HANDBOOK 2013/14

ITOPF

Cover photo: A vessel's hull reflected in oily waters, Turkey

In the Event of a Spill of Oil or Hazardous and Noxious Substance (chemical)

Emergency Contact – Business Hours

Please use ITOPF's office telephone number:

+44 (0)20 7566 6999

Emergency Contact – Outside Normal Office Hours

+44 (0)7623 984 606

We are aware that there have been difficulties using our 24hr emergency pager number from some countries. An alternative number to try if this should occur is: **+44 (0)20 7566 6998**. These numbers are linked to a message paging system. Callers should therefore be ready to leave their name, contact number and a brief message. The member of the ITOPF technical staff who is on duty will return the call and will require as much of the following information as possible:

Essential Information

- Contact details of the person reporting the incident
- Name of vessel and owner
- Date and time of the incident (specifying local time or GMT/UTC)
- Position (eg latitude and longitude or distance and direction from the nearest port or landmark)
- Cause of the incident (eg collision, grounding, explosion, fire, etc) and nature of damage
- Description and quantity of cargo and bunker fuel on board
- Estimate of the quantity spilt or likelihood of spillage
- Name of the cargo owner
- Action, both taken and intended (and by whom), to combat pollution
- Status of the vessel and any planned salvage activities

Additional Useful Information

- Weather and sea conditions, wind speed and direction
- Length, breadth and appearance of any slicks or plumes, including direction of movement
- Type of resources that may be at risk (eg fisheries or residential areas)
- Distribution of cargo and bunkers and location relative to damage

Oil

- Density, viscosity, pour point, distillation characteristics, wax & asphaltene content

HNS Chemicals

- State – solid, liquid, gas, bulk, packaged
- UN or CAS number, MSDS, cargo manifest

Contents

ITOPF Directors

Mr B Moller	Teekay Corporation (Chairman)
Dr K J Purnell	ITOPF Ltd (Managing Director)
Mr M Al-Gusaier	Vela International Marine Ltd
Mr J Buono	ExxonMobil, SeaRiver Maritime Inc
Ms S Burgess	Gard (UK) Ltd
Mr B Chiu	BW Maritime Pte Ltd
Mr P J Goulandris	Triandros Corporation
Mr E Hånell	Stena Bulk AB
Dr G Henderson	Shell International Trading & Shipping Co Ltd
Mr D C C Koo	Valles Steamship Company Limited
Mr D R Kurz	Keystone Shipping Corporation
Mr M Martecchini	Stolt-Nielsen Transportation Group BV
Mr D Mei	China Shipping Development Co Ltd
Mr H Nagasawa	NYK Line
Mr E A Neto	Transpetro
Mr N Ohsumi	Japan Shipowners Mutual P&I Association
Mr S Popravko	Sovcomflot
Mr D J Ridgway	BP Shipping Ltd
Mr P Rodgers	Euronav
Mr M H Ross	Chevron Shipping Company LLC
Mr N H Schües	F Laeisz GmbH
Mr B Sheth	Great Eastern Shipping Company Ltd
Ms H Sørensen	Maersk Tankers
Mr H Takahashi	JX Tanker Company Ltd
Mr C Trappe	North of England P&I Association
Mr C Williams	Steamship Insurance Management Services Ltd

An Introduction to ITOPF

Over the past 45 years ITOPF's technical staff have responded to almost 700 ship-source spills in 97 countries in order to give objective advice on clean-up measures, environmental and economic effects, and compensation. While many of these spills involved crude oil spilt from tankers, ITOPF staff are regularly called upon to respond to spills of bunker fuel, chemicals and bulk cargoes from all types of ship. Advice is also occasionally given in relation to oil spills from pipelines and offshore installations, and physical damage to coral reefs resulting from ship groundings.

The first-hand experience gained by ITOPF staff through direct involvement in pollution incidents is put to good use during damage assessment, contingency planning and training assignments, as well as in the production of technical publications.

ITOPF is a not-for-profit organisation. Over 90 percent of our income comes from subscriptions paid by P&I insurers on behalf of their shipowner members, who they enrol in ITOPF as either Members or Associates. This gives them access to the Federation's full range of technical and information services, usually at no cost.

ITOPF's Membership comprises over 6,300 tanker owners and bareboat charterers, who between them own or operate about 10,900 tankers, barges and combination carriers with a total gross tonnage of about 338 million GT. This represents virtually all the world's bulk oil, chemical and gas carrier tonnage and so it is extremely rare for the owner of any such ship engaged in international trade not to be a Member of ITOPF.

Associates comprise the owners and bareboat charterers of all other types of ship, currently totalling almost 658 million GT. This reflects ITOPF's increasingly important role in recent years in responding to bunker spills from non-tankers.

ITOPF's activities are overseen by an international Board of Directors representing the Federation's independent and oil company tanker owner Members, its Associates and P&I insurers. The names of the current Directors appear on the previous page.

Since its establishment in 1968, ITOPF has evolved into the maritime industry's primary source of objective technical advice, expertise and information on effective response to ship-source pollution. ITOPF has observer status at both the International Maritime Organization (IMO) and the International Oil Pollution Compensation Funds (IOPC Funds) and it regularly contributes to discussions on matters relating to ship-source pollution.

Staffing

Managing Director

Dr Karen Purnell is a chartered chemist and a member of the Royal Society of Chemistry. Prior to joining ITOPF in 1994 she was a project manager involved in nuclear/toxic waste management and environmental remediation. She was appointed Managing Director in May 2009.

Technical Director

Richard Johnson is a marine biologist and holds a master's degree in radiation and environmental protection. His previous employment included investigation of fallout from the Chernobyl accident and assessing radioactive contamination of the marine environment. He joined ITOPF in 1994.

Support & Development Director

Dr Tim Lunel is an organic chemist with a PhD in Oceanography from Cambridge. He has worked on research in marine oil and chemical spills, including the BRAER and SEA EMPRESS spills. He joined ITOPF in 2012, bringing the skills he has acquired from his MBA and his experience of director roles in private, public and not-for-profit sectors.

Technical Team Managers

Dr Michael O'Brien is a natural resource economist. Prior to joining ITOPF in 2001 he worked in the USA for the NOAA Damage Assessment Center. Before that he was an Assistant Professor for Environmental Economics at the University of Innsbruck, Austria.

Dr Franck Laruelle is a marine biologist and before joining ITOPF in 2006 worked with the French research organisation CEDRE. He acted as a technical adviser on behalf of the French government in a number of spills, including ERIKA and PRESTIGE.

Alex Hunt is a marine biologist with a master's degree in tropical coastal management. Prior to joining ITOPF in 2004 he worked as a project coordinator and researcher on marine habitat mapping and coral reef damage assessment programmes in the Indo-Pacific and Wider Caribbean regions.

Senior Technical Advisers

Colleen O'Hagan has a degree in geophysics and a master's degree in remote sensing and image processing. She joined ITOPF in 2004 and was promoted to Senior Technical Adviser in 2010.

Dr Mark Whittington is a marine biologist with a background in fisheries, aquaculture and environmental monitoring. Prior to joining ITOPF in 2007, he worked in marine consultancy in the UK and on coastal zone management projects in East Africa and the Middle East.

Kelly Reynolds has a degree in maritime environmental management and a master's degree in coastal zone management. Before joining ITOPF in 2008, she worked for the UK Maritime and Coastguard Agency in the Counter Pollution Response Branch.

Technical Advisers

Dr Henk Renken is a marine ecologist and has a master's degree in tropical coastal management. Before joining ITOPF in 2009 he worked as a project manager for the Bonaire National Marine Park and as a consultant on coastal/marine conservation projects in Sri Lanka and Vietnam with a focus on mangroves, coral reefs and seagrasses.

Dr Rebecca Coward has a degree in marine environmental science and conducted research and development into non polluting antifouling technology as a postgraduate. Prior to joining ITOPF in 2010, she was involved in pollution tracing, identification and remediation of watercourses on behalf of Thames Water.

Dr Annabelle Nicolas-Kopec earned her doctorate in organic chemistry in 2010. She has postgraduate research experience in cell biology, computer modelling and synthetic chemistry. She also has a master's degree in chemical engineering. She joined ITOPF in 2011.

Dr Nicola Beer is a marine ecologist who has previously worked in the UK, New Zealand and the Caribbean. She has experience in environmental impact assessment in relation to marine aggregate extraction and fisheries characterisation and monitoring. She joined ITOPF in 2011.

Miguel Patel has a degree in zoology and a master's degree in environmental management. He has research experience in ecotoxicology, population dynamics and habitat restoration and joined ITOPF in 2011.

Dr Joe Green has a degree in marine geography and researched the reuse of oil from marine spill incidents for his PhD. He has experience in coastal and offshore biological and hydrographic survey techniques and has taught and lectured in the UK and overseas. Prior to joining ITOPF in 2012, he worked at Natural England as a statutory adviser to the English Government on marine and coastal nature conservation.

Dr Ann Zhang is an environmental scientist. She holds a master's degree in environmental engineering and a doctorate in energy storage systems. Prior to joining ITOPF in 2012, she worked as a research scientist in the field of environmental toxicity of nano-particles.

Nicky Cariglia has a master's degree in tropical coastal management and has experience in the design, implementation and analysis of environmental and fisheries monitoring programmes. She joined ITOPF in 2012 from an international natural resources consultancy.

Technical Support Manager

Tim Wadsworth has degrees in engineering and law and joined ITOPF in 1991. He became Technical Support Manager in 2006 and is responsible for ITOPF's technical support functions, including the assessment of claims.

Senior Technical Support Co-ordinator

Lisa Stevens has a degree in physics with satellite technology. Before joining ITOPF in 2006, she worked at a defence and technology company on their satellite programme and information mapping service. Her responsibilities include maintaining ITOPF's databases, intranet and GIS.

Technical Support Co-ordinators

Susannah Musk has a degree in marine biology and coastal ecology and a background in dangerous goods insurance. Before joining ITOPF in 2009 she investigated the effects of tourism upon dolphin behaviour in Bali, Indonesia. Her responsibilities at ITOPF include maintaining the oil spill database, statistics and claims assessment.

Iain Harrison has a master's degree in law and environmental science. He has previously worked as an environmental consultant and an underwriter. He joined ITOPF in 2010 and his duties include claims assessment and other project work.

China Liaison Officer

Rose Ying has a degree in English and a background in business development, marketing and liaison. She has worked for the British, Australian and Swedish Consulates in Shanghai and began working for ITOPF in 2012. Rose is based in Shanghai where she is responsible for raising awareness of ITOPF's technical services and developing working relations in China.

Information Officer

Deborah Ansell has an MA in librarianship and joined ITOPF in 1996 from the Institute of Petroleum Library. She is responsible for maintaining ITOPF's extensive library of technical publications, the website and the Country Profiles.

IT Systems Manager

Chris Pavey joined ITOPF in 2006 as IT Support Technician. He was promoted in 2011 to IT Systems Manager and is responsible for maintaining ITOPF's IT systems.

Finance and Administration Manager

Amanda Howarth has an MBA and joined ITOPF in 2000. She has over 15 years experience of the tanker industry and has worked as Financial Controller for small entities for over 20 years. Her responsibilities at ITOPF include the management of its financial affairs, membership procedures and company administration.

Membership Secretary

Karen Young joined ITOPF in 2008, having previously worked in a membership administration role at the Institute of Marine Engineering, Science and Technology (IMarEST). She is responsible for all matters relating to Membership, including the issuance of Membership Record Forms and liaising with relevant parties.

Finance Officer

Doreen Pounds has over 30 years accounts experience and joined ITOPF in 2001. She is responsible for ITOPF's accounting transactions, including the collection of Membership and Associate dues.

Finance Assistant

Chee-Ming Chung has a higher national diploma in business and finance and 15 years accounts experience across a variety of sectors. He joined ITOPF in 2012 and provides administrative support for ITOPF's financial activities.

