7. CONCLUSIONS AND RECOMMENDATIONS

Based on the simulated docking maneuvers that have been completed as part of this study, a number of conclusions and recommendations can be made.

The simulations completed for the *MV Caribou* with 40 knots of wind demonstrated that winds from the ENE are the most challenging with respect to completing the docking maneuver successfully.

For the N2 hull equipped with conventional rudders that are the same size as presently installed on the *MV Caribou*, it was not possible to dock in a 40 knot wind. When the rudder area was increased by 10%, it was possible to successfully dock the vessel in a 40 knot ENE wind. However, the number of attempts and the amount of fine tuning required to successfully complete this maneuver indicate that the balance required in determining helm and control settings has little margin for error. If unsteady forces come into play as would be expected if wind gusts were prevalent during the maneuver, then it is conceivable that control of the vessel could be lost under these environmental conditions. As a result of the difficulty level that was demonstrated for completing this maneuver, the N2 with conventional rudders is not recommended as a viable option for operating within Port-aux-Basques in winds of 40 knots.

When the N2 hull is adapted to use high lift Becker rudders, the docking maneuvers were easily completed in 40 knot ENE wind. The fact that the vessel was still able to dock with one bow thruster inoperable is a testament to the maneuverability of the hull with Becker rudders installed. Considering the requirement of backing in ice with rudders at 0°, the vessel was still able to dock successfully, although the maneuver was simplified with the addition of a stern thruster. The N2 hull configured with Becker rudders would represent a viable solution to permitting maneuvering with Port-aux-Basques in 40 knot winds. If this option is selected, then it is also recommended that the stern thruster be added as this will provide increased flexibility to accommodate the backing maneuver in ice without using rudder moments.

For the N2 hull configured with podded propulsion units, it has been shown that the vessel will be able to dock in the difficult 40 knot ENE winds, even without the aid of bow thrusters. Additionally, loss of steering control on one pod will not prohibit the vessel from docking in this wind condition. The selection of podded propulsion units for this vessel is a viable option.

In summary, and considering the evidence presented here, the use of conventional rudders on the N2 hull is not recommended. In terms of providing the maximum flexibility for maneuvering within Port-aux-Basques harbour, it is recommended that the podded propulsion option be exercised. The use of the Becker rudder option is also viable, but the flexibility of this configuration is not as great as that of the podded propulsion configuration.