The Impact of Black Carbon on Arctic Sea and The Improvement Plan through Polar Code

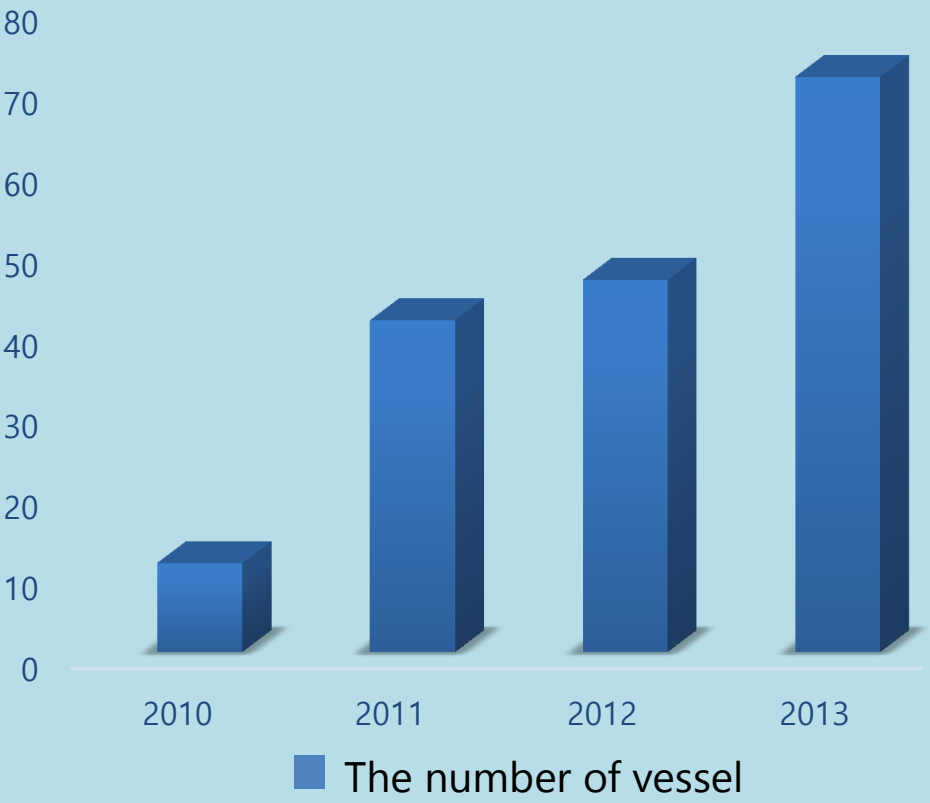
INDEX

12500 Miles → 9300 Miles

30 Days → 20 Days

The shipping community is fast jumping on the possibility of saving huge amounts of money on fuel and time by utilizing these new routes.

Popularity of Northern Sea Route



Source: NORTHERN SEA ROUTE INFORMATION OFFICE

Marine Accident

Pollution

INTERNATIONAL MARITIME ORGANIZATION

POLAR CODE

SHIPPING IN POLAR WATERS

Black Carbon(BC)

warms the Earth by absorbing sunlight and heating the atmosphere and by reducing albedo when deposited on snow and ice and indirectly by interaction with clouds.