Administration and Personnel Assistant

Carol Remnant joined ITOPF in 2001. She is an Associate Member of the Chartered Institute of Personnel and Development, with many years practical human resources experience. She is responsible for all ITOPF's personnel related issues, as well as additional administrative tasks.

Secretary to the Technical Director

Jayne Foster has a BA Honours in design and has had experience of running a family business. She is a previous employee of ITOPF and rejoined the team in 2012. Jayne is secretary to the Technical Director and provides administrative support to the technical team including travel duties.

Secretary to the Support & Development Director

Carla Smith has a background in business studies and previously worked for a consultancy firm as PA to the directors before joining ITOPF in 2009. Her main duties involve providing secretarial support to the Support & Development Director and his team.

Receptionist/Secretary to the Managing Director

Terry Goodchild worked for a market research company prior to joining ITOPF in 2002. As well as acting as Receptionist, she is the Managing Director's Secretary, undertakes general clerical duties and is responsible for the distribution of ITOPF's publications.

Technical Services

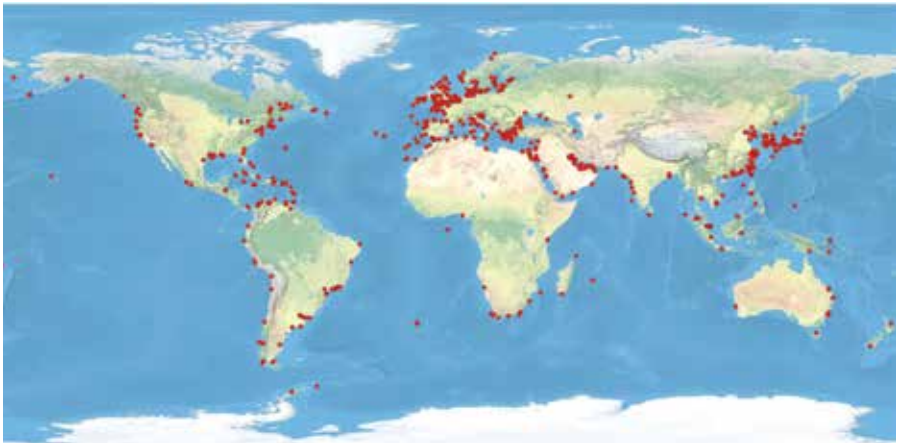
Response to Marine Spills

Responding to ship-source spills of oil or chemicals is ITOPF's priority service and is normally performed, without charge, at the request of one of its Members or Associates and their P&I insurers. The IOPC Funds also usually call on ITOPF's technical services for oil spills with which they are involved.

ITOPF's first task on being advised of a new spill is to evaluate the probable behaviour, fate and impact of the oil or chemical, and the local capability to organise an effective clean-up response.

At the same time as the details listed on page 1 are being sought from external sources, ITOPF's staff will be referring to internal information on environmental and economic resources likely to be at risk in the affected country, as well as on the national arrangements for spill response. This and other relevant information is summarised in the appropriate Country Profile, the complete series of which can be found on ITOPF's website. This is also the source of other relevant information, for example, on the applicable liability and compensation regime.

Internal databases on the availability of clean-up equipment and materials, local surveyors and other experts will also be consulted and guidance sought from ITOPF's experience of previous spills in the same region. If the evaluation of the spill indicates that it is likely to pose a serious threat to sensitive resources, a member of ITOPF's technical staff is likely be asked to attend on-site immediately.



Spills attended by ITOPF staff, 1970-2012

The role of the ITOPF technical adviser at the site of a spill varies according to the circumstances but is always advisory. It normally includes one or more of the following activities:

- advising and assisting all parties on the most appropriate clean-up response, with the aim of mitigating any damage;
- helping secure equipment and organise the clean-up when there is a need to supplement the local response capability;
- monitoring the clean-up, in order to provide subsequent reports of events and of the technical merit of actions in relation to claims for compensation;
- investigating any damage to the environment and to coastal resources such as fisheries and mariculture.

In all cases the aim is to co-operate and work closely with all parties involved in a spill, and to reach agreement on measures that are technically justified in the particular circumstances. This not only helps ensure that the clean-up is as effective as possible and that damage is minimised, but also that subsequent claims for compensation can be dealt with promptly and amicably.

Damage Assessment and Claims Analysis

Assessment of the technical merits of claims for compensation is a natural extension of ITOPF's on-site attendance at the time of a spill. It usually involves assessing the reasonableness of clean-up costs and the merits of claims for damage to economic resources. The assessment of damage to fisheries – especially mariculture facilities – is a particular area of specialisation which often requires the detailed analysis of complex claims, frequently in conjunction with other specialists who have in-depth knowledge of the affected area and the economics of its particular fisheries.

ITOPF's advice is also sought regularly on environmental damage caused by spills, and on the feasibility and technical justification of proposed restoration measures designed to enhance natural recovery.

ITOPF's role in damage assessment and claims analysis is limited to providing advice on the technical merit of claims. The final decision on settling any claim rests with those who will pay the actual compensation, usually a P&I insurer and/or the IOPC Funds.

Contingency Planning and Advisory Work

A major spill of oil or chemicals presents those in charge with a range of complex problems and prompt decisions are needed if an effective response is to be mounted. There is a greater likelihood that this will happen if effort has been devoted beforehand to the preparation of a contingency plan that is both comprehensive and realistic.

Using their extensive practical experience of spill response around the world, ITOPF's staff often advise governments, industry, international agencies and other organisations on the preparation of contingency plans and related matters.

Training and Education

Regular training is vital if personnel are to implement a contingency plan effectively. ITOPF organises and participates in numerous training courses and seminars for government and industry personnel around the world, and frequently assists with spill drills and exercises conducted by shipowners and other groups.

Information Services

www.itopf.com

ITOPF's website contains background information on ITOPF and news of current activities, as well as technical advice on spills of oil and chemicals. The website provides access to ITOPF's publications, GIS and oil spill statistics.

Publications

ITOPF produces a wide range of technical publications and papers. These are designed to keep Members, Associates and others around the world in touch with developments in spill preparedness, response and compensation. A list of publications can be found on pages 14 and 15.

Library

To support its technical services, ITOPF maintains an extensive library of publications and information on clean-up techniques, effects and other related issues. Visitors are welcome by appointment.

Databases

Since 1970, ITOPF has maintained a worldwide database of accidental oil spills from tankers, combined carriers and barges. This is probably the most comprehensive of its kind and allows long term trends to be analysed (see pages 16 and 17 for details).

Country Profiles

A series of Country Profiles, summarising the spill response arrangements and clean-up resources in some 160 maritime states, are freely available on ITOPF's website. Each Country Profile contains information on the spill notification point, command structures for at-sea and on-shore response, the availability of government- and privately-owned equipment, past spills, HNS response and preparedness (where available) and the status of relevant international conventions.

GIS

The Oil Spills Database and Country Profiles can be displayed on ITOPF's Geographic Information System (GIS) accessed via the website. This also displays tanker traffic and cargo volume routing data, as well as the status of relevant conventions.

Publications

Technical Services Brochure

A 6 page brochure published in 2012 providing an introduction to ITOPF and the technical services it provides. Contact terrygoodchild@itopf.com for a hard copy or download a PDF from ITOPF's website.

Technical Information Papers

ITOPF's Technical Information Papers (TIPs) cover a specific topic in a concise manner (8-20 pages), illustrated by colour photographs and diagrams. The series was updated and expanded in 2012 to reflect technological advances and ITOPF's more recent collective experience on a wide range of marine pollution topics. The TIPs are also being made available in other languages.

1. Aerial observation of marine oil spills
2. Fate of marine oil spills
3. Use of booms in oil pollution response
4. Use of dispersants to treat oil spills
5. Use of skimmers in oil pollution response
6. Recognition of oil on shorelines
7. Clean-up of oil from shorelines
8. Use of sorbent materials in oil spill response
9. Disposal of oil and debris
10. Leadership, command & management of oil spills
11. Effects of oil pollution on fisheries and mariculture
12. Effects of oil pollution on social and economic activities
13. Effects of oil pollution on the marine environment
14. Sampling and monitoring of marine oil spills
15. Preparation and submission of claims from oil pollution
16. Contingency planning for marine oil spills
17. Response to marine chemical incidents

One set is available free of charge. Additional TIPs are charged at £1 per paper (ie £17 per set) plus postage. If more than 10 sets are ordered, the cost reduces to £12 per set plus postage, contact terrygoodchild@itopf.com. The TIPs are also available to download from ITOPF's website.

Response to Marine Oil Spills

Updated in 2012, this book provides a comprehensive review of the problems posed by marine oil spills and available response measures. Available as a hardback or e-book, priced £95 from:

Witherby Seamanship Internaitonal
4 Dunlop Square, Livingston,
Edinburgh EH54 8SB
Tel: +44(0) 1506 463 227
Fax: +44(0) 1506 468 999
Web: www.witherbyseamanship.com
E-Mail: info@emailws.com

Oil Tanker Spill Statistics

An annual publication providing data on accidental oil spills from tankers, combined carriers and barges since 1970, derived from ITOPF's database. Hard copies are available free of charge, contact terrygoodchild@itopf.com, or download a PDF from ITOPF's website.

Oil Spill Compensation

The joint ITOPF/IPIECA briefing guide on the International Conventions on Liability and Compensation for Oil Pollution Damage provides a summary of the fundamental features of the Conventions and comprises an explanatory text and a series of answers to frequently asked questions. Copies can be downloaded from the IPIECA website (www.ipieca.org).

The ERIKA – DVD

ITOPF assisted in the production of this 30-minute film, which provides a graphic account of this major oil spill off France in December 1999, including the clean-up operations and the mechanisms for compensating those whose livelihoods were affected. Copies are available at a cost of £10.00 from Steamship Mutual Underwriting Association Ltd:

Tel: +44 (0) 20 7247 5490
Web: www.simsl.com/publications/publications.html

The Real Story – the Environmental Impact of the BRAER – video

A 30-minute video, produced by the Marine Laboratory in Scotland, which summarises the main findings of the scientific studies into the impact of this major oil spill in Shetland in January 1993.

Available from ITOPF at £10.00 in PAL and NTSC versions.

Ocean Orbit

ITOPF's newsletter with news on its activities and reports and articles on developments concerning spill preparedness, response, effects and compensation. To be added to ITOPF's mailing list for hard or electronic copies, contact terrygoodchild@itopf.com.

Annual Review

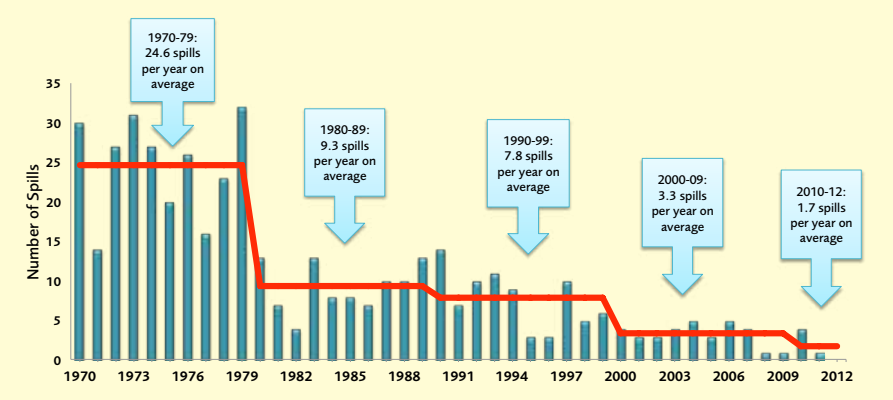
A review of ITOPF's activities during the previous 12 months, including the Directors' Report and Accounts.

