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INTERPRETATIONS OF, AND AMENDMENTS TO, MARPOL AND RELATED INSTRUMENTS

Designation of an Emission Control Area for Nitrogen Oxides, Sulphur Oxides and Particulate Matter Submitted by the United States

SUMMARY

Executive summary:	This document is submitted in support of the proposal to designate an Emission Control Area for specific portions of the coastal waters of the United States and Canada. It provides references and other information considered in developing the proposal.
Strategic Direction:	7.3
High-level Action:	7.3.1
Planned Output:	7.3.1.1
Action to be taken:	Paragraph 3
Related documents:	MEPC 59/6/5; MARPOL Annex VI Appendix III; MARPOL Annex VI Regulations 13 & 14.

Background

1 In document MEPC 59/6/5, the United States and Canada propose the designation of an Emission Control Area (ECA) for specific portions of U.S. and Canadian coastal waters, for the control of nitrogen oxides (NO_X), sulphur oxides (SO_X), and particulate matter (PM) emissions. Adoption of the proposed ECA will result in significant reductions in ambient levels of air pollution in the United States and Canada, which will achieve substantial benefits to human health and the environment.

2 Many in-depth technical analyses were conducted in developing the proposal for a U.S./Canada ECA. A comprehensive presentation of the analyses performed by the U.S. Government has been prepared and is available as a separate technical support document. Due to the length of that document, it is not attached herein. Rather, Annex 1 to this document presents a brief synopsis of that technical support document, and in paragraph 1.3 provides a link to the Internet site where the full document may be retrieved electronically. Annex 2 to this document is a bibliography of materials that are referenced in MEPC 59/6/5, Annex 1.

Action requested of the Committee

3 The Committee is invited to note the information provided in this document, and consider it during review of the U.S./Canada proposal for an Emission Control Area.

ANNEX 1

Analyses in Support of the Proposal to Designate an Emission Control Area for Nitrogen Oxides, Sulphur Oxides and Particulate Matter

1. Introduction

1.1 In document MEPC 59/6/5, the United States and Canada propose the designation of an Emission Control Area (ECA) for specific portions of U.S. and Canadian coastal waters, for the control of nitrogen oxides (NO_X), sulphur oxides (SO_X), and particulate matter (PM) emissions. Designation of the proposed ECA is necessary to protect public health and the environment in the United States and Canada by reducing exposure to harmful levels of air pollution resulting from these emissions. The burden on international shipping is small compared to the improvements in air quality, reductions in premature mortality and other benefits resulting from designation of the proposed ECA.

1.2 Document MEPC 59/6/5 provides a complete analysis of how each of the eight Criteria for Designation of an ECA established under MARPOL Annex VI Appendix III is fulfilled. In developing the ECA proposal, many in-depth technical analyses were conducted. A comprehensive presentation of the analyses performed by the U.S. Government is available as a separate Technical Support Document (TSD). Due to the length of the TSD, it is not attached herein; however, a synopsis of the TSD is presented below.

1.3 The full TSD and other supporting materials may be retrieved electronically on the Internet at the following URL: http://www.epa.gov/otaq/oceanvessels.htm#emissioncontrol.

2. Synopsis of Technical Support Document

Emission Inventory

2.1 Chapter 2 of the TSD describes how U.S. emission inventories were developed to describe air emissions from ships operating in waters within the proposed ECA. These inventories provide the foundation upon which all the subsequent analyses were built, and address Criterion 6 of Section 3, Appendix III to MARPOL Annex VI. Beyond the level of detail provided in MEPC 59/6/5, Chapter 2 of the TSD explains how the inputs were developed and what assumptions were made in assessing what the emissions are from ships currently (2002 base year), what the emissions would look like in 2020 without the proposed ECA, and what reductions can be expected from the proposed ECA.

2.2 Chapter 2 describes the “bottom-up” methodology that was used, based on the latest state of the art models and inputs. This chapter describes which port-related emissions were included and why, and how emissions were obtained for ships while underway in U.S. waters. This chapter explains in great detail each parameter that went into the modelling and analyses, including which ships are included, which fuels are used by those ships, which other (non-ECA) emission controls are in place for each scenario, and what growth rates are expected, incorporating forecasts of the demand for marine transportation services in 2020.

