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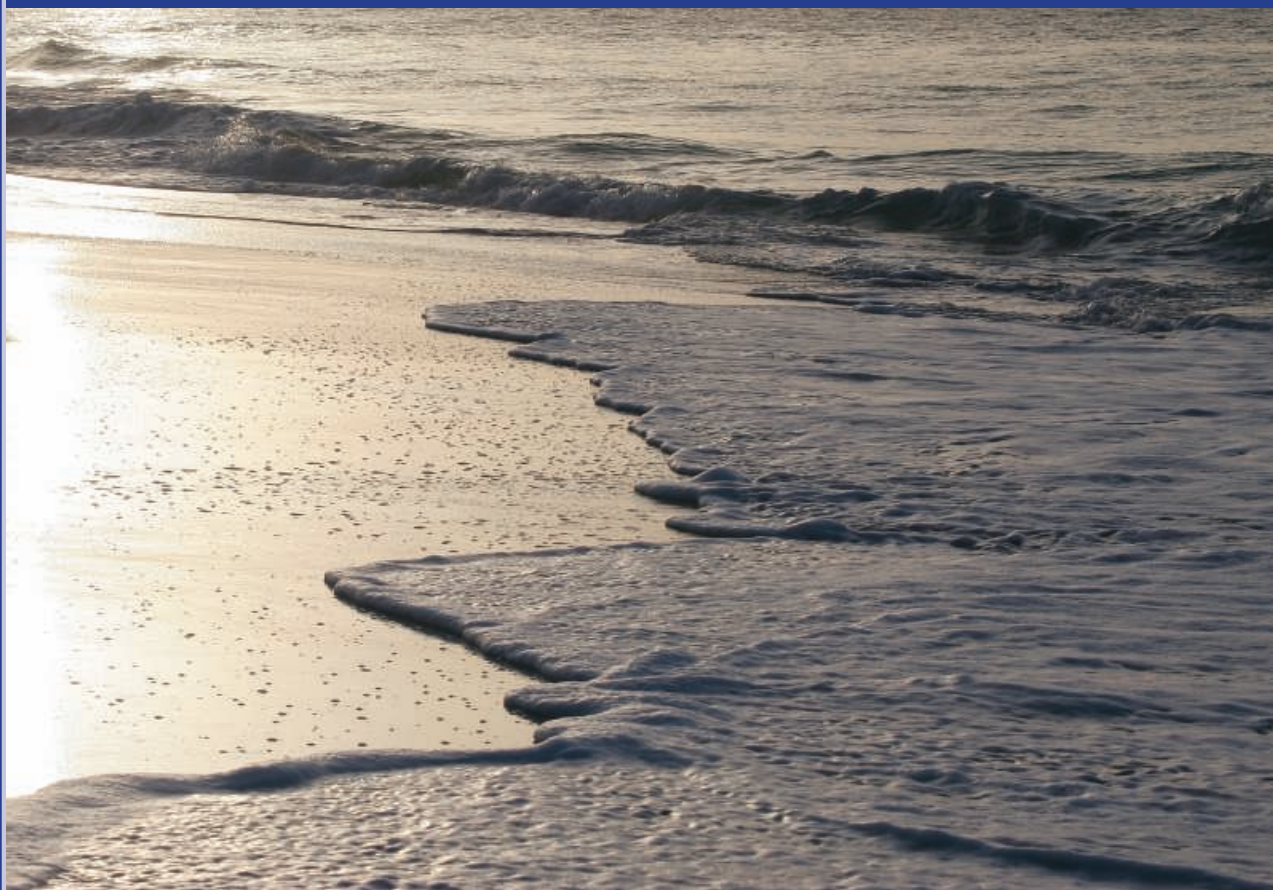
REPORTS AND STUDIES



GESAMP

Joint Group of Experts on the
Scientific Aspects of Marine
Environmental Protection

ESTIMATES OF OIL ENTERING THE MARINE ENVIRONMENT FROM SEA-BASED ACTIVITIES



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IMO FAO UNESCO-IOC WMO UNIDO IAEA UN UNEP