Oil Spill Statistics

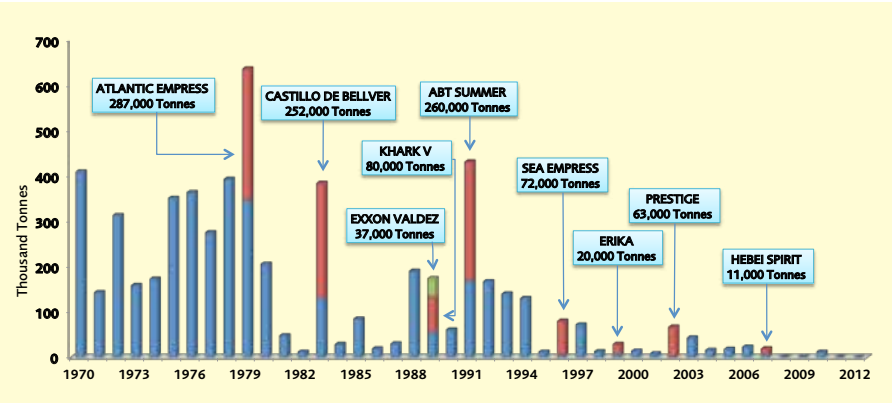
ITOPF's database contains information on approximately 10,000 oil spills from tankers, combined carriers and barges, some 81% of which were less than seven tonnes.

Number and Amounts

The average number of large oil spills (>700 tonnes) during the 2000s was just an eighth of that during the 1970s. This dramatic reduction has been due to the combined efforts of the oil/shipping industry and governments (largely through the IMO) to improve safety and pollution prevention. The total amount of oil spilt each year varies considerably, with a few very large spills



Numbers of large spills (over 700 tonnes), 1970–2012



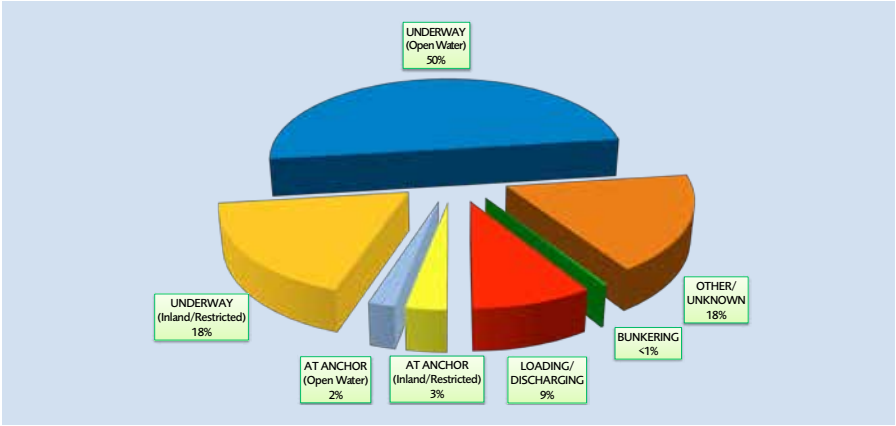
Quantities of oil spilt, 1970–2012

being responsible for a high percentage of the total annual quantity. 2012 was the lowest on record.

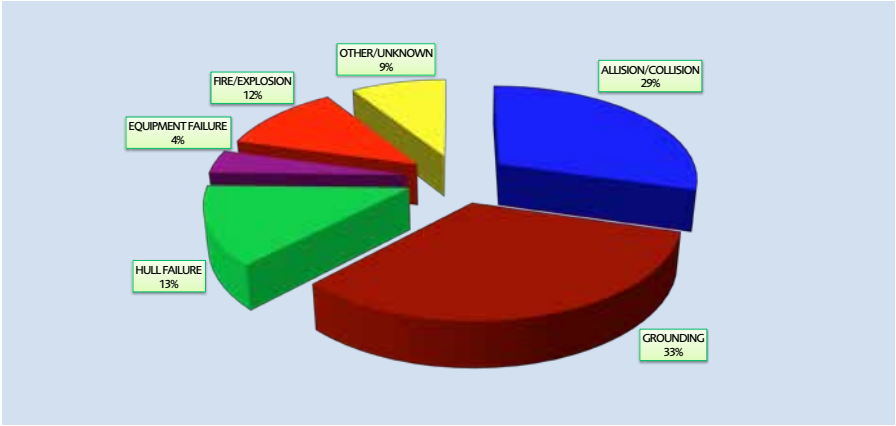
Causes of Spills

Spills of different sizes have been evaluated in terms of the operation taking place at the time and the primary event leading to the spill. During the period 1970-2012, 50% of larger spills (>700 tonnes) occurred while the vessel was underway in open water and 18% while underway in inland or restricted waters. The main causes of larger spills were allisions/collisions (29%) and groundings (33%). Other significant causes include hull failures and fire/explosion.

More detailed information is available on the ITOPF website.



Operation at time of incident for large spills (>700 tonnes), 1970–2012



Causes of large spills (>700 tonnes), 1970–2012

Fate of Marine Oil Spills

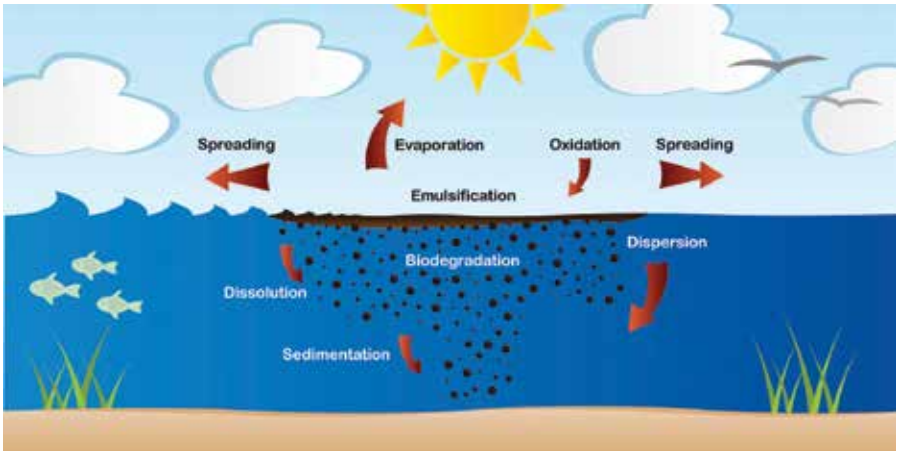
When oil is spilt at sea it spreads and moves on the surface while undergoing a number of chemical and physical changes, collectively termed weathering. The diagram below represents schematically the different processes involved.

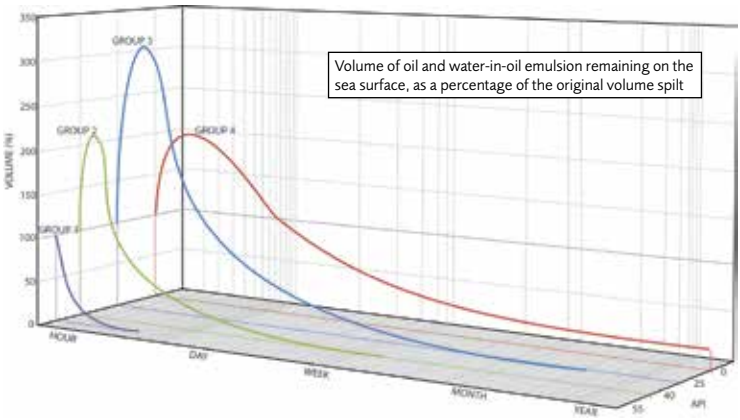
Weathering Processes

Most of the processes, such as evaporation, dispersion, dissolution and sedimentation, lead to the disappearance of oil from the surface of the sea, whereas others, particularly the formation of water-in-oil emulsions ("mousse") and the accompanying increase in viscosity, promote its persistence. The speed and relative importance of the processes depend on factors such as the quantity and type of oil, the prevailing weather and sea conditions, and whether the oil remains at sea or is washed ashore. Ultimately, the marine environment eliminates spilt oil through the long-term process of biodegradation.

Persistence of Oil

In considering the fate of spilt oil at sea, a distinction is frequently made between non-persistent oils (which tend to disappear rapidly from the sea surface) and persistent oils (which, in contrast, dissipate more slowly and usually require a clean-up response). The definition of a non-persistent oil developed in relation to compensation is given on page 36. However, this definition is based on distillation characteristics of oils under standard laboratory conditions. It may not, therefore, fully reflect the behaviour of an oil in the environment, where factors such as burial in sediments can lead to the long-term persistence of oils





that would normally be defined as non-persistent.

Classification of Persistence

The main properties that affect the behaviour of spilt oil at sea are specific gravity (its density relative to pure water – often expressed as °API); distillation characteristics (its volatility); viscosity (its resistance to flow); and pour point (the temperature below which it will not flow).

Since the interactions between the various weathering processes are not well understood, reliance is often placed on empirical models based upon the properties of different oil types. For this purpose, it is convenient to classify the most commonly transported oils into four main groups, roughly according to their specific gravity (see table overleaf). Having classified the oils, the expected rates of dissipation can be predicted. These are shown in the above graph, where account is also taken of the competing process of emulsification which, for most oils, leads to an increase in volume.

Group I oils (non-persistent) tend to dissipate completely through evaporation within a few hours and do not normally form emulsions. Group II and III oils can lose up to 40% by volume through evaporation but, because of their tendency to form viscous emulsions, there is an initial volume increase as well as a curtailment of natural dispersion, particularly in the case of Group III oils. Group IV oils are very persistent due to their lack of volatile material and high viscosity, which precludes both evaporation and dispersion.

It is important to appreciate the assumptions upon which such models are based and not to place too much reliance on the results. However, they can serve as a useful guide to understanding how a particular oil is likely to behave and help in assessing the scale of the problem which a spill might generate.

CLASSIFICATION OF OILS ACCORDING TO THEIR SPECIFIC GRAVITY

Group 1 oils

A: °API > 45 (Specific gravity < 0.8)
B: Pour point °C
C: Viscosity @ 10–20°C: less than 3 CSt
D: % boiling below 200°C: greater than 50%
E: % boiling above 370°C: between 20 and 0%

	A	B	C	D	E
Aasgard	49	-28	2 @ 10°C	58	14
Arabian Super Light	51	-39	2 @ 20°C		
Cossack	48	-18	2 @ 20°C	51	18
Curlew	47	-13	2 @ 20°C	57	17
F3 Condensate	54	<-63	1 @ 10°C	81	0
Gippsland	52	-13	1.5 @ 20°C	63	8
Hidra	52	-62	2.5 @ 10°C	60	11
Terengganu condensate	73	-36	0.5 @ 20°C	>95	0
Wollybutt	49	-53	2@ 20°C	55	4
Gasoline	58		0.5 @ 15°C	100	0
Kerosene	45	-55	2 @ 15°C	50	0
Naptha	55		0.5 @ 15°C	100	0

Group 2 oils

A: °API 35–45 (Specific gravity 0.8–0.85)
B: Pour point °C
C: Viscosity @ 10–20°C: between 4 Cst and semi-solid
D: % boiling below 200°C: between 20 and 50%
E: % boiling above 370°C: between 15 and 50%

Low pour point <6°C	A	B	C	D	E
Arabian Extra Light	38	-30	3 @ 15°C	26	39
Azeri	37	-3	8 @ 20°C	29	46
Brent	38	-3	7 @ 10°C	37	33
Draugen	40	-15	4 @ 20°C	37	32
Dukhan	41	-49	9 @ 15°C	36	33
Liverpool Bay	45	-21	4 @ 20°C	42	28
Sokol (Sakhalin)	37	-27	4 @ 20°C	45	21
Rio Negro	35	-5	23 @ 10°C	29	41
Umm Shaif	37	-24	10 @ 10°C	34	31
Zakum	40	-24	6@ 10°C	36	33
Marine Gas oil (MGO)	37	-3	5 @ 15°C		
High pour point >5°C					
Amna	36	19	Semi–solid	25	30
Beatrice	38	18	32 @ 15°C	25	35
Bintulu	37	19	Semi–solid	24	34
Escravos	34	10	9 @ 15°C	35	15
Sarir	38	24	Semi–solid	24	39
Statfjord	40	6	7 @ 10°C	38	32

Note: High pour point oils only behave as Group 2 at ambient temperatures above their pour point. Below this treat as Group 4 oils.

