against cement ships for "blowing tubes" in port in violation of the city's Smoke Abatement Code. The shipowner defended himself by arguing that the ships were regulated by the Coast Guard and met all federal standards. In the first marine environmental case to go to the U.S. Supreme Court, the court upheld the legality of a state or local government to protect the public health and welfare through impartial pollution controls. This case set the stage for state and local efforts to regulate marine air emissions.
- Congress later passed the *Clean Air Act Amendments of 1970*. This law established the basic regulatory framework that exists today with its heavy reliance on states and localities to reduce air pollution through State Implementation Plans (SIP). The thought is that the states and localities know how best to reduce the emission of pollutants that are precursors to ozone and smog. The U.S. Environmental Protection Agency (EPA) establishes New Source Performance Standards and National Emissions Standards for Hazardous Air Pollutants. The Clean Air Act Amendment required EPA to set national standards for "criteria pollutants," such as nitrogen oxides, sulfur oxides and particulate matter.
- It was under this construct that the first systematic attempts were made to impose controls on marine emissions. Initially, marine emissions were not identified as major sources in State Implementation Plans, however, as controls on other sources were implemented marine emissions rose to prominence. Using the marine terminal as the nexus, marine vapor control requirements were developed in California, Louisiana, New Jersey and Texas to limit the release of volatile organic compounds (VOCs) during tank vessel loading. VOCs are precursors to ground-level ozone formation in urban and industrial areas. Ground-level ozone is the primary constituent of smog.
- California and its Air Quality Management Districts took initial steps to address NO_x, SO_x and particulate emissions from steam and diesel emissions both afloat and ashore. This eventually included requirements for low sulphur fuels and cold ironing while in port. Efforts to limit diesel

emissions picked up after diesel emissions were declared by the state to be a carcinogen.

Step #3: Controlling emissions from a national and regional perspective

- In 1990, the Clean Air Act was amended again to strengthen mechanisms to address interstate and mobile source air pollution. This law contained the first provisions to specifically address marine emissions both on the engines and marine vapor control for loading or cargo and fuel. These provisions to establish national standards were at the behest of industry over concern over the possibility of multiple and potentially conflicting state and local requirements.
- This moved marine emissions from the state and local level to the national level. The thought became EPA has taken the position that pollution from large marine diesel engines affects not just populations living near ports and coastlines, but also those living hundreds of miles inland. According to the EPA, these engines are significant contributors to U.S. national mobile source emission inventory and their contribution is expected to grow in the future. Without further action, by 2030, NOx emissions from ships are projected to more than double, growing to 2.1 million tons a year, while annual PM2.5 emissions are expected to almost triple to 170,000 tons. When people breathe this polluted air, their health is adversely affected leading to lost productivity due to increased illnesses, hospitalizations and even premature deaths. EPA believes that diesel exhaust is likely to be carcinogenic to humans by inhalation. Children, people with heart and lung diseases, and the elderly are thought to be most at risk. Reducing emissions from these large marine diesel engines will lead to significant public health benefits and will help states and localities attain and maintain PM and ozone National Ambient Air Quality Standards.
- The result has been a multi-year effort by the EPA to regulate emissions from marine engines. The thought became that emissions from large marine diesel engines affect not just populations living near ports and coastlines, but also those living hundreds of miles inland since these engines are significant contributors to U.S. national mobile source emission inventory. To support that argument, the EPA states that without further action, by 2030, NOx emissions from ships are projected to more than double, growing to 2.1 million tons a year, while annual PM2.5 emissions are expected to almost triple to 170,000 tons.
- In May 2004, as part of the Clean Air Nonroad Diesel Rule, EPA finalized new requirements for nonroad diesel fuel that will decrease the allowable levels of sulfur in fuel used in marine vessels by 99 percent. These fuel improvements,

which took effect in 2007, apply to fuel produced or offered for sale in the United States and apply to distillate grades DMX, DMA, and their equivalents.

- The California Air Resources Board has unilaterally imposed its own low sulphur fuel requirements as well as cold ironing in port. In effect 1 July 2009.
- In March 2008, EPA finalized a three part program to reduce emissions from marine auxiliary engines below 30 liters per cylinder displacement. The rule will cut PM emission from these engines by as much as 90 percent and NOx emissions by as much as 80 percent.
- These developments to national standards in the United States were paralleled by efforts internationally to address regional marine emissions problems. The International Maritime Organization (IMO) began to examining safety issues related to the quality of fuel oils as well as emissions that resulted from poor quality fuels. Coincidentally, the Norwegian Government requested the IMO address NOx emissions from vessels operating in the North Sea.
- As the IMO took the issue up, the Norwegian Government pushed to examine marine emissions more globally noting that:

Sulphur emissions from ships' exhausts were estimated at 4.5 to 6.5 million tons per year - about 4 percent of total global sulphur emissions. Emissions over open seas are spread out and effects moderate, but on certain routes the emissions create environmental problems, including English Channel, South China Sea, Strait of Malacca.