***Albedo: the ratio of the intensity of light from an object.**

Drafting and submitting an information paper to IMO

- INTRODUCTION
- PART I: SAFETY MEASURE
- PART II: POLLUTION PREVENTION

INTRODUCTION

PART I: SAFETY MEASURE

PART II: POLLUTION PREVENTION

PART I: SAFETY MEASURE

- I-A: Mandatory Provision
- I-B: Recommendations

PART II: POLLUTION PREVENTION

- II-A: Mandatory Provision
- II-B: Recommendations

International Code for Ships Operating in Polar Waters

POLLUTION PREVENTION MEASURES

International Code for Ships Operating in Polar Waters

ADDITION GUIDANCE TO PART II-A

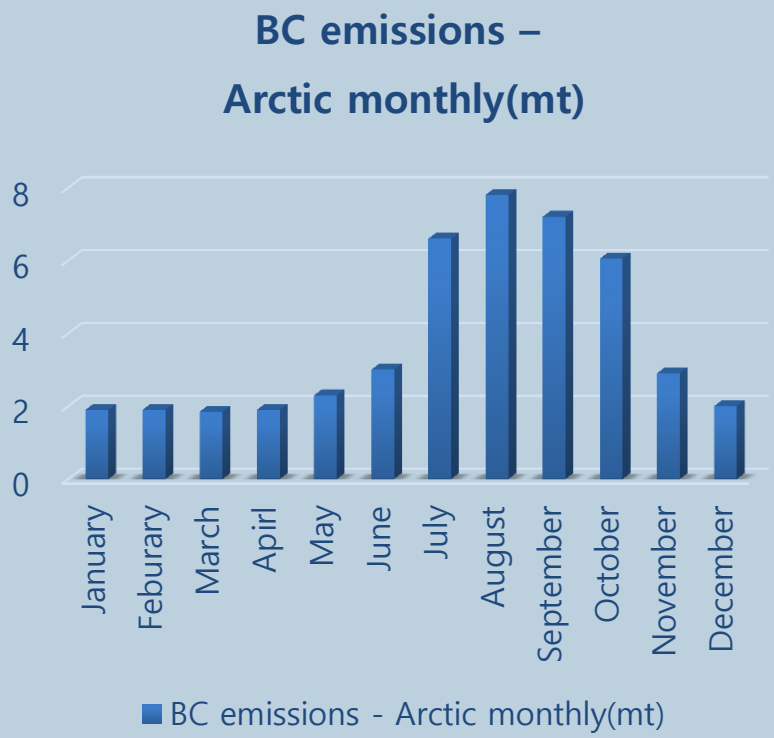
II-A: Mandatory Provision

II-B: Recommendations

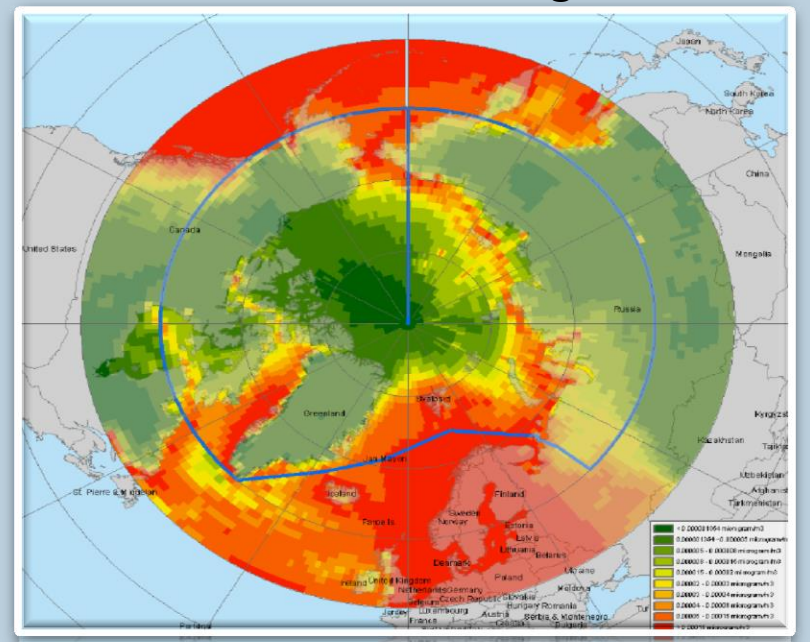
Black Carbon (Soot)

- light-absorbing carbonaceous material emitted as solid particulate matter (PM)
- the most effective PM and one of the major causes of global warming
- formed by the incomplete combustion of fossil fuels, biofuels, and biomass

Mid-July to Mid-October: Open Water Period



BC concentration from shipping above 50° in August



Source: DNV. 2013

1. DIRECT EFFECT

2. INDIRECT EFFECT

3. SNOW ICE ALBEDO EFFECT

1. DIRECT EFFECT

Black carbon absorbs the light from the sun

and radiates it back to (the) atmosphere

so warming the surrounding atmosphere

2. INDIRECT EFFECT

Absorption of sunlight by low clouds

Reduces the vertical mixing of moisture to the cold base

Thinning the clouds to increase the solar energy

3. SNOW ICE ALBEDO EFFECT

Soot deposition increases melting of ice masses.