Group 3 oils

A: °API 17.5–35 (Specific gravity 0.85–0.95)
B: Pour point °C
C: Viscosity @ 10–20°C: between 8 CSt and semi solid
D: % boiling below 200°C: between 10 and 35%
E: % boiling above 370°C: between 30 and 65%

Low pour point <6°C	A	B	C	D	E
Alaska North Slope	28	-18	32 @ 15°C	32	41
Arabian Heavy	28	-40	55 @ 15°C	21	56
Arabian Medium	30	-21	25 @ 15°C	22	51
Arabian Light	33	-40	14 @ 15°C	25	45
Bonny Light	35	-11	25 @ 15°C	26	30
Iranian Heavy	31	-36	25 @ 15°C	24	48
Iranian Light	34	-32	15 @ 15°C	26	43
Khafji	28	-57	80 @ 15°C	21	55
Sirri	33	-12	18 @ 10°C	32	38
Thunder Horse	35	-27	10 @ 10°C	32	39
Tia Juana Light	32	-42	500 @ 15°C	24	45
Troll	33	-9	14 @ 10°C	24	35
IFO 180	18–20	10–30	1,500–3,000 @ 15°C		–
High pour point >5°C					
Cabinda	33	12	Semi–solid	18	56
Coco	32	21	Semi–solid	21	46
Gamba	31	23	Semi–solid	11	54
Mandji	30	9	70 @ 15°C	21	53
Minas	35	18	Semi–solid	15	58

Note: High pour point oils only behave as Group 3 at ambient temperatures above their pour point. Below this treat as Group 4 oils.

Group 4 oils

A: °API <17.5 (Specific gravity >0.95) or
B: Pour point >30°C
C: Viscosity @ 10–20°C: between 1500 CSt and semi-solid
D: % boiling below 200°C: less than 25%
E: % boiling above 370°C: greater than 30%

	A	B	C	D	E
Bachaquero 17	16	-29	5,000 @ 15°C	10	60
Boscan	10	15	Semi –solid	4	80
Cinta	33	43	Semi –solid	10	54
Handil	33	35	Semi –solid	23	33
Merey	17	-21	7,000 @ 15°C	7	70
Nile Blend	34	33	Semi–solid	13	59
Pilon	14	-3	Semi–solid	2	92
Shengli	24	21	Semi–solid	9	70
Taching	31	35	Semi–solid	12	49
Tia Juana Pesado	12	-1	Semi–solid	3	78
Widuri	33	46	Semi–solid	7	70
IFO 380	11–15	10–30	5,000–30,000 @ 15°C		

Example oils classified according to their °API (American Petroleum Institute gravity). Indicative ranges of expected viscosities and distillation characteristics are provided for each group. Generally, when spilt, persistence increases with group number. However, if an oil cools to below its pour point temperature, it will change from a liquid to a semi-solid. This can occur for certain oils irrespective of whether they are classed as Group 2, 3 or 4. The pour points of oils classed as Group 1 are sufficiently low so as not to be a concern in the marine environment.

Oil Spill Clean-up Techniques

Choosing the most appropriate techniques for cleaning up an oil spill is crucial and will depend upon the exact circumstances of an incident. The main techniques are described briefly below. More detailed information can be found in other ITOPF publications (see pages 14 and 15).

A clean-up response is not always necessary. Sometimes the oil will remain offshore, where it will dissipate and eventually degrade naturally without affecting coastal resources or wildlife. In such cases, monitoring the movement and fate of the floating slicks to confirm the predictions may be sufficient. On this basis, some of the largest spills over the last 40 years have not required a clean-up response. In contrast, even a small spill, especially of a very persistent crude or heavy fuel oil, may call for a major response effort, especially if sensitive resources are threatened.

Response at Sea

Booms and Skimmers

The use of booms to contain and concentrate floating oil prior to its recovery by specialised skimmers is often seen as the ideal solution since, if effective, it would remove the oil from the marine environment.

Unfortunately, this approach suffers from a number of fundamental problems, not least of which is the fact that it is in direct opposition to the natural tendency of the oil to spread, fragment and disperse under the influence of wind, waves and currents. Thus, even if containment and collection systems are operating within a few hours of an initial release they will tend to encounter floating oil at an extremely low rate. Because of this it is rare, even in ideal conditions, for more than a relatively small proportion (10-15%) of the spilt oil to be recovered.

When containment and recovery is attempted it is important to select equipment that is suitable for the type of oil and the weather/sea conditions. Efforts should target the heaviest oil concentrations and areas where collection will reduce the likelihood of oil impacting sensitive resources and shorelines.

In-situ Burning

Because of the logistical difficulties of picking up oil from the sea surface and storing it prior to final disposal on land, an alternative approach involves concentrating the oil in special fireproof booms and setting it alight. In practice, this technique is unlikely to be viable in most ship-source spills, due to the difficulty of collecting and maintaining sufficient thickness of oil to burn. As the most flammable components of the oil evaporate quickly, ignition can also be difficult. Residues from burning may sink, with potential long-term effects on sea bed ecology and fisheries. Close to the shore or the source of the spill, there may be health and safety concerns as a result of the risk of the fire spreading out of control or atmospheric fall-out from the smoke plume.

Dispersants

Dispersant chemicals work by enhancing the natural dispersion of the oil into the sea. The oil is broken down into tiny droplets which are dispersed into the water column, where they are diluted by currents and eventually break down naturally.

Dispersants can be sprayed from boats, planes and helicopters. With good operational support, large quantities of oil spread over a wide area can be treated quickly and effectively. For maximum effectiveness, dispersants need to be applied to oil before it has become viscous through evaporation or formed an emulsion. Some types of oil such as heavy fuel oil and viscous crude are less amenable to dispersion from the outset.

The controlled use of dispersants can reduce the overall impact of an oil spill on environmental and economic resources. However, since their use results in the oil being transferred from

the sea surface into the water column, there needs to be a careful evaluation of the relative risk to potentially sensitive resources in different parts of the marine environment. If there are conflicting priorities (eg between seabirds at risk from floating oil and commercial fish and shellfish at risk from dispersed oil) these need to be resolved at the contingency planning stage. Because of their potential to do harm if used incorrectly, the approval of dispersant products and their use is generally strictly controlled by the relevant government authorities.

Protecting Sensitive Resources

Given the difficulties of cleaning up oil at sea, spilt oil will often threaten coastal resources. It may be possible to protect some of these resources by the strategic deployment of booms. Other measures may also be appropriate, such as closing water intakes to industrial plants or coastal lagoons.

Highest priority should be given to protecting coastal resources which are particularly sensitive to oil pollution and which can be boomed effectively. These can include fish and shellfish farms, industrial water intakes, leisure facilities such as marinas, and environmentally sensitive areas, such as bird colonies.

While some sites will be relatively easy to protect, others such as marshes, mangroves and amenity beaches, are often too extensive for booming to be practical. It is important to act quickly and, with limited resources available, decisions must be taken as to which sites should be given priority. This should be pre-determined, in contingency plans.

Shoreline Clean-up

Once oil has reached coastlines, response efforts first should focus on areas that have the heaviest concentrations of mobile oil, which could otherwise lead

to further pollution of surrounding areas. A combination of clean-up techniques is normally used when cleaning contaminated shorelines, including manual and mechanical removal, flushing or washing with water at high or low temperatures and pressures, and even wiping with rags and sorbent materials.

It is important to choose techniques which are appropriate for the level of contamination and shoreline type, which may range from mud flats, through sandy and cobble beaches, to rocky shores and high cliffs, as well as to man-made structures such as breakwaters and protective walls.

It is important to ensure that the techniques selected do not do more harm than good. This requires a site-specific assessment of the environmental and economic benefits of the proposed actions. In some cases the most appropriate strategy will be to allow natural clean-up and recovery to take its course. Experience around the world has shown, for example, that sensitive areas such as marshes and mangroves often recover more quickly and completely if invasive clean-up techniques and physical disturbance are avoided. Natural cleaning can also be very effective on rocky shores that are exposed to strong wave action.

Bioremediation

The application of oil-degrading bacteria and nutrients to contaminated shorelines to enhance the process of natural degradation has generated considerable interest for more than two decades. However, it has so far not been demonstrated to be technologically feasible or beneficial for large-scale restoration projects.

Disposal

At-sea recovery and shoreline clean-up generate substantial amounts of oil and oily waste which need to be transported, temporarily stored and ultimately disposed of in an environmentally acceptable manner. Such operations often continue long after the clean-up phase is over.

Liquid oil and oily water may be reprocessed at a refinery. Oily material can be used as a low-grade feedstock in some industrial processes and it may also be stabilised for use in construction projects, as a low-cost secondary raw material. More traditional disposal routes include incineration and landfill.

Organisation of Spill Response and Planning

While the technical aspects of dealing with a spill are clearly important, the effectiveness of the response to a major pollution event will ultimately depend upon the quality of the contingency plan, and of the organisation and control of the various aspects of the clean-up operation.

Organisation of Spill Response

Apart from the major oil importing nations of the USA, Japan and Korea, which have little passing tanker traffic, government authorities in most countries have traditionally assumed responsibility for organising and controlling the clean-up of a major ship-source oil spill. The resources called on by such government authorities may be publicly owned or provided by private organisations under some form of contract. In anticipation of a major incident that exceeds the national capability, many governments have ratified the 1990 OPRC Convention (see page 46) and also entered into bilateral or regional inter-governmental agreements that facilitate the provision of additional clean-up resources from neighbouring countries. Assistance may also be sought from the oil industry's Tier 3 Centres or from commercial clean-up contractors.

There are good reasons why governments have traditionally assumed responsibility for responding to shipping casualties. Firstly, such incidents often involve vessels in innocent passage whose owners do not have an operational capability in the affected country and who would therefore find it difficult to respond promptly when the need arises. The responsibility for protecting a country's interests also ultimately rests with government authorities and they alone are in a position to determine priorities for protection and clean-up in the particular circumstances. The international compensation Conventions were largely created to encourage such authorities to assume the responsibility for responding to spills of persistent oil from tankers by providing a straightforward system whereby the costs of "reasonable" measures are promptly reimbursed (see pages 36–42).

Spill response is not a core activity for most government authorities due to the fact that serious events are an infrequent occurrence. The organisational structure for responding to ship-source spills therefore tends to follow administrative structures created for other purposes. This is particularly evident when it comes to shoreline clean-up, where the responsibility often lies with a multitude of local and regional government authorities. In harbour areas some responsibility may also fall on the port authority and on the operators of terminals and other facilities. In a major spill, this can lead to unclear command and control and a lack of co-ordination.

Such spill management problems are not overcome by inviting all interested parties to serve on one or more committees during an incident so that they can participate in the decision-making process. This can lead to large, unwieldy spill management teams, delayed decision making and, frequently, the adoption of inappropriate or conflicting response strategies.

When the oil is on the water or on the shore, informed and decisive leadership is required, with authority vested in an appropriate individual or in a small command team. This should ensure that an effective response consistent with the contingency plan is initiated promptly. However, one individual or even a small command team cannot manage the response to a significant spill alone. It will be necessary for them to be supported by experienced technical and scientific advisers (including ITOPF). Other members of the management team will need to look after the various components of the overall operation, as well as logistic support, record keeping and financial control.