Nitrogen oxide emissions from ships were put at around 5 million tons per year - about 7 percent of total global emissions. Nitrogen oxide emissions cause or add to regional problems including acid rain and health problems in local areas such as harbours.

Emissions of CFCs from the world shipping fleet was estimated at 3,000-6,000 tons - approximately 1 to 3 percent of yearly global emissions. Halon emissions from shipping were put at 300 to 400 tons, or around 10 percent of world total.

- From these seeds sprouted a new Annex to MARPOL 73/78 on prevention of air pollution. Annex of the Protocol of 1997 to amend the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL Annex VI) was adopted in 1997 and set limits on sulphur oxide and nitrogen oxide emissions from ship exhausts as well as prohibited deliberate emissions of ozone depleting substances. The Annex includes a global cap of 4.5% m/m on the sulphur content of fuel oil and allowed for special SOx Emission Control Areas

(SECAS) to be established with more stringent controls on sulphur emissions. In these areas, the sulphur content of fuel oil used onboard ships must not exceed 1.5% m/m or ships must fit an exhaust gas cleaning system. Annex VI also sets limits on emissions of nitrogen oxides (NO_x) from diesel engines. The Annex also prohibits the incineration onboard ship of certain products. Annex VI entered into force in 2005, although most vessels were already meeting its conditions after 2000.

- The U.S. Senate did not give its "advice and consent" until 2006. Congress enacted the *Maritime Pollution Protection Act of 2008* which provided a statutory basis to implement Annex VI. The requirements became enforceable through the *Act to Prevent Pollution from Ships (APPS)* in January 2009.
- The EPA is currently proposing more stringent exhaust emission standards Category 3 engines (those with per-cylinder displacement at or above 30 liters) as part of a coordinated strategy to address emissions from all oceangoing vessels that affect U.S. air quality. Current Clean Air Act standards for new Category 3 have been in effect since January 2004 and are equivalent to the current international standards for marine engines contained in Annex VI. These standards rely on engine based technologies to reduce exhaust emissions of nitrogen oxides (NO_x). The near-term standards for newly-built engines would apply beginning in 2011. Long-term standards would begin in 2016, and are based on the application of high-efficiency after-treatment technology.
- EPA's coordinated strategy also includes designation of U.S. coasts as an Emission Control Area through an amendment to MARPOL Annex VI. On July 17, 2009, the joint proposal from the United States and Canada to amend MARPOL Annex VI to designate specific areas of coastal waters as an Emission Control Area (ECA) was accepted in principle at the International Maritime Organization (IMO). The North American ECA could go into force as early as 2012. From the effective date until 2015, fuel used by all vessels operating in designated areas cannot exceed 1.0 percent sulfur (10,000 ppm). Beginning in 2015, fuel used by all vessels operating in these areas cannot exceed 0.1 percent sulfur (1,000 ppm). Beginning in 2016, NO_x after-treatment requirements become applicable.
- EPA is also proposing a change to the diesel fuel program that would forbid the production and sale of marine fuel oil above 1,000 ppm sulfur for use in the waters within the proposed U.S. ECA and internal U.S. waters and allow for the production and sale of 1,000 ppm sulfur fuel for use in Category 3 marine vessels.
- The estimated cost of implementing the coordinated strategy is approximately \$1.85 billion in 2020, increasing to \$3.11 billion in 2030. Of the 2020 costs,

nearly 86 percent or \$1.64 billion are attributable to the use of higher-cost lower-sulfur fuel in the proposed ECA.

- When attributed by pollutant, at a net present value of 3 percent from 2010 through 2040, the NOx controls are expected to cost about \$510 per ton of NOx reduced, SOx controls are expected to cost about \$930 per ton of SOx reduced, and the PM controls are expected to cost about \$8,600 per ton of PM reduced.
- In October 2008, member states of the IMO adopted new international standards for marine diesel engines and their fuels (2008 Amendments to MARPOL Annex VI) that will apply globally, once the amended treaty is ratified by enough parties. The amendments establish additional, more stringent emission requirements for ships that operate in designated coastal areas where air quality problems are acute. These new global and geographic standards have the potential to significantly reduce air pollution from ships, and provide important benefits to our national air quality. Under the new global standards, NOx emissions will be reduced, and the fuel sulfur cap will drop to 5,000 ppm in 2020 (pending a fuel availability review in 2018). Under the new geographic standards, ships operating in designated areas will be required to use engines that meet the most advanced technology-forcing standards for NOx emissions, and to use fuel with sulfur content at or below 1,000 ppm.