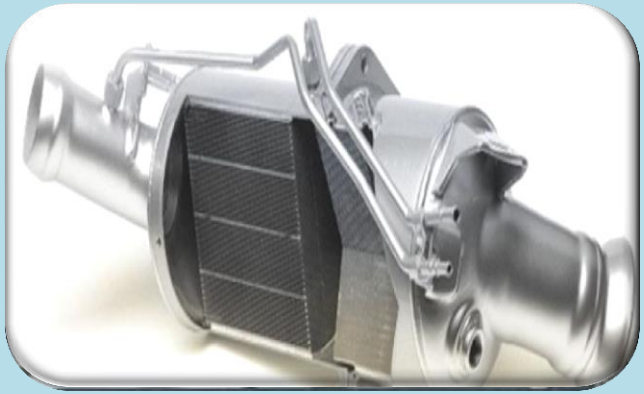
Reduced snow albedo increase surface temperature.

The increased surface temperature would decrease the snow cover.

1. Install Diesel Particulate Filters(DPFs)

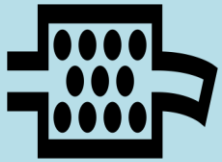
2. Slow steaming with De-rating

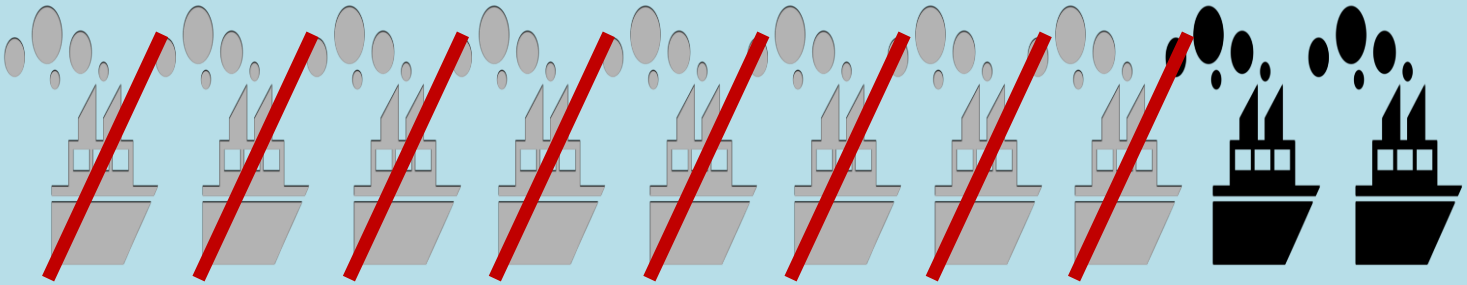
3. Including the arctic area as ECA (Emission Control Areas)