Government organised response, with additional support provided by shipowners and other private entities, has proved to be a successful formula in numerous past spills. However, there is an increasing tendency by government authorities in some parts of the world to require shipowners (and even, on occasion, cargo owners) to go further and to organise and manage the clean-up of spills originating from their vessels. This is despite the fact that such an obligation is often not stated in national contingency plans. This can mean that a shipowner who attempts to mount a spill response operation will be confronted by numerous practical difficulties, leading to *ad hoc* arrangements. To avoid this, the responsible government authority should define, prior to any spill occurring, how the shipowner's response operation will be integrated into its own organisational structures. It also needs to guarantee that the necessary logistic support will be available in the event of a spill (eg suitable boats, oil storage facilities, trained operators). All of this needs to be tested through realistic exercises, based on actual spill experiences.

Contingency Planning

A major spill will inevitably present those in charge with numerous, complex problems, some of which will be non-

technical in nature. There is a greater likelihood that prompt and effective response decisions will be made if considerable effort has been devoted in advance of any spill to the preparation of comprehensive, realistic and integrated contingency plans for different levels of risk. Issues that are difficult to resolve prior to an incident are likely to become serious conflicts in the highly charged atmosphere following a major spill when everyone should be working together, with the common purpose of cleaning up the pollution as effectively as possible with the minimum of damage to the environment and economic resources.

As well as assessing the particular risks faced by a facility, region or country, contingency plans should clearly define the responsibilities of all the different parties likely to be involved in a spill and the organisational structure for effective command and control. There should be an up-to-date list of key contact points. On the technical side, plans should identify sensitive environmental and economic resources, priorities for protection and clean-up, agreed response strategies for different sea and shoreline areas at different times of the year, stocks of clean-up equipment and materials, temporary storage sites and final disposal options. Increasingly there is also a need to plan for managing the legitimate interests of the media in a way that ensures that they receive regular factual updates, without interfering with the control and conduct of the actual response operation.

Completed contingency plans may look impressive but, in reality, the final product is less important than the actual process of planning. Thus, the main benefit of developing a plan comes from gathering all the necessary data, consulting and getting to know all potentially interested parties, and resolving potential disputes in a calm atmosphere. For this reason it is important that those who will be required to implement the plan should also be closely involved in its preparation.

Contingency plans should be regularly tested and updated. The ultimate test is a major spill when organisational and technical problems will inevitably occur. These problems need to be identified in an objective manner before memories fade and interest wanes so that they can be addressed through amendments to the plan.

Because actual spills are rare, regular training of personnel at all levels and the testing of equipment is essential. Spill drills and exercises can be valuable in this regard, so long as they are not too ambitious and include a large element of surprise and realism, with all 'players' being willing to recognise problems in the final debrief.

Effects of Marine Oil Spills

Environmental Impacts

Oil spills can have serious effects on marine life, as highlighted by the photos of dead birds which immediately appear in the news after any spill. Such images fuel the perception of widespread and permanent environmental damage after every spill, and an inevitable loss of marine resources. A science-based appraisal of the effects reveals that while damage occurs and may be profound at the level of individual organisms, populations are more resilient and natural recovery processes are capable of repairing the damage and returning the system to normal functions. The first stage on the road to recovery is usually a well conducted clean-up operation but in some specific habitats aggressive clean-up methods can cause more harm than good and then it is better to let natural cleaning processes take their course.

The marine ecosystem is highly complex and natural fluctuations in species composition, abundance and distribution are a basic feature of its normal function. The extent of damage can therefore be difficult to detect against this background variability. Nevertheless, the key to understanding damage and its importance is whether spill effects result in a downturn in breeding success, productivity, diversity and the overall functioning of the system.

The exact nature and duration of any impacts from an oil spill depend on a number of factors. These include the type and amount of oil and its behaviour once spilt; the physical characteristics of the affected area; weather conditions and season; the type and effectiveness of the clean-up response; the biological and economic characteristics of the area and their sensitivity to oil pollution. Typical effects on marine organisms range across a spectrum from toxicity (especially for light oils and products) to smothering (heavier oils and weathered residues). The presence of toxic components does not always cause mortality, but may induce temporary effects like narcosis and tainting of tissues, which usually subside over time. Some typical oil impacts are described below.

Plankton

Their importance in primary productivity of the oceans and as a temporary home for the eggs and larvae of fish, shellfish, sea bed and shoreline organisms is well known, but there is little evidence of widespread harm to these functions from spills which subsequently translates into long-term damage.

Seabirds

Seabirds are amongst the most vulnerable inhabitants of open waters since they are easily harmed by floating oil. Species that dive for their food or that congregate on the sea surface are particularly at risk. Although oil ingested by birds during attempts to clean themselves by preening may be lethal, the most common cause of death is from drowning, starvation and loss of body heat following fouling of plumage by oil.

Cleaning and rehabilitation of oiled birds is often attempted, but for many species it is rare for more than a fraction to survive cleaning and rarer still for those that survive to breed successfully after release. Penguins are an exception and are much more resilient than other birds. When handled properly, the majority are likely to survive the cleaning process and rejoin breeding populations.

Bird mortality occurs during most spills and in some major spills breeding colonies have been seriously depleted. Some species react by laying more eggs, breeding more frequently or younger birds joining the breeding group. These processes can assist recovery, although recovery may take several years and will also depend on other factors like food supply. While it is common for short and medium term loss to occur in populations, there is scant evidence of spills causing long-term harm to populations, or of a spill tipping a marginal colony into permanent decline.

Sea Mammals

Whales, dolphins and seals in the open sea do not appear to be particularly at risk from oil spills. Marine mammals such as seals and otters that breed on shorelines are, however, more likely to encounter oil. Species that rely on fur to regulate their body temperature are the most vulnerable since, if the fur becomes matted with oil, the animals may die from hypothermia or overheating, depending on the season.

Shallow Coastal Waters

Spill damage in shallow waters is most often caused by oil becoming mixed into

the sea by wave action or by dispersant chemicals used inappropriately. In many circumstances the dilution capacity is sufficient to keep oil concentrations in the water below harmful levels, but in cases where light, toxic products have become dispersed, or in major incidents where heavy wave action has dispersed large volumes of oil close inshore, large kills of marine organisms such as shellfish have occurred. Post-spill studies reveal that recovery has taken place in a relatively short timescale and impacts are rarely detectable beyond a few years.

Shorelines

Shorelines, more than any other part of the marine environment, are exposed to the effects of oil as this is where it naturally tends to accumulate. However, many of the animals and plants on the shore are inherently tough since they must be able to tolerate periodic exposure to pounding waves, drying winds, high temperatures, rainfall and other severe stresses. This tolerance also gives many shoreline organisms the ability to withstand and recover from oil spill effects.

Rocky and sandy shores exposed to wave action and the scouring effects of tidal currents tend to be resilient to the effects of a spill and they usually self-clean quite rapidly. Rocky shores exposed to wave action are often quoted as those which recover most rapidly, and there have been many cases in which this was true. A typical example of impact on this habitat is the temporary loss of a keystone species, the limpet, which is a grazing snail, which leads to a 'bloom' of seaweeds in their absence. Because of the increased availability of their food source, re-colonisation by limpets usually follows rapidly and the normal grazing pattern is re-established.

However, in some circumstances, subtle

changes to rocky shore communities can be triggered by a spill, which can subsequently be detected for ten or more years. Although the functioning, diversity and productivity of the ecosystem is restored, the detailed distribution of particular species present may alter.

Soft sediment shores consisting of fine sands and mud are found in areas that are sheltered from wave action, including estuaries, and tend to be highly biologically productive. They often support large populations of migrating birds, indigenous populations of specialist sediment dwellers and shellfisheries. They also act as nursery areas for some species. If oil does penetrate fine sediments it can persist for many years, increasing the likelihood of longer-term effects. The upper fringe of 'soft' shores is often dominated by saltmarsh which is generally only temporarily harmed by a single oiling. However, damage lasting many years can be inflicted by repeated oil spills or by aggressive clean-up activity, such as trampling or removal of oiled substrate.

In tropical regions, mangrove swamps replace saltmarshes and provide an extremely rich and diverse habitat as well as coastal protection and important nursery areas. The mangrove trees which provide the framework upon which this habitat depends can sometimes be killed depending on the type of oil and the substrate in which the trees are growing. Damage is more likely if oil smothers their breathing roots or if toxic oils penetrate

the sediments. Where high mortality of trees occurs, in some cases including trees which are 50 or more years old, natural recovery to a diverse and productive structure can take decades. An important function of both saltmarsh and mangrove habitats is that they provide organic inputs to coastal waters which in turn enrich the communities living there. It is in these marsh and mangrove areas where reinstatement measures have real potential to speed up recovery.

Recovery

An important and widespread reproductive strategy for marine organisms is the production of vast numbers of eggs and larvae which are released into the plankton and are widely distributed by currents. This mechanism has evolved to deal with the pressures of predation and other causes of mortality, and to take

maximum advantage of available space and resources in the sea. In some cases, only one or two individuals in a million actually survive through to adulthood. This over-production of young stages ensures that there is a considerable reservoir not only for the colonisation of new areas, but also for the replacement of any adults which have been killed as a result of predation or some other calamity. Long-lived species, that do not reach sexual maturity for many years and which produce few offspring, are therefore likely to take longer to recover from the effects of an oil spill.

While there may be considerable debate over what constitutes recovery, there is a widespread acceptance that natural variability in systems makes getting back to the exact pre-spill condition unlikely, and most current definitions of recovery focus on the re-establishment of a community of plants and animals which are characteristic of the habitat and are functioning normally in terms of biodiversity and productivity.

Restoration

Removal of bulk oil contamination either through natural processes or a well conducted clean-up operation is the first stage of the recovery of a damaged environment. Thereafter it may be justified to take further active steps to restore lost resources and encourage natural recovery, especially in circumstances where it would otherwise be relatively slow. An example of such an approach following an oil spill would be to replant a saltmarsh or mangrove after the bulk oil contamination has been removed. In this way erosion of the area would be minimised and other forms of life would be encouraged to return.

While it may be possible to help restore damaged vegetation and physical structures, designing meaningful restoration strategies for animals is a much greater challenge. In some cases it may be warranted to protect a natural breeding population at a nearby, un-oiled site, for example by predator control, to provide a reservoir from which re-colonisation of the damaged areas can occur. In reality, the complexity of the marine environment means that there are limits to which ecological damage can be repaired by artificial means. In most cases natural recovery is likely to be relatively rapid and will only rarely be outpaced by restoration measures.

Economic Impacts

Contamination of coastal amenity areas is a common feature of many oil spills, leading to interference with recreational activities such as bathing, boating, angling and diving. Hotel and restaurant owners and others who gain their livelihood from tourism can also suffer temporary losses. A return to normal requires an effective clean-up programme and the restoration of public confidence.

Industries that rely on seawater for their normal operation can be adversely affected by oil spills. Power stations and desalination plants which draw large quantities of seawater can be particularly at risk, especially if their water intakes are located close to the sea surface, thereby increasing the possibility of drawing in floating oil. The normal operations of other coastal industries, such as shipyards, ports and harbours, can also be disrupted by oil spills and clean-up operations.

Fisheries and Mariculture

An oil spill can directly damage the boats and gear used for catching or cultivating marine species. Floating equipment and fixed traps extending above the sea surface are more likely to become contaminated by floating oil, whereas submerged nets, pots, lines and bottom trawls are usually well protected provided they are not lifted through an oily sea surface. However, they may sometimes be affected by dispersed or sunken oil. Less common is mortality of stock, which can be caused by physical contamination or close contact with freshly spilt oil in shallow waters with poor water exchange.