Step #4: Limiting Emissions to Stop Global Warming

- To this point, it can be argued that efforts to control marine air emissions remained focused safety and the impact of air emissions on a region's air quality due to heavy concentrations of vessels or vessels being stationary. The first hint of broader initiatives was the banning of CFCs and Halons.
- Concern over global warming and climate change went from the halls of academia to the front pages of newspapers and the lead story on news channels.
- The primary culprit which was identified was greenhouse gases. These are gases in an atmosphere that absorb and emit radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. The main greenhouse gases in the Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone, and Chlorofluorocarbons (CFC). Greenhouse gases greatly affect the temperature of the Earth; without them, Earth's surface would be on average about 33°C (59°F) colder than at present. On the other hand, too much of greenhouse gases increases the Earth's temperature.

- As the IMO was agreeing to Annex VI, in December 1997 the world's governments were agreeing to Kyoto Protocol to the United Nations Framework Convention on Climate Change. Under the Protocol, 37 industrialized countries committed themselves to a reduction of four greenhouse gases (GHG) (carbon dioxide, methane, nitrous oxide, sulphur hexafluoride) and two groups of gases (hydrofluorocarbons and perfluorocarbons) produced by them, and all member countries give general commitments. Annex I countries agreed to reduce their collective greenhouse gas emissions by 5.2% from the 1990 level. Emission limits do not include emissions by international aviation and shipping, but are in addition to the industrial gases, chlorofluorocarbons, or CFCs, which are dealt with under the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer.
- Emissions from maritime transport only subject to reporting. Article 2.2-Annex 1 Parties pursue limitations through IMO.
- The United States, although a signatory to the Kyoto Protocol, has neither ratified nor withdrawn from the Protocol. The signature alone is merely symbolic, as the Kyoto Protocol is non-binding on the United States unless ratified. The United States was, as of at least 2005, the largest per capita emitter of carbon dioxide from the burning of fossil fuels. On 12 November 1998, Vice President Al Gore symbolically signed the protocol. Both Gore and Senator Joseph Lieberman indicated that the protocol would not be acted upon in the Senate until there was participation by the developing nations. The Clinton Administration never submitted the protocol to the Senate for ratification.
- President George W. Bush did not submit the treaty for Senate ratification based on the exemption granted to China (now the world's largest gross emitter of carbon dioxide, although emission is low per capita). Bush opposed the treaty because of the strain he believed the treaty would put on the economy; he emphasized the uncertainties which he believed were present in the scientific evidence. Furthermore, the U.S. was concerned with broader exemptions of the treaty.
- On 31 May 2002, all fifteen then-members of the European Union deposited the relevant ratification paperwork at the UN. The EU produces around 22% of global greenhouse gas emissions, and has agreed to a cut, on average, by 8% from 1990 emission levels. On 10 January 2007, the European Commission announced plans for a European Union energy policy that included a unilateral 20% reduction in GHG emissions by 2020.
- The EU has consistently been one of the major supporters of the Kyoto Protocol. In December 2002, the EU created an emissions trading system in an effort to meet these tough targets. Quotas were introduced in six key industries: energy, steel, cement, glass, brick making, and paper/cardboard.

There are also fines for member nations that fail to meet their obligations, starting at €40/ton of carbon dioxide in 2005, and rising to €100/ton in 2008.