DIESEL PARTICULATE MATTER

SOOT





REMOVE 80% OR MORE OF THE SOOT

Source: BLG 17/INF.7, 2012

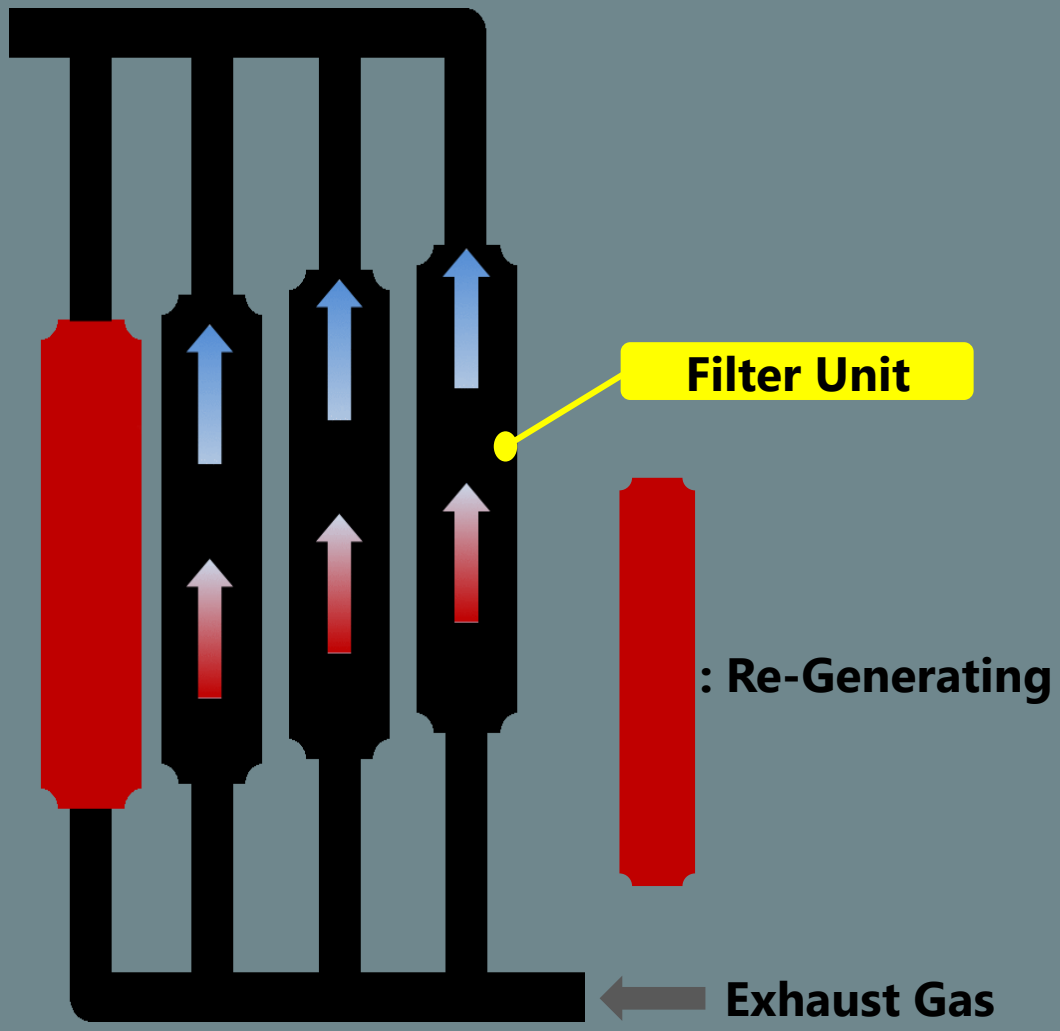
MOL
Mitsui O.S.K. Lines

- DPF system installed on the diesel engine on an MOL operated ocean-going vessel.
- This is the world's first application of the self-cleaning DPF on an ocean-going ship.

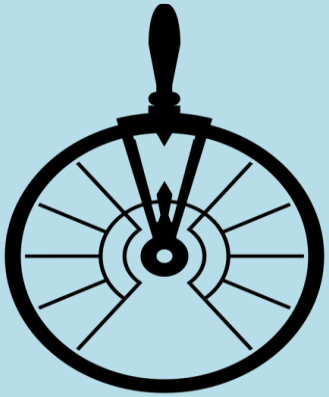
BERGER Maritiem
passion for green

- manufacturing and supplying DPF considering the size of the engine rooms and the kind of ships
- provides 24/7 after-sales service to ships on European Ports

Diesel Particulate Filter Re-generating Cycle



Source: MOL Newsletter, 2012.02



Slow Steaming with De-Rating

“Low load operation”