ESTIMATES OF OIL ENTERING THE MARINE ENVIRONMENT FROM SEA-BASED ACTIVITIES

INTERNATIONAL MARITIME ORGANIZATION
London, 2007

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Table of Contents

Preface	iii
Acknowledgements	iii
Members of the Oil Input Working Group (GESAMP WG 32)	iv
EXECUTIVE SUMMARY	v
1 INTRODUCTION	1
1.1 Scope of task	1
1.2 Overview of the report	2
2 METHODS - MAKING ESTIMATES OF OIL ENTERING THE SEA FROM SHIPS AND OTHER SEA-BASED ACTIVITIES	3
2.1 The general approach	3
2.2 Limitations and uncertainties of methodology – inputs from ships	5
2.2.1 Operational discharges – cargo-related.	5
2.2.2 Operational discharges – ship-related (bilge oil and fuel oil sludge)	5
2.2.3 Air pollution from ships	5
2.3 Accidental spillage methodology	5
2.3.1 International Oil Spill Database (IOSD)	5
2.3.2 Estimation factor for smaller spills	7
2.3.3 Application of the small spill estimation factors to the IOSD	8
2.3.4 Average annual input estimation	8
2.3.5 Definition of accidental spillage	9
2.3.6 Regional analysis of accidental spillage data	9
2.4 Produced water discharges	12
2.5 Operational discharges from coastal refineries	12
3 OIL INPUTS FROM SHIPS	13
3.1 Operational discharges – ship-related	13
3.1.1 Introduction	13
3.1.2 Operational engine room wastes and discharges (fuel oil sludge and bilge oil)	13
3.1.3 Oily ballast from fuel tanks	15
3.1.4 Total operational discharges – ship-related: Total amount of oil discharged from engine rooms (all ships)	15
3.1.5 Air emissions - VOCs from tankers – “Volatile Organic Compounds”	15
3.1.6 VOCs from onboard bunkering and engine operations	16
3.2 Operational discharges – cargo-related	17
3.2.1 Introduction	17
3.2.2 Tanker construction and legislation	17
3.2.3 Tanker fleet size	18
3.2.4 Assumptions to the outflow model	18
3.2.4.1 Crude oil tankers	18
3.2.4.2 Product and chemical tankers	19
3.2.5 Distinction between short haul and long haul voyages	19
3.2.6 Voyage frequency	21
3.2.7 Summary of operational discharges – cargo-related	23
3.3 Accidental discharges of oil	24
3.3.1 Accidental spillage from all sea-based activity sources	24
3.3.2 Accidental discharges from ships	27
3.3.2.1 Accidental discharges from tankers	27
3.3.2.2 Accidental discharges from non-tankers	29
3.3.3 Accidental spillage in relation to sea-borne oil trade	30
3.3.4 Regional analysis of accidental spillage data from all sources	32
3.3.5 Sunken vessels	37
3.3.5.1 Merchant vessel casualties	37
3.3.5.2 Military vessel casualties	39

3.4	Dry docking of ships	40
3.4.1	Tankers	40
3.4.2	Other vessels	40
3.5	Recycling of ships	41
3.5.1	Hydraulic oils, lubricating oils and fuels (all ships)	41
3.2.5	Cargo residues/ oil sludge (tankers)	41
3.6	Operational discharges from ships operating under sovereign immunity	42
3.7	Deliberate discharges of oil to save life at sea	42
4	EXPLORATION AND PRODUCTION IN THE OFFSHORE	43
4.1	Introduction	43
4.2	Operational discharges from offshore installations	43
4.2.1	Machinery space discharges	43
4.2.2	Drilling discharges	44
4.2.3	Produced water discharges	44
4.2.4	Air emissions (Non-methane volatile organic compounds or VOCs)	46
4.3	Accidental discharges from exploration and production activities	46
4.4	Pipelines	47
4.4.1	Operational discharges	47
4.4.2	Accidental releases from pipelines	47
4.5	Offshore exploration and production - Summary	47
5	OTHER INPUTS OF OIL INTO THE SEA FROM SEA-BASED ACTIVITIES AND RELATED TOPICS	48
5.1	Coastal refineries, oil storage facilities and marine terminals	48
5.1.1	Operational oil inputs from coastal refineries	48
5.1.2	Accidental releases from coastal facilities	48
5.2	Reception facilities	48
5.3	Oil in waste materials dumped at sea	55
5.4	Fuel dumps from aircraft	55
5.5	Small craft activity	55
5.5.1	Outboard engines	55
5.5.2	Inboard engines	56
5.5.3	Small craft activity: Overview	57
5.6	Natural oil seeps	57
5.7	Rocket launches	58
5.8	Tar distributions and their significance regarding inputs from ships	58
5.9	Oil inputs from unidentified point sources	59
6	SUMMARY AND CONCLUSIONS	60
6.1	Summary	60
6.2	Data and information needs	63
7	RECOMMENDATIONS	64
8	BIBLIOGRAPHY	65
ANNEX	Glossary and Acronyms	76
	List of Figures	82
	List of Tables	83