- Transport CO₂ emissions in the EU grew by 32% between 1990 and 2004. The share of transport in CO₂ emissions was 21% in 1990, but by 2004 this had grown to 28%.
- After a scientific review ordered in 2007 by the U.S. Supreme Court, the EPA issued a proposed finding that greenhouse gases contribute to air pollution that may endanger public health or welfare. The finding identified six greenhouse gases that pose a potential threat gases – carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride. The proposed endangerment finding states, ***“In both magnitude and probability, climate change is an enormous problem. The greenhouse gases that are responsible for it endanger public health and welfare within the meaning of the Clean Air Act.”*** GHG are very likely the cause of the increase in average temperatures and other changes in our climate.
- Findings from a recent EPA study titled “Assessment of the Impacts of Global Change on Regional U.S. Air Quality: A Synthesis of Climate Change Impacts on Ground-Level Ozone,” suggest that climate change may lead to higher concentrations of ground-level ozone, a harmful pollutant. Additional impacts of climate change include, but are not limited to: increased drought; more heavy downpours and flooding; more frequent and intense heat waves and wildfires; greater sea level rise; more intense storms; and harm to water resources, agriculture, wildlife and ecosystems.
- *The American Clean Energy and Security Act of 2009 (ACES)* is an energy bill in the 111th United States Congress (H.R.2454). The bill proposes a cap and trade system, under which the government sets a limit (cap) on the total amount of greenhouse gases that can be emitted nationally. Companies then buy or sell permits to emit these gases, primarily carbon dioxide (CO₂). The cap is reduced over time to reduce total carbon emissions. The legislation would set a cap on total emissions over the 2012–2050 period and would require regulated entities to hold rights, or allowances, to emit greenhouse gases. After allowances were initially distributed, entities would be free to buy and sell them (the trade part of the program). Those entities that emit more gases face a higher cost, which provides an economic incentive to reduce emissions. Key elements of the bill include:
 - Requires electric utilities to meet 20% of their electricity demand through renewable energy sources and energy efficiency by 2020.
 - Invests in new clean energy technologies and energy efficiency, including renewable energy (\$90 billion in new investments by 2025), carbon capture and sequestration (\$60 billion), electric and other

- advanced technology vehicles (\$20 billion), and basic scientific research and development (\$20 billion).
 - Protects consumers from energy price increases. According to estimates from the Environmental Protection Agency, the reductions in carbon pollution required by the legislation will cost American families less than a postage stamp per day.
 - It sets a slightly higher target for reductions in emissions of carbon dioxide, methane, and other greenhouse gases than that proposed by President Barack Obama. The bill requires a 17-percent emissions reduction from 2005 levels by 2020; Obama has proposed a 14 percent reduction by 2020. Both plans would reduce United States' emissions by about 80 percent by 2050. Complementary measures in the legislation, such as investments in preventing tropical deforestation, will achieve significant additional reductions in carbon emissions.
 - It includes a renewable electricity standard (almost identical to a renewable portfolio standard, but narrowly tailored to electrical energy) requiring each electricity provider who supplies over 4 million MWh to produce 20 percent of its electricity from renewable sources (such as wind, solar, and geothermal) by 2020. There is a provision whereby 5% of this standard can be met through energy efficiency savings, as well as an additional 3% with certification of the Governor of the state in which the provider operates.
- The bill was approved by the House of Representatives on June 26, 2009 by a vote of 219-212, and has been placed on calendar in the Senate under general orders on July 6, 2009. Senate Environment and Public Works Committee took action three weeks ago. The Kerry-Boxer bill would cut the nation's greenhouse gas emissions 20 percent by 2020 from 2005 levels by compelling industries releasing carbon dioxide and other gases linked to global warming to buy a dwindling number of pollution credits over time. They would be able to trade the permits with other emitters, including some that would not be covered by the overall carbon cap.

Step #5: Copenhagen and beyond

- The United Nations Climate Change Conference will take place at the Bella Center in Copenhagen, Denmark, between December 7 and December 18, 2009. The conference includes the 15th Conference of the Parties (COP 15) to the United Nations Framework Convention on Climate Change and the 5th Meeting of the Parties (COP/MOP 5) to the Kyoto Protocol. According to the Bali Road Map, a framework for climate change mitigation beyond 2012 is to be agreed there.
- On October 20, 2009, the Council of the European Union issued Council Conclusions on the EU position for the Copenhagen Climate Conference. Among other things, the Council proposes that the global emission reduction

target for international maritime transport should be incorporated into a Copenhagen agreement and that the parties should commit to work through the IMO to enable an agreement that does not lead to competitive distortions or carbon leakage and that is agreed upon in 2010 and approved by 2011. Further, the global reduction target for international maritime transport should be set by the UNFCCC to -20% below 2005 levels by 2020 to be implemented globally in a manner that ensures a level playing field. The Council supports the use of global market-based instruments to reduce emissions from the maritime sector and proposes that such instruments be developed within the IMO. Aviation will be expected to cut emissions by only 10% in the same period.