A common cause of economic loss to fishermen is interruption to their activities by the presence of oil or the performance of clean-up operations. Sometimes this results from a precautionary ban on the catching and sale of fish and shellfish from the area, both to maintain market confidence and to protect fishing gear and catches from contamination. Cultivated stocks are more at risk from an oil spill: natural avoidance mechanisms may be prevented in the case of captive species, and the oiling of cultivation equipment may provide a source for prolonged input of oil components and contamination of the organisms. Cultured seaweed and shellfish are particularly vulnerable in tidal areas where they may become contaminated with oil as the tide drops.

It is almost always necessary to make a thorough investigation of the status of a fishery and alleged effects of a spill, in order to determine the real impacts. In order to make the best assessment of damages attributable to contamination by oil it is necessary to make comparisons of post-spill recovery results with the conditions which pre-existed the spill or with control areas outside the affected area.

Conclusion

Pollution incidents can, and do, cause a wide range of impacts in the marine environment, but it is all too often stated that a particular event constitutes an "environmental disaster" with dire consequences for the survival of marine flora and fauna. The reality is that even after the largest oil spills, such as TORREY CANYON, AMOCO CADIZ, EXXON VALDEZ, NAKHODKA, ERIKA, PRESTIGE and DEEPWATER HORIZON,

the affected environments and associated marine life have recovered remarkably quickly and with no overt signs of lasting damage. Perhaps the most compelling fact is that fisheries and mariculture resources for which Brittany, Alaska, Japan, Galicia and the Gulf of Mexico are famous had recovered to pre-spill levels within a short period. Nevertheless, the short-term environmental and economic impact is invariably severe in a major incident and can cause serious distress to the people living near the contaminated coastline, affecting their livelihoods and impairing their quality of life, but it is reassuring that natural processes can provide a positive recovery, assisted by an appropriate clean-up and sometimes accelerated by restoration measures.

Spill Compensation

Civil Liability and Fund Conventions

Those affected by spills of persistent* crude oil and fuel oil from tankers benefit from a uniquely successful international compensation regime that was first devised by the governments of maritime States within the IMO in the late 1960s, but which was updated in 1992, 2000 and 2003. Under this two-tier regime both tanker owners and oil cargo receivers contribute to the payment of compensation up to about US$1.2 billion according to the terms of the 1992 Civil Liability Convention (1992 CLC), the 1992 Fund Convention and its 2003 Protocol (Supplementary Fund).

The Conventions apply in any State that chooses to ratify them, irrespective of the owner and flag of the tanker or the owner of the cargo. Most claims are settled promptly without the need for litigation because the liability of tanker owners is 'strict' (ie there is no need to prove fault).

As at 1 February, 2013, 111 States were party to both the 1992 CLC and 1992 Fund Convention (see page 47). Twenty-eight of these States were also party to the Supplementary Fund, which entered into force in 2005.

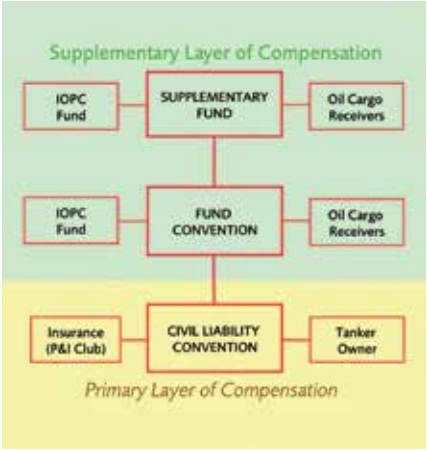
1992 CLC

Tanker owners are strictly liable to pay compensation for oil spill damage (including clean-up costs) within the Exclusive Economic Zone of an affected State, up to an amount determined by the gross tonnage of the tanker which is the source of the spill. In order to guarantee that tanker owners are able to meet their maximum potential liability the CLC requires that they maintain adequate financial security (normally through oil pollution insurance with a P&I Club). Claims for compensation may be brought directly against the insurer, thereby avoiding any problems that might be involved in identifying and locating the registered owner of the tanker. All these measures benefit the victims. In return the tanker owner may limit his liability to the defined amount, except in exceptional circumstances.

1992 Fund Convention

On the relatively rare occasions that valid claims exceed the tanker owner's limit of liability under the 1992 CLC, additional

* Whilst the term persistent oil is not precisely defined in any of the Conventions, the IOPC Funds have developed guidelines which are widely accepted. Under these guidelines, an oil is considered non-persistent if at the time of shipment at least 50 per cent of the hydrocarbon fractions, by volume, distill at a temperature of 340 °C (645 °F), and at least 95 per cent of the hydrocarbon fractions, by volume, distill at a temperature of 370 °C (700 °F), when tested in accordance with the American Society for Testing and Materials' Method D86/78 or any subsequent revision thereof. Oils which are normally classified as persistent include crude oils, fuel oils, heavy diesel and lubricating oils. Non-persistent oils include gasoline, light diesel oil and kerosene.



compensation is provided under the terms of the 1992 Fund Convention. This is done through the International Oil Pollution Compensation Funds (1992 Fund).

Payments of compensation by the 1992 Fund are financed by contributions levied on oil companies and other entities located in all 1992 Fund Member States that receive crude oil and heavy fuel oil by sea. Contributions are only sought after a spill in order to pay the resulting claims.

The 1992 Fund's contribution arrangements are highly effective and ensure that the costs of oil spills are shared on a world-wide basis. They are also socially responsible since oil importing companies in 'rich' industrialised nations pay the majority of the compensation, irrespective of where the spill occurs. By ratifying the Conventions developing countries which export oil or which do not import more than 150,000 tonnes of crude oil or heavy fuel oil can have access to the full amount of compensation in the event of a tanker spill at no cost to their oil or power generating industries.

2003 Supplementary Fund

A third tier of compensation for pollution damage caused by oil spills was created with the adoption of a Protocol establishing an International Oil Pollution Compensation Supplementary Fund. This provides compensation over and above that available under the 1992 Civil Liability and Fund regime and was designed to address the concerns of those States which consider that the 1992 limits might be insufficient to cover all valid claims arising out of a major tanker accident. The Protocol is open to ratification by any States party to the 1992 Fund Convention. The Supplementary Fund is financed by contributions payable by oil receivers in the States which ratify this instrument. However, for the purpose of contributions it will be considered that there is a minimum aggregate quantity of 1 million tonnes of contributing oil received in each Member State of the Supplementary Fund.

Compensation Limits

The liability of tanker owners under the 1992 CLC ranges from 4.5 million Special Drawing Rights (SDR) – about US$ 7 million – for a small tanker (up to 5,000 gross tons) to 90 million SDR – about US$ 139 million – for a tanker of 140,000 or more gross tons.

A maximum of 203 million SDR – about US$ 313.5 million – is available per incident from the 1992 Fund, irrespective of the size of the tanker (this figure includes the sum paid by the tanker owner or his insurer under the 1992 CLC).

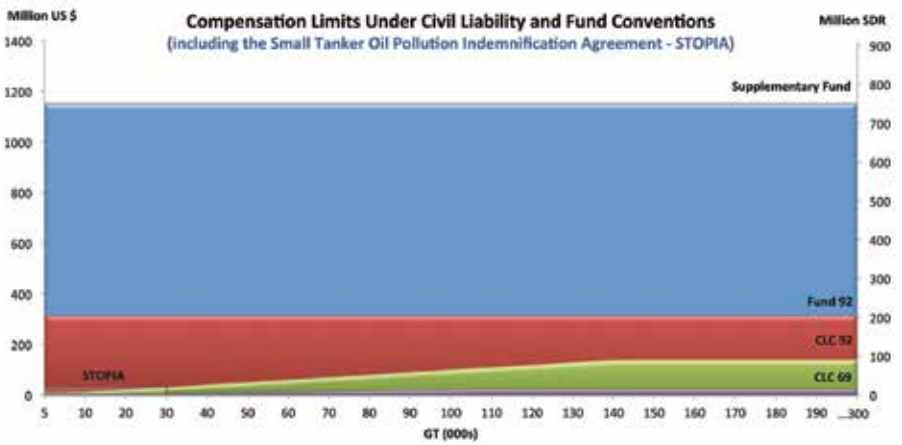
An additional 547 million SDR (approximately US$ 844.5 million) is available to countries that opt to ratify the 2003 Supplementary Fund. As a result, the total amount of compensation available for each incident in such countries is approximately US$ 1,158 million.

STOPIA & TOPIA

To ease the burden on oil receivers, a voluntary agreement has been reached amongst owners of small tankers indemnified through members of the International Group of P&I Clubs to introduce the Small Tanker Oil Pollution Indemnification Agreement (STOPIA 2006). Under the terms of STOPIA 2006 the liability in respect of incidents involving tankers up to 29,548 GT is increased to 20 million SDR – about $31 million. STOPIA 2006 applies to incidents involving participating tankers in all 1992 Fund Member States. A second agreement known as the Tanker Oil Pollution Indemnification Agreement (TOPIA 2006) provides for indemnification of the Supplementary Fund for 50% of the amounts paid in compensation by that Fund in respect of incidents involving tankers entered in one of the International Group P&I Clubs.

Claims Handling

P&I Clubs and the IOPC Funds co-operate closely in the assessment and settlement of claims, usually using joint experts such as ITOPF. In the event of a major incident a local claims office is usually established to assist potential claimants and to facilitate the submission of claims.



Admissible Claims

For a claim to be admissible it must fall within the definition of pollution damage or preventive measures in the 1992 CLC and Fund Convention. A uniform interpretation of the definitions and a common understanding of what constitutes an admissible claim are essential for the efficient functioning of the international system of compensation. For this reason, the governments of the Member States of the 1992 Fund have established clear policies and guidelines, as summarised in the organisation's Claims Manual.

Admissible claims can fall under a number of general headings:

- Preventive measures (including clean-up)
- Damage to property
- Economic losses
- Reinstatement/restoration of impaired environments

Preventive Measures

Claims for measures aimed at preventing or minimising pollution damage may include the costs of removing oil (cargo and fuel) from a damaged tanker or a sunken tanker wreck posing a serious pollution threat, as well as the costs of clean-up measures at sea, in coastal waters and on shorelines. The costs of disposing of recovered oil and associated debris are also covered.

To qualify for compensation under the Conventions, the costs as well as the preventive measures themselves have to be "reasonable". This is generally interpreted to mean that the measures taken or equipment used in response to an incident were, on the basis of an expert technical appraisal at the time the decision was taken, likely to have been successful in minimising or preventing pollution damage. The fact that the response measures turned out to be ineffective or the decision was shown to be incorrect with the benefit of hindsight are not reasons in themselves for disallowing a claim for the costs involved. A claim may be rejected, however, if it was known that the measures would be ineffective but they were instigated simply because, for example, it was considered necessary "to be seen to be doing something". On this basis, measures taken for purely public relations reasons would not be considered reasonable.

Property Damage

Claims under this category would include, for example, the costs of cleaning contaminated fishing gear, mariculture installations, yachts and industrial water intakes. In cases of very severe contamination of fishing gear and mariculture equipment where effective cleaning is impossible, replacement of the damaged property may sometimes be justified, with a reduction for normal wear and tear.

Economic Loss

Spills can result in economic loss through, for example, preventing fishing activity or causing a reduction in tourism. Such economic losses may be the direct result of physical damage

to a claimant's property ("consequential loss") or may occur despite the fact that the claimant has not suffered any damage to his own property ("pure economic loss"). An example of the first category is the fisherman who cannot fish as a consequence of his boat and gear being contaminated by oil. In the second case the fisherman remains in port while there is oil on the water in order to avoid damaging his property but then suffers "pure economic loss" as he is prevented from fishing.

Claims for pure economic loss are admissible only if they are for loss or damage caused by oil contamination. It is also necessary that there is a reasonable degree of geographic and economic proximity between the contamination and the loss or damage sustained by the claimant.