Preface

Spilled oil from sea-based activities continues to be a marine pollutant in coastal and offshore waters. This is despite many successful regulatory initiatives at international and national levels, and the considerable efforts that are being made by the oil and shipping industries to reduce the number of accidents and to reuse, recycle and filter oily wastes aboard ships. This study develops a methodology and presents updated estimates of global inputs of oil, as defined under the MARPOL 73/78 Convention, that originate from shipping and other sea-based activities.

The report addresses the methods that can be used for making such estimates of input and the difficulties and uncertainties involved. Ship-based activities are the primary focus. These activities include ships, offshore oil and gas exploration and production, and the onshore facilities related to both operations, including refineries and all associated infrastructures. Estimation of operational ship inputs, both cargo and ship related, was a primary focal point of this study and required knowledge of vessel types and structures, operations, the oil trade, and MARPOL 73/78 regulations. Data on other inputs were obtained from many sources, published and unpublished. Considerable effort has been made to assemble data and conduct trend analysis of accidental spills from ships and other sea-based activities, from the late 1960s onwards.

Some other important input topics are briefly presented. These include volatile organic compounds (VOC) emissions from shipping, inputs from sunken vessels (casualties), inputs from recreational boating, and oil seeps. These help to supplement the picture of inputs from sea-based activities. Inputs from VOC emissions and recreational boating may be very substantial, but methods for making global estimates are very uncertain. Pelagic and littoral tar is discussed as tar is found on beaches worldwide and can be a monitor of shipping discharges.

The Working Group strived to identify all sources of oil from ships and sea-based activities, to reach reasonable estimates of current annual inputs to the oceans from these sources, and to point out areas of uncertainty. The input values are estimates, from both calculations and measurements. With the exception of data on accidental discharges, most estimates lack ranges or confidence limits, i.e. measures of variability. The greatest value of the presented input numbers, therefore, is that they give a picture of relative inputs from the different global ship and sea-based sources and they point to input sources requiring additional research, monitoring, assessment, regulatory and industry attention. The study presents recommendations for improving our ability to provide oil input estimates, a knowledge of which will ultimately contribute to global marine environmental protection related to sea-based activities.

Acknowledgments

This study was conducted by the GESAMP Oil Inputs Working Group, the members of which are listed below. The Group is very grateful to the many persons providing data and information for this study. Funding for this work came from IMO. Other agencies (IAITO, ITOFF, Environment Canada, and E&P Forum) supported some of the working group members. The Cutter Information Corp., USA, provided one of the primary data bases, but disclaims all warranties as to the accuracy, completeness or adequacy of the information provided to IMO, and has no liability for damages resulting in the use of this data. GESAMP members reviewed the report on several occasions from 1999-2003; they are thanked for these special efforts. The report was technically reviewed by J. N. Butler (USA), M. Fingas (Canada), T. Gunner (Norway), S. Hara (Japan), K. Kvenvolden (USA), R. Law (UK), J. Payne (Canada), J. Phinney (USA), R. Pond (USA), J. A. Sanchez Cabeza (Spain), K. Skjolsvik (Norway), D. Walker (USA), and F. Wiese (Canada), whom the Group thanks immensely for their special efforts.