- In case of an absence of an international agreement, the EU has stated on many occasions that regional measures will be proposed. The IMO has been given 1-year to come up with a regime and it must be approved by 2011.
- What should be of concern was the reported statement from the official EU environmental spokesperson and I quote: “So far, there has been no commitment by the [maritime] sector to climate change, and it has done nothing about fighting it.”
- Without passage of the *American Clean Energy and Security Act of 2009*, the Obama Administration has little it can firmly place on the table at the Copenhagen Conference. It has announced a goal of reducing U.S. emissions 17% from 2005 levels and reaching 80% by mid century. The Obama Administration does support utilizing the IMO and ICAO framework to address these mobile sources.
- Where does shipping fit? Like ICAO, the IMO agreed a work plan, with a timetable, to identify and develop the mechanisms needed to achieve the limitation or reduction of carbon dioxide (CO₂) emissions from ships, noting that climate change caused by greenhouse gas emissions from the burning of fossil fuel is a steadily growing concern for most countries. The MEPC noted that shipping, although an environmentally friendly and fuel-efficient mode of transport, nevertheless, needs to take action on greenhouse gases (GHG).
- The work plan provides for the further development of the Emission Indexing Scheme, the consideration and evaluation of methodology for emission baseline(s); and the consideration of technical, operational and market-based methods for dealing with GHG emissions. This includes fuel standards, regulating volatile organic compounds (VOCs) emissions, policies and Practices related to the Reduction of Greenhouse Gas Emissions from Ships.
- In November 2003, IMO adopted resolution A.963 (23) IMO Policies and practices related to the reduction of greenhouse gas emissions from ships.

- At its 52nd session in October 2004, the MEPC made progress on developing draft Guidelines on the Indexing Scheme and urged Members to carry out trials using the scheme and to report to the next session. One purpose of developing guidelines on emission indexing is to develop a simple system that could be used voluntarily by ship operators during a trial period. Meanwhile, the Committee recognized that IMO guidelines on greenhouse gas emissions have to address all six greenhouse gases covered by the Kyoto Protocol (Carbon dioxide (CO₂); Methane (CH₄); Nitrous oxide (N₂O); Hydrofluorocarbons (HFCs); Perfluorocarbons (PFCs); and Sulphur hexafluoride (SF₆).

The future?

- One can see a progression. Shipboard emissions were originally controlled for safety and personnel protection. Then they were controlled for local air pollution challenges. The regional and national pollution. Now ship emissions are being addressed for the global concerns about green house gases and climate change. This transition occurred primarily in the past 20 years.
- What will the next 20 years bring? Are "zero emission" ships possible or probable?
 - Energy Efficiency Design Index
 - Energy Efficiency Operational Indicator
 - Best Practices
 - Ship Energy Efficiency Management Plan
 - Market Based Measures to be discussed at IMO in March 2010
 - Emissions Trading Scheme
 - GHG International Compensation Fund
 - Starting cost may be \$10Bn/year for shipping?
 - Enforcement: Flag States, Port States, ROs, charterers
- It would pose immense difficulties for shipping if different nations and different flag States adopted different requirements. Shipping needs global standardization which is referred to as the "No More Favorable Treatment" approach.
- Are the implementation schedules realistic?
 - Right now there are calls to delay the European low-sulphur requirements. An independent report to the European Commission that reveals up to 260 LNG vessels and 2,500 tankers could need to adapt boilers to be able to use a distillate fuel instead of a heavy fuel oil. INTERTANKO and OCIMF have requested an extra year to meet the impending European low sulphur requirements in ports because they argue that tanker and gas ship owners have not prepared for the impending rules in January 1, 2010 that say a ship entering a

European port must use a fuel with a sulphur content of less than 0.1%.
The European Commission refuses to extend the deadline.

- The EPA's attempt to impose new technology and fuel standards ran into a roadblock on the Great Lakes in October 2009. Congressmen representing the Great Lakes were able to exempt 13 ships from the new requirements. The ships would have been put out of commission necessitating the use of trains and trucks to transport ore.
 - Engine manufacturers and designers will continue to seek technical improvements which will offer slim percentage improvements in efficiencies that, cumulatively promise measurable advances. Are their promises achievable?
 - Shipyards need to be flexible and not penalize owners for requesting modifications to standard vessel designs to achieve air emissions savings.
 - Is the current USA implementation structure able to accommodate vessels?
 - San Francisco COTP issues letter on fuel switching leading to propulsion losses and fuel-related equipment failures (particularly at slow speeds manuvuering) when using low sulphur fuels
- Basic principles that have be adhered to:
 - The need to avoid imposing standards within the shipping sector that would drive an intermodal shift of cargoes to less efficient modes, to the overall detriment of the environment.
 - That any reduction goals established for shipping should be in line with shore-based industry targets.
 - That any regulations should be binding on all flag States and not distort competition.
 - A recognition that advances in technology have opened up the possibility of making an overall 15 percent reduction in CO2 emissions generated from the construction and operation of existing and new ships by 2030.
 - And finally, that the requirements should be practical, transparent and easy to administer.
- Thank you all for your attention.