Section IV: Upper Range of Speeds Available for Commercial High-Speed Cargo Ships

4.0 Background

Section 1.3 contains a matrix by ship type of the U.S.-flag commercial ships included in the Maritime Security Program (MSP); average speed and cargo capacity is provided for each ship type. Containerships (36 ships) have the highest average speed, 20 knots, and an average cargo capacity of 2,910 TEU.

Recently the private sector has shown interest in both the design of very large vessels to achieve economies of scale and increased speed to provide guaranteed schedule performance. Investments are being made to achieve these goals, evidenced by the P&O Nedlloyd Southampton, a 89,640 bhp, 6,690 TEU containership with a 25 knot speed capability. An example of a much smaller 25 knot open-hatch container vessel is the Nigel Gee & Associates Ltd. (NG) designed 1,400 TEU feeder containership. Norasia Services is operating five of these vessels which were built by Germany's HDW Shipyard. Five similar Norasia vessels are being built in China.

4.1 Upper Range of Speeds Available in Near-Term (next five years)

Increases in the speeds of ocean-going commercial ships are expected to evolve progressively based on technical advances and the availability of suitable markets to support the associated required freight rates. The concurrent development of high-speed coastal and short-sea ferry systems of varying hull forms will contribute to solutions to both technical and operational issues associated with increases in ocean-going ship speeds.

Studies by the U.S. Navy to date have scientifically supported calm water speeds of 60 knots carrying a payload of 2,000 tons at a range of 4,000 nm. This could foreseeably be achieved within five years. The 60 knot privately designed Halter/NG RO/RO Freight Vessel (pentamaran) described in Section 2.2.1.3 supports the achievement of similar speeds and ranges for cargo vessels in the commercial sector. This design has completed the preliminary design stage and towing tank testing, indicating serious interest and private investment in high-speed commercial cargo transport. While 60 knot speed is technically possible, achievement of this speed will require a combination of technology development and market forces that make that speed profitable.

High-speed cargo transport in open ocean routes involves more technical risk than similar transport on coastal "feeder" routes. The hydrodynamic loads associated with high-speed operations in a seaway are largely unknown. Military and commercial vessels with speed capabilities in the range of 30 knots have suffered moderate to severe damage while attempting to maintain speed in deteriorating sea conditions. Similarly, the technology and analysis to evaluate the effect of fatigue on ship life is not well developed. Also, little data is available on

the long-term effectiveness of the human element at such speeds, considering both motion-induced performance degradation, and human operational issues such as the ability to perform safe navigation at 60 knots.

On the other hand, the technology for forecasting weather and sea state has improved dramatically. Coupled with high speeds, this technology opens the possibility of avoiding weather rather than handling it. The cargo liner trade is highly competitive, and the issues of speed and speed margins are critical for schedule dependability and overall system reliability associated with commercial ship system operation. The commercial market for rapid and reliable movement of high-value cargo must be able to divert around major environmental disturbances while maintaining schedules and preventing loss of high-value cargo. This is a highly desirable capability in light of the damage and cargo loss suffered by the containerships APL China, APL President Adams, and Evergreen Line's Ever Union on Pacific transits during October 1998.

If technical issues involving hydrodynamic loads and design for fatigue can be resolved, or if high-speed weather routing becomes commercial operating practice, at least one 60 knot, commercial ocean-going cargo vessel could be in operation within five years.

4.2 Upper Range of Speeds Available in Long-Term (next ten years)

The advancement of commercial cargo vessel speeds above 60 knots requires significant advances in at least three technology areas. Engine development is required to achieve horsepower in the range of 400,000 to 500,000 horsepower to move 2,000 to 4,000 tons of cargo at speeds of 70 to 80 knots. This horsepower must be developed in a high-density machinery package to minimize ship size. Concurrently, propulsors must be developed to efficiently convert this power to thrust; waterjet propulsors appear the best candidate at this time. The third technology advance involves materials and structural concepts to achieve 50 percent structural weight savings without sacrificing strength or fatigue life. All of these advances have been identified by the U.S. Navy as realistic, although they are not necessarily being developed.

Barring an unforeseen technical breakthrough, we expect the number of commercial cargo vessels capable of 60 knot speeds to increase, as incremental improvements are achieved in propulsion and structures that improve the economic performance of these vessels.