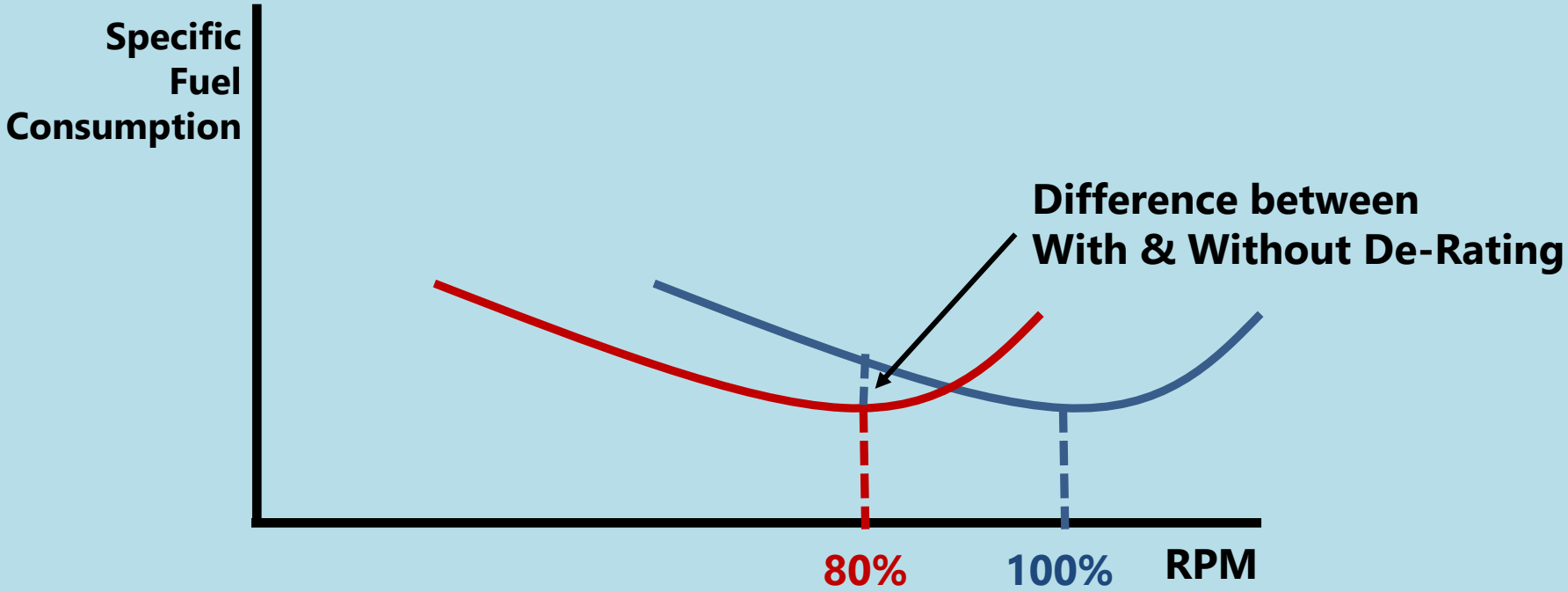
reduction of vessel speed in order to cut fuel consumption.

Without De-rating

With De-rating

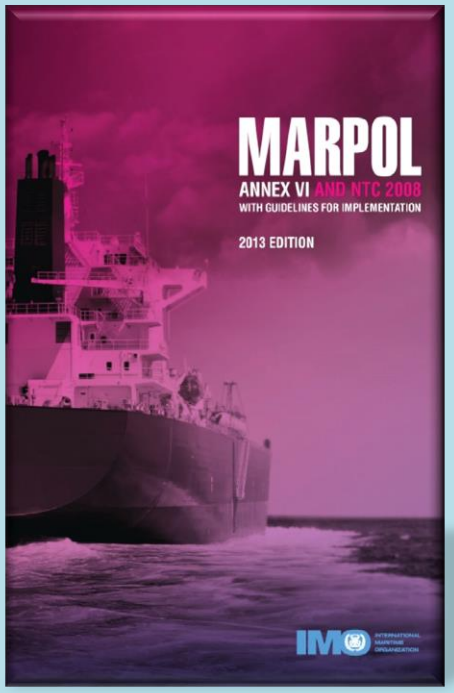
De-Rating

Adjustment to the engine combustion process in order to increase fuel efficiency.