Impacts of Emissions on Air Quality, Human Health and the Environment

2.3 Chapter 3 of the TSD describes in great detail most of the analyses conducted in support of Criteria 2, 3, 4 and 5 of Section 3, Appendix III to MARPOL Annex VI. For organizational reasons, the analyses conducted to assess the impacts of ships' emissions on human health are presented in Chapter 4 of the TSD, summarized below. Chapter 3 contains several sub-sections, outlined here for ease of reference.

Impacts of Pollutants on Human Health

2.4 Section 3.1 describes the human health impacts of the pollutants proposed for control in the U.S./Canada ECA. The proposed ECA would not only reduce direct emissions of NO_X, SO_X and PM, but also secondarily formed ambient PM and ground-level ozone. Section 3.1.1 describes the nature of these pollutants, formation processes, and relationship to ship emissions. Section 3.1.2 presents the health effects associated with exposure to NO_X, SO_X, PM and ground-level ozone, summarizing the key scientific literature.

Impacts of Ships' Emissions on Air Quality and Benefits of ECA to Air Quality

2.5 Section 3.2 describes the effects of NO_X, SO_X and PM emissions on ambient air quality under the same scenarios for which emission inventories were developed, presented in terms of ground-level ozone and PM. This section also describes the multi-pollutant modelling platform that was used to assess the impacts of reduced marine emissions from the application of the proposed ECA. Appendix A to Chapter 3 describes the relevant meteorological conditions that contribute to at-sea emissions being transported to populated areas and contributing to harmful human health and ecological impacts, and which formed inputs to the modelling platform.

Impacts of Ships' Emissions on Ecosystems and Benefits of ECA to Ecosystems

2.6 Section 3.3 describes the impacts of emissions from ships on terrestrial and aquatic ecosystems such as visibility, ozone uptake, eutrophication, acidification, loss of forest biomass, and overall forest health. Using the same scenarios as for the other analyses, improvements in environmental conditions for many types of ecosystems were evaluated. Unlike the analyses for human health, there are a larger number of pollutants of concern to ecosystems. Thus, deposition of many chemical forms of NO_X, SO_X and PM are discussed in this section, as well as the biogeochemical cycles of interrelated pollutants such as mercury.

Impacts of Ships' Emissions on Human Health and Benefits of ECA to Human Health

2.7 Chapter 4 of the TSD presents quantified U.S.-related health impacts for PM and ozone associated with emissions from ships, both in terms of the expected contribution of overall ship emissions to adverse health impacts on land and the reductions in adverse health impacts that can be expected to occur from the adoption of the proposed ECA.

2.8 The health impacts modelling presented in Chapter 4 is based on peer-reviewed studies of air quality and health and welfare effects associated with improvements in air quality. This chapter also describes the computer program used to estimate health benefits by integrating a number of modelling elements (e.g., interpolation functions, population projections, health impact functions, valuation functions, analysis and pooling methods) to translate modelled air concentration estimates into health effect incidence estimates.

Cost Analyses

2.9 Chapter 5 of the TSD describes our estimates of the costs associated with the reduction of SO_X, NO_X, and PM emissions from ships, not only to the shipping industry but also to marine fuel suppliers and companies who rely on the shipping industry. This chapter provides additional detail regarding the analyses conducted in support of Criteria 7 and 8 of Section 3, Appendix III to MARPOL Annex VI. This chapter describes the analyses used to evaluate the cost impact of Tier III NO_X requirements combined with low sulphur fuel use on vessels operating within the proposed ECA, including estimates of low sulphur fuel production costs, vessel hardware costs, and operating costs. This chapter also presents cost per ton estimates for ECA-based NO_X and fuel sulphur standards and compares these with the costs of established land-based control programs.

Economic Impact Analysis

2.10 Chapter 6 of the TSD examines the economic impacts of the projected ECA costs on shipping engaged in international trade. This chapter provides additional detail in support of Criterion 8 of Section 3, Appendix III to MARPOL Annex VI. This chapter describes the econometric methodology that was used in estimating two aspects of the economic impacts: social costs and how they are shared across stakeholders, and market impacts for the new engine and new vessel markets.

ANNEX 2

Bibliography of Materials for MEPC 59/6/5 Annex 1
(Information Responding to the Criteria in Appendix III to Annex VI)

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