The Working Group received considerable support from Dr. Manfred Nauke, IMO (retired), and Mr. René Coenen, Marine Environment Division, IMO, who in their capacity as technical secretaries of GESAMP graciously and efficiently assisted the study. At IMO, Ms. Jennie Hallett assisted the working group at its early meetings, and Ms. Jennifer Francis greatly assisted with the co-ordination of the technical reviews and preparation of the final manuscript. The report was revised and edited through several drafts by Dr. P. G. Wells, Chair of the Working Group, who accepts responsibility for any errors or omissions that remain. The Group and IMO solicit comments from the reader on any aspect of this topic.

"There must be a beginning of any great matter, but the continuing unto the end until it be thoroughly finished yields the great glory."

Sir Francis Drake

Dedication

This report is dedicated to Dr. Manfred Nauke, recently retired from the Marine Environment Division, IMO, and the GESAMP Secretariat. Dr. Nauke provided leadership, inspiration, knowledge and support for many GESAMP working groups and their members over many years, and was instrumental at initiating the Oil Inputs Working Group. He symbolizes the excellence of individual marine professionals who, through extraordinary commitment and efforts throughout their careers, contribute substantially to the protection and conservation of the global seas and their living resources for present and future generations.

Members of the Oil Input Working Group (GESAMP WG 32)

Dr. Peter G. Wells (Chairman)

Ecosystem Science and Information Division
Canadian Wildlife Service
Environmental Conservation Branch
Environment Canada
45 Alderney Drive
Dartmouth, Nova Scotia
Canada B2Y 2N6
Tel: +1 902 426 1426
Fax: +1 902 426 6434
Email: peter.wells@ec.gc.ca

Mr. John Campbell

Technical Director, International Association of
Oil and Gas Producers
25-28 Old Burlington Street
London W1X 1LB
United Kingdom
Tel: +44 (0)20 7292 0603
Fax: +44 (0)20 7434 3721
Email: john.campbell@ogp.org.uk

Ms. Dagmar Schmidt Etkin

Environmental Research Consulting
41 Croft Lane, Cortlandt Manor
NY10567-1160
USA
Tel: +1 914 734 7511
Fax: +1 914 734 2256
Email: etkin@environmental-research.com

Dr. John S. Gray¹

Biology Institute, University of Oslo
P.B. 1064, N-0316 Blindern
Norway
Tel: +47 228 54510
Fax: +47 228 54438
Email: j.s.gray@bio.uio.no

Ms. Catherine Grey²

The International Tanker Owners Pollution
Federation Limited (ITOPF)
Staple Hall, Stonehouse Court
89-90 Houndsditch
London EC3A 7AX
United Kingdom
Tel: +44 (0)207 621 1255
Fax: +44 (0)207 621 1783
Email: central@itopf.com

Dr. Paul Johnston

Greenpeace Research Laboratories
Department of Biological Sciences
University of Exeter
Prince of Wales Road
Exeter EX4 4PS
United Kingdom
Tel: +44 (0)1392 413019
Fax: +44 (0)1392 423635
Email: p.Johnston@exeter.ac.uk

Mr. Jens Koefoed

Bdoey Ale 11
0257 Oslo 2
Norway
Tel: +47 22 454500
Fax: +47 22 454780
Email: koefoed@sjofartsdir.dep.no

Mr. T.A. Meyer³

The International Association of Independent
Tanker Owners
Baltic Exchange
38 St. Mary Axe
London EC3A 8BH
United Kingdom
Tel: +44 (0)207 623 4311
Fax: +44 (0)207 626 7078
Email: Trygve@grobu26.demon.co.uk

Mr. Fionn C. Molloy⁴

The International Tanker Owners Pollution
Federation Limited (ITOPF)
Staple Hall, Stonehouse Court
87-90 Houndsditch
London EC3A 7AX
United Kingdom
Tel: +44 (0)207 621 1255
Fax: +44 (0)207 621 1783
Email: fionnmolloy@itopf.com