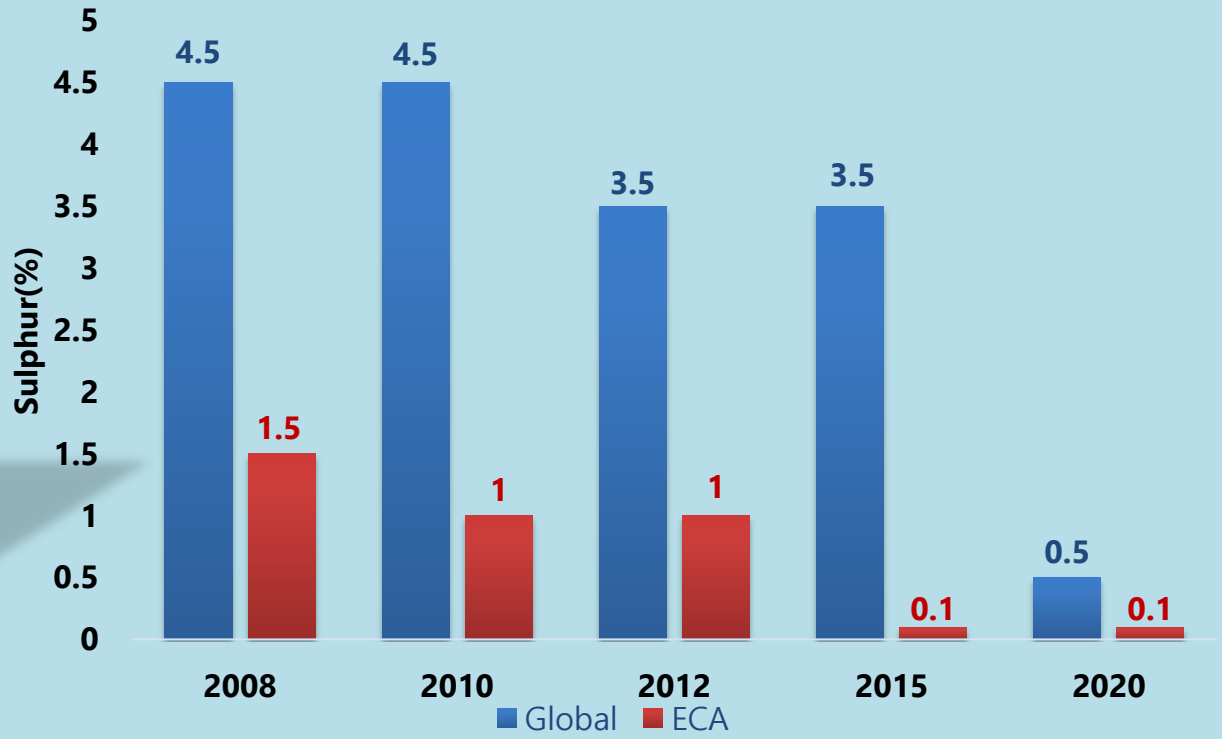


Emission Control Area

ECA



MARPOL ANNEX VI – Reg. 14
Sulphur Oxides (SOx) and Particulate Matter



PART II-A
POLLUTION PREVENTION MEASURES

CHAPTER 6 – PREVENTION AIR POLLUTION FROM SHIPS

1.1 Definition

1.1.1 DPFs(Diesel particulate filters) means a device designed to remove diesel particulate matter or soot from exhaust gas of a diesel engine.

1.1.2 Ships constructed means ships the keels of which are laid or which are at a similar stage of construction.

1.1.3 "Existing ship" means a ship which is not a new ship.

PART II-A
POLLUTION PREVENTION MEASURES

CHAPTER 6 – PREVENTION AIR POLLUTION FROM SHIPS

1.2 Structural requirements

1.2.1 For category A, B and C ships constructed on or after 1 January 2017, DPFs shall be installed on board.

1.2.2 DPFs shall be installed on all ships of category A, B and C constructed before 1 January 2017 by the date of the first scheduled dry-docking after 1 January 2017, but not later than 1 January 2020.

PART II-B
ADDITIONAL GUIDANCE REGARDING THE PROVISIONS OF THE INTRODUCTION AND PART II-A

4 Additional guidance to chapter 6

4.1 Definition

4.1.1 Slow steaming means reduction of vessel speed in order to cut fuel consumption.

4.1.2 De-rating means decrease engine load in order to decrease specific fuel oil consumption.

PART II-B
ADDITIONAL GUIDANCE REGARDING THE PROVISIONS OF THE INTRODUCTION AND PART II-A

4 Additional guidance to chapter 6

4.2 Ships are encouraged to implement slow steaming when operating in Arctic waters.

MARPOL ANNEX VI- CHAPTER III

Regulation 14
Sulphur Oxides (SOx) and Particulate Matter

3. For the purpose of this regulation, emission control areas shall include:

.3 the United States Caribbean Sea area as described by the coordinates provided in Appendix VII to this Annex;

.4 Arctic Area as described by the coordinates provided in Annex I, regulations 46.2; and

.5 any other sea area, including any port area, designated by the Organization in accordance with the criteria and procedures set forth in Appendix III to this Annex.

MARPOL ANNEX VI- CHAPTER III

Relation 14
Sulphur Oxides (SOx) and Particulate Matter

4. While ships are operating within an Emission Control Area, the sulfur content of fuel oil used on board ships shall not exceed the following limits:

.1 1.50% m/m prior to 1 July 2010;

.2 1.00% m/m on and after 1 July 2010; and

.3 0.10% m/m on and after 1 January 2015.


THANK YOU