Reinstatement/Restoration of an Impaired Environment

Claims for impairment of the environment are accepted only if the claimant has sustained an economic loss which can be quantified in monetary terms. Claims based on theoretical and speculative 'models' or formulae are therefore not admissible. On the other hand, compensation would be available for the costs of reasonable measures of reinstatement/restoration. However, for any such measures to be considered admissible they would have to satisfy a number of criteria aimed at demonstrating that they were technically feasible and likely to enhance natural recovery, and that the costs were reasonable and not disproportionate to the expected results.

The costs of post-spill environmental studies are admissible to the extent that they concern pollution damage as covered by the 1992 CLC and Fund Convention.

Record Keeping

The speed with which claims are settled depends largely upon how long it takes claimants to provide the P&I insurer and the 1992 Fund with the information they require in a format that readily permits analysis.

For this reason it is vital during any incident that records are kept of what was done, when, where and why in order to support claims for the recovery of the money spent in clean-up. Unfortunately, pressures to deal with practical clean-up problems often result in record keeping being given less attention than it deserves. The appointment of a financial controller at an early stage of an incident can be valuable, both to co-ordinate expenditure and to ensure that adequate records are maintained.

Bunker Spills Convention

Recognition of the problems that can be caused by spills of heavy bunker fuel from non-tankers led to the adoption of the International Convention on Civil Liability for Bunker Oil Pollution Damage, which entered into force in 2008.

This IMO Convention seeks to ensure that adequate compensation is promptly available to persons who are required to clean up or who suffer damage as a result of spills of ships' bunker oil, who would not otherwise be compensated under the 1992 CLC. Although strict liability under the Bunker Spills Convention extends beyond the registered owner to the bareboat charterer, manager and operator of the ship, the Convention only requires the registered owner of ships greater than 1,000 GT to maintain insurance or other financial security. The level of cover must be equal to the limits of liability under the applicable national or international limitation regime, but in no case exceeding the amount calculated in accordance with the Convention on Limitation of Liability for Maritime Claims, 1976, as amended.

HNS Convention

The International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (HNS Convention) was adopted by the IMO in May 1996. It aims to ensure adequate, prompt and effective compensation for damage that may result from shipping accidents involving hazardous and noxious substances.

The Convention entitles claimants to compensation for loss or damage to persons, property and the environment caused by incidents involving cargoes of oil, gases and chemicals, plus other substances which are hazardous in packaged form. Pollution damage caused by persistent oils already covered by the CLC and Fund Convention is excluded, as is damage caused by radioactive materials and coal.

The HNS Convention is modelled on the CLC and Fund Convention. Thus, the shipowner (and his P&I insurer) is strictly liable to pay the first tier of compensation whereas the second tier comes from a fund levied on cargo receivers in all Contracting States on a post-event basis.

By 2009, the HNS Convention had still not entered into force and, as a result, a Protocol was developed to address practical problems that had prevented many States from ratifying it. The Protocol was adopted by a diplomatic conference, convened by the IMO, in April 2010.

Under the 2010 Protocol, if damage is caused by bulk HNS, compensation would first be paid by the shipowner, up to a maximum limit of 100 million SDR (US$154 million). Where damage is caused by packaged HNS, or by both bulk HNS and packaged HNS, the maximum liability for the shipowner is 115 million SDR (US$178 million). The shipowner will be obliged to maintain insurance to cover his liabilities under the Convention.

In cases where the shipowner's insurance does not cover an incident, or is insufficient to satisfy the claim, compensation would be paid from the second tier, the HNS Fund, up to a

maximum of 250 million SDR (US$386 million), including compensation paid under the first tier. The HNS Fund will be administered by the secretariat of the IOPC Funds. The Fund will consist of one general account (for HNS substances such as bulk solids and chemicals) and three separate accounts for oil, liquefied natural gas (LNG) and liquefied petroleum gas (LPG). Each separate account will meet claims attributable to the relevant cargo i.e. there will be no cross-subsidisation.

The 2010 HNS Protocol will enter into force 18 months after ratification by 12 States, including four States each with not less than 2 million units of gross tonnage and having received during the preceding year a total quantity of at least 40 million tonnes of cargo that would be contributing to the general account. Once the 2010 HNS Protocol enters into force, the 1996 Convention, as amended by the 2010 Protocol, will be called the International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea, 2010 (2010 HNS Convention). As at 1 February, 2013, 8 States had signed the Protocol, subject to ratification.

Wreck Removal Convention

In May 2007 the IMO adopted the Nairobi International Convention on the Removal of Wrecks 2007, which will provide the legal basis for States to remove, or have removed, shipwrecks which pose a hazard to the safety of navigation or to the marine and coastal environments, or both. This Convention is not yet in force.

National Laws

A number of countries have their own domestic legislation for compensating those affected by spills of oil and other substances from ships. The most comprehensive example, which is summarised in the next section, is the US Oil Pollution Act of 1990. Canada also has its own Ship-source Oil Pollution Fund (SOPF) which can be used to pay claims arising from spills of both persistent and non-persistent oil from all types of ship. As Canada is party to the 1992 CLC, Fund and Supplementary Fund Conventions, the SOPF would only become involved in paying compensation in a case falling within the scope of these Conventions if the total value of the valid claims exceeded the Supplementary Fund limit.

Other countries have chosen not to ratify the international Conventions and instead rely on laws originally developed for other purposes. This is frequently an unsatisfactory solution for claimants, shipowners and other parties involved in a pollution incident, since the provisions of these laws may not be clear.

Oil Pollution Act of 1990

In the wake of the EXXON VALDEZ oil spill in March 1989, US Congress passed the Oil Pollution Act of 1990 (OPA '90). It is a comprehensive piece of legislation. Only those sections of OPA '90 that relate to liability and compensation for clean-up and damage, and to prevention and preparedness are summarised here. More detailed information, including a complete copy of the Act and associated regulations, can be accessed via the US Coast Guard's website at www.uscg.mil.

It should be noted that OPA '90 does not prevent individual States in the USA from implementing their own more stringent oil spill laws and many have done so.

Oil Pollution Liability and Compensation

The owner, operator or bareboat charterer ("Responsible Party") of a vessel from which oil is discharged, or which poses a substantial threat of discharge, into the waters (out to the EEZ) of mainland USA or its overseas territories and possessions, is strictly liable for removal costs and damages.

Removal Costs

Removal costs include the costs incurred in containing and removing oil from water and shorelines, or taking other actions in accordance with the National Contingency Plan, to mitigate damage to public health or welfare, including fish, shellfish, wildlife, and public and private property, shorelines and beaches.

Damages

A wide range of damages are specifically covered by OPA '90. They include:

- real or personal property damage;
- loss of profits or earning capacity;
- loss of subsistence use of natural resources;
- loss of government revenues from taxes, royalties, rents, fees etc;
- cost of increased public services;
- natural resource damage and the costs of assessing such damage.

Any person or government who incurs an allowable cost, damage or loss as a result of an oil pollution incident may submit claims against the Responsible Party or its guarantor. In certain circumstances claims may be submitted to the Oil Spill Liability Trust Fund.

Limits

The first layer of liability is placed on the Responsible Party. In the case of tank vessels of less than 3,000 gross tons, this liability is the greater of US$ 3,200 per gross ton or US$ 6.408 million for single hull tank vessels and US$ 2,000 per gross ton or US$ 4.272 million for double hull tank vessels. For tank vessels of over 3,000 gross tons, it is the greater of US$ 3,200 per gross ton or US$ 23.496 million for single hull tank vessels and US$ 2,000 per gross ton or US$ 17.088 million for double hull tank vessels. For other types of vessel (eg dry cargo vessels) the limit is the greater of US$ 1,000 per gross ton or US$ 854,400. No liability is placed on cargo owners under OPA '90.

The owners of ships over 300 gross tons must obtain a Certificate of Financial Responsibility (COFR) as evidence of their financial capability to satisfy the maximum liability under OPA '90.

A responsible party's right to limitation under OPA '90 can be easily lost. This can happen if the incident was caused by gross negligence or wilful misconduct, or if any applicable Federal safety, construction or operating regulation is violated. The right to limit will also be lost through a failure or refusal to report the incident, to provide all reasonable co-operation and assistance requested by a responsible official in connection with removal activities, or to comply with an order under certain sections of other Acts.

Oil Spill Liability Trust Fund

In general, the Oil Spill Liability Trust Fund comes into operation when the Responsible Party denies a claim or fails to settle it within 90 days, or when the first level of liability is insufficient to satisfy all admissible claims for compensation. In circumstances where the Trust Fund pays claims that the responsible party has denied, it will later seek to recover the costs of settling those claims from the Responsible Party. The Trust Fund will consider claims for oil removal costs, third party damages and NRDA costs, although there are a number of conditions which have to be satisfied, as well as restrictions as to who is able to claim from the Trust Fund.

The maximum amount of compensation available from the Trust Fund is $1 billion per incident. It derives its money from a per barrel tax on imported

and domestically produced oil. The Trust Fund is administered by the National Pollution Funds Center, which produces a helpful Claimant's Guide.

Prevention

There are a considerable number of sections in OPA '90 that deal with the prevention of oil spills, including provisions relating to the issue of licences to seafarers; manning standards for foreign tank vessels; US vessel traffic service systems; gauging of plating thickness; overfill, tank level and pressure monitoring devices; tanker navigation safety standards and manning; and double hull requirements for tank vessels. This last provision requires the phasing out of single hull vessels by certain dates (depending on the size and age of the tank vessels).

Vessel Response Plans

The owners or operators of vessels over 400 GT are required to have approved plans for responding to a worst case discharge of oil or hazardous substance, or substantial threat thereof. Such Vessel Response Plans (VRP) are required to be consistent with the requirements of the National Contingency Plan and Area Plans and must:

(i) identify a Qualified Individual having full authority to implement removal actions;

(ii) identify and ensure the availability of private personnel and equipment necessary to respond to a worst case discharge or substantial threat thereof; and

(iii) describe the training, and equipment testing, periodic unannounced drills and response actions of the crew.

VRPs have to be updated periodically and also have to be re-submitted for approval after each significant change.

OPRC Convention

The International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC) was adopted in 1990 and entered into force in 1995.

The primary objective of OPRC 1990 is to facilitate international co-operation and mutual assistance between States and regions when preparing for, and responding to, major oil pollution incidents, and to encourage States to develop and maintain an adequate capability to deal with such emergencies. OPRC 1990 covers oil spills from offshore oil exploration and production (E&P) platforms, ports, oil handling facilities and ships.

By ratifying OPRC 1990 a State commits itself to establishing a national system for responding promptly and effectively to oil pollution incidents. This should include, as a basic minimum, a national contingency plan; designated national authorities and focal points responsible for oil pollution preparedness and response; oil pollution reporting procedures; and arrangements for handling requests for assistance.

In addition, each party to the Convention, either individually or through bi- or multi-lateral co-operation, and in co-operation with the oil and shipping industries, port authorities and other relevant entities, is required to ensure:

- a minimum level of pre-positioned oil spill combating equipment;
- a programme of exercises for oil pollution response organisations;
- a training programme for relevant personnel;
- mechanisms or arrangements to co-ordinate the response to an oil pollution incident; and
- capabilities to mobilise resources.

The operators of ships, E&P facilities, ports and oil terminals are also required to prepare oil pollution emergency plans. In the case of ships, this is the same plan that is required under MARPOL – the Shipboard Oil Pollution Emergency Plan or SOPEP.

In 2000 a Protocol was introduced extending the provisions of OPRC 1990 to encompass Hazardous and Noxious Substances (OPRC-HNS Protocol) which entered into force in 2007.

Operators of ships, ports and facilities handling HNS are required to have emergency plans for dealing with an HNS incident. It is recommended that confirmation of specific requirements is sought from the relevant Administration even if the Administration with which the ship is registered is not a party to the OPRC-HNS Protocol.