Mr. Tim Wilkins⁵

The International Association of Independent
Tanker Owners
St. Clare House
30-33 Minories
London EC3N 1DD
United Kingdom
Tel: +44 (0)207 977 7016
Fax: +44 (0)207 977 7011
Email: tim.wilkins@intertanko.com

IMO Technical Secretaries of GESAMP

Dr. Manfred Nauke

(sessions 1 to 4 of Working Group)

Mr. René Coenen

(sessions 5 and 6 of Working Group)

Marine Environment Division
International Maritime Organization
4 Albert Embankment
London SE1 7SR
United Kingdom
Tel: +44 (0)207 587 3239
Fax: +44 (0)207 587 3210
Email: rcoenen@imo.org

¹ Attended Working Group Meeting 3 only.

² Attended Working Group Meetings 1 and 2 only.

³ Attended Working Group Meetings 1 to 3.

⁴ Participated in Working Group Meetings 4, 5 and 6.

⁵ Participated In Working Group Meetings 4, 5 and 6.

EXECUTIVE SUMMARY

1 Introduction

ES-1 As part of the global effort to reduce oil inputs into the marine environment from ships and other sea-based activities, an independent detailed assessment of inputs from the various sources is periodically required. This has been conducted previously (GESAMP 1976, 1993; MEPC 1990; The National Research Council of USA, NRC 1975, 1985, 2003; amongst others). In the late 1990s, the Marine Environment Protection Committee (MEPC) of IMO requested GESAMP to evaluate carefully all available data sources on oil inputs into the marine environment from sea-based activities (i.e. maritime transportation, offshore exploration and production), and particularly to develop approaches that might be used for the provision of such input data. Hence, the terms of reference of the GESAMP Oil Input Working Group were to estimate current annual amounts of oil entering the marine environment from sea-based activities, and to focus particularly on improving the methodology of making such estimates. This report addresses both inputs and methodologies for making estimates, and places the various types of oil source inputs from ships and ship-related activities into perspective. The report covers four areas: approaches to making estimates of oil inputs, oil inputs from ships, oil inputs from offshore exploration and production, and other oil inputs and related topics.

2 Approaches to making estimates of oil inputs into the sea

ES-2 Obtaining reliable and up-to-date data on quantities of oil entering the marine environment from all of the different ship and other sea-based sources is not a simple task. Some inputs have to be calculated (i.e. operational inputs from ships). Few countries have reliable databases, thus this report relies heavily on spill and other input data available for the North Sea and for North American waters. Data on inputs are lacking or are inaccessible from key areas such as the Middle East, South America (e.g. Brazil), West Africa and South-East Asia. It is

the specialization with regard to vessel type, function, performance and regulatory requirements. Hence, different methodologies from both the original 1990 Report (MEPC 1990) and between the various sources of oil discharge from ships have been used in the current report. Inputs of bilge oil and fuel oil sludge are the most extensively evaluated sources.

ES-4 Much of the data used in the analysis of spillage from all point sources, including vessels, pipelines, facilities, and offshore exploration and production activities, were derived from records in the International Oil Spill Database (IOSD) of Cutter Information Corp., and records in the databases of Environmental Research Consulting (ERC), USA. Each of the databases has extensive information on individual spill incidents. This includes information on spill date, location, source type, source name, and the amount and type of oil spilled. Data on spill incidents in the IOSD and ERC databases, as well as other compiled data on which these databases rely, are collected from a large number of reputable sources on an international basis e.g. the ITOFF Tanker spills database and personal contacts. Due to the nature of the data collection process, discrepancies and inaccuracies exist in these databases and original data sources. Since the IOSD contains no verified information on oil spills below 34 tonnes and the ERC databases contain incomplete information on oil spills in this smaller range, a "small spill estimation factor" was calculated for both the number of spills and the amount of oil spilled in incidents involving less than 34 tonnes.

ES-5 Estimates for oil inputs from produced water at offshore wells and from refineries near-shore were based on extrapolations from best available data and assumptions on compliance with existing regulations and guidelines.

ES-6 Sources of data and information on oil discharges from ships and boats are extensive in the published literature, but uneven in detail and quality.

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