Status of International Conventions

This table shows which countries were parties to the 1969 CLC, 1992 CLC, 1992 Fund Convention, 2003 Supplementary Fund, 1990 OPRC, OPRC-HNS and Bunkers Convention as at 1 February 2013. x denotes that the Convention is in force in that country, whereas + denotes that it has been ratified but is not yet in force. o denotes that the country has denounced that Convention but that it has not yet taken effect. For a current list see the IMO or IOPC Fund websites (www.imo.org; www.iopcfund.org).

	CLC 69	CLC 92	FUND 92	Supp Fund 03	OPRC 90	OPRC-HNS 00	BUNKERS 01
Albania		x	x		x		x
Algeria		x	x		x		
Angola		x	x		x		
Antigua & Barbuda		x	x		x		x
Argentina		x	x		x		
Australia		x	x	x	x	x	x
Austria							+
Azerbaijan	x	x			x		x
Bahamas		x	x		x		x
Bahrain		x	x				
Bangladesh					x		
Barbados		x	x	x			x
Belarus							
Belgium		x	x	x			x
Belize		x	x				x
Benin	x	x	x		x		
Bosnia & Herzegovina							
Brazil	x				x		
Brunei Darussalam		x	x				
Bulgaria		x	x		x		x
Cambodia	x	x	x				
Cameroon		x	x		x		
Canada		x	x	x	x		x
Cape Verde		x	x		x		
Chile	x	x			x	x	
China		x			x	x	x
China (Hong Kong spec.admin.region)		x	x		x	x	x
Colombia		x	x		x	x	
Comoros		x	x		x		
Congo		x	x		x		
Cook Islands		x	x				x
Costa Rica	x						
Cote d'Ivoire	x						
Croatia		x	x	x	x		x
Cuba					x		
Cyprus		x	x				x
Czech Republic							+
Dem. Rep. of the Congo							
Denmark		x	x	x	x	x	x
Djibouti		x	x		x		
Dominica		x	x		x		
Dominican Republic	x	x	x				
Ecuador	x	x	x		x	x	
Egypt	x	x			x	x	x
El Salvador	x	x			x		
Equatorial Guinea	x						
Eritrea							
Estonia		x	x	x	x	x	x
Ethiopia							x
Fiji		x	x				
Finland		x	x	x	x		x
France		x	x	x	x	x	x
Gabon		x	x		x		
Gambia	x						
Georgia	x	x	x		x		
Germany		x	x	x	x	x	x
Ghana	x	x	x		x		
Greece		x	x	x	x	x	x
Grenada		x	x				
Guatemala	x						
Guinea		x	x		x		
Guinea-Bissau							
Guyana	x				x		
Haiti							
Honduras	x						
Hungary		x	x	x			x
Iceland		x	x		x		
India		x	x		x		
Indonesia	x	x					
Iran		x	x		x	x	x
Iraq							
Ireland		x	x	x	x		x
Israel		x	x		x		
Italy		x	x	x	x		x
Jamaica		x	x		x		x
Japan		x	x	x	x	x	
Jordan	x				x		x
Kazakhstan	x						
Kenya		x	x		x		
Kiribati		x	x				x
Kuwait	x	x					
Latvia		x	x	x	x		x
Lebanon	x	x			x		
Lesotho							
Liberia		x	x		x	x	x
Libya	x				x		
Lithuania		x	x	x	x		x
Luxembourg		x	x				x
Madagascar		x	x		x		
Malaysia		x	x		x		x
Maldives	x	x	x				
Mali							
Malta		x	x		x	x	x
Marshall Islands		x	x		x		x
Mauritania	o	+	+		x		
Mauritius		x	x		x		
Mexico		x	x		x		
Micronesia							
Moldova		x					
Monaco		x	x		x		
Mongolia	x	x					x
Montenegro		x	x	x			x
Morocco		x	x	x	x		x
Mozambique		x	x		x		
Myanmar							
Namibia		x	x		x		
Nauru							
Netherlands		x	x	x	x	x	x
New Zealand		x	x		x		
Nicaragua	x						
Nigeria		x	x		x		x
Niue		+	+				x
North Korea							x
Norway		x	x	x	x	x	x
Oman		x	x		x		
Pakistan		x			x		
Palau		x	x		x	x	x
Panama		x	x				x
Papua New Guinea		x	x				
Peru	x	x			x		
Philippines		x	x				
Poland		x	x	x	x	x	x
Portugal		x	x	x	x		
Qatar		x	x		x		
Romania		x			x		x
Russian Federation		x	x		x		x
Saint Kitts and Nevis	x	x	x		x		x
Saint Lucia		x	x		x		
St. Vincent & Grenadines		x	x				x
Samoa		x	x		x		x
Sao Tome & Principe	x						
Saudi Arabia	x	x			x		
Senegal	x	x	x		x		
Serbia		x	x				x
Seychelles		x	x		x		
Sierra Leone		x	x		x		x
Singapore		x	x		x	x	x
Slovakia							
Slovenia		x	x	x	x	x	x
Solomon Islands		x					
Somalia							
South Africa		x	x		x		
South Korea		x	x	x	x	x	x
Spain		x	x	x	x	x	x
Sri Lanka		x	x				
Sudan							
Suriname							
Sweden		x	x	x	x	x	
Switzerland		x	x		x		
Syria	x	x	x		x	x	x
Tanzania		x	x		x		
Thailand					x		
Togo		+			x		x
Tonga		x	x		x		x
Trinidad & Tobago		x	x		x		
Tunisia		x	x		x		x
Turkey		x	x		x		
Turkmenistan	x	x					
Tuvalu		x	x				x
Ukraine		x					
United Arab Emirates	x	x	x				
United Kingdom		x	x	x	x		x
United States					x		
Uruguay		x	x		x	x	
Uzbekistan							
Vanuatu		x	x		x	x	x
Venezuela		x	x		x		
Viet Nam		x					x
Yemen		x					

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Terms and Conditions of Membership
(effective 16th November, 2011)

1. Membership of The International Tanker Owners Pollution Federation ("ITOPF") is subject to ITOPF's Memorandum and Articles of Association and to these Terms and Conditions, which apply to all Owners who are Members of ITOPF as at 16th November, 2011, and to all Owners who thereafter are accepted for Membership. The Directors of ITOPF have the right from time to time to add to or modify these Terms and Conditions. Any such additions or modifications and their effective date will be notified to Members.

2. Membership of ITOPF is available only to an owner or demise charterer ("Owner") of a tanker, being any ship (whether or not self-propelled) designed, constructed or adapted for the carriage by water in bulk of crude petroleum, hydrocarbon products and any other liquid substance ("Tanker").

3. A Member is required to notify ITOPF (or ensure that ITOPF is notified) in writing from time to time of the name and tonnage of Tankers of which it is or becomes Owner and in respect of which it wishes to be entitled to the services of ITOPF. A Member who is no longer the Owner of any Tanker whose name and tonnage have been so notified shall automatically cease to be a Member of ITOPF.

4. Subject to these Terms and Conditions, a Member has the right to request ITOPF to provide technical and other services, advice and information ("Services") in relation to:

a) a spill (or the threat thereof) from a Tanker, including on-site attendance to give technical advice with the aim of effecting an efficient response operation and mitigating any damage;

(b) the technical assessment of damage caused by a spill from a Tanker;

(c) the technical assessment of claims for compensation resulting from a spill (or the threat thereof) from a Tanker;

(d) oil pollution contingency planning, response techniques, oil spill effects and compensation for oil pollution damage;

(e) oil spill training courses, drills, exercises and similar events; and

(f) the provision of such of ITOPF's publications as are for circulation to Members and such other general information and advice as is within the scope of ITOPF's Services.

5. It is a condition of entitlement to Services that the Member's ITOPF subscription has been paid in respect of the current year commencing 20th February and for all prior periods of Membership, either directly or by another body on the Member's behalf, and in respect of all Tankers notified pursuant to paragraph 3 of which the Member is the Owner.

6. Although under no obligation to solicit or obtain such information, ITOPF reserves the right from time to time to request any Member or its insurer to provide information satisfactory to ITOPF concerning the Member's pollution liability insurance cover. It is a condition of entitlement to Services that any Member or its insurer of which such a request is made will duly comply.

7. ITOPF reserves the right to recover costs incurred in respect of the provision of any Services from a Member, on whose behalf such costs are incurred. ITOPF will not normally charge a fee for providing Services to a Member but may do so from time to time when circumstances warrant at ITOPF's discretion. It is a condition of entitlement to Services that a Member will agree to, and arrange for,

the payment of such costs and fees when so requested by ITOPF.

8. a) ITOPF shall, where the Directors in their absolute discretion so determine, be entitled to:(i) terminate the Membership of any Member where the continuation of such Membership; and/or (ii) decline to respond or cease responding either in whole or in part to any request by or on behalf of a Member for the provision of services where such response or its continuation; may in any way howsoever expose ITOPF to the risk of being or becoming subject to any sanction, prohibition or adverse action in any form whatsoever by any state or international organisation; and (b) ITOPF reserves the right not to respond either in whole or in part to any request by or on behalf of a Member for the provision of Services whether because of a failure on the part of the Member to meet a condition set by ITOPF, or because of a lack of available ITOPF staff capacity, or for any reason which in ITOPF's opinion might adversely affect ITOPF, the safety of its staff, or the provision of the Services requested. In the case of competing demands for its Services, ITOPF will normally give priority to its Members.

9. To the extent permitted by law, ITOPF shall have no liability to any Member or other person for any direct, indirect, special or consequential loss, expenses and/or costs arising out of or in connection with the provision of, or failure to provide, any Services.

Note: Membership of ITOPF and payment of the relevant subscription referred to in paragraph 5 of these Terms and Conditions of Membership is normally arranged by a tanker owner's P&I insurer. This subscription is currently calculated on the basis of 0.57 of a UK penny per gross ton of entered Tankers.

Terms and Conditions of Associate Status
(effective 16th November, 2011)

1. Associate status of The International Tanker Owners Pollution Federation Limited ("ITOPF") is subject to these Terms and Conditions, which apply to all Associates of ITOPF as at 16th November, 2011, and to all persons who thereafter become Associates. The Directors of ITOPF have the right from time to time to add to or modify these Terms and Conditions.

2. Associate status of ITOPF is available only to such persons as the Directors of ITOPF may determine being an owner or demise charterer ("Owner") of any ship other than a tanker ("Ship"). For these purposes "tanker" means any ship (whether or not self-propelled) designed, constructed or adapted for the carriage by water in bulk of crude petroleum, hydrocarbon products and any other liquid substance.

3. An Associate may be required to notify ITOPF (or ensure that ITOPF is notified) in writing from time to time of the name and tonnage of Ships of which it is or becomes Owner and in respect of which it wishes to be entitled to the services of ITOPF. An Associate who is no longer the Owner of any Ship shall automatically cease to be an Associate of ITOPF.

4. Subject to these Terms and Conditions, an Associate has the right to request ITOPF to provide technical and other services, advice and information ("Services") in relation to:

a) a spill (or the threat thereof) from a Ship, including on-site attendance to give technical advice with the aim of effecting an efficient response operation and mitigating any damage;

(b) the technical assessment of damage caused by a spill from a Ship;

(c) the technical assessment of claims for compensation resulting from a spill (or the threat thereof) from a Ship;

(d) oil pollution contingency planning, response techniques and oil spill effects;

(e) oil spill training courses, drills, exercises and similar events; and

(f) the provision of such of ITOPF's publications as are for general circulation and such other general information and advice as is within the scope of ITOPF's Services.

5. ITOPF will charge each Associate an annual subscription to assist in meeting its general expenses. It is a condition of entitlement to Services that the Associate's ITOPF subscription has been paid in respect of the current year commencing 20th February and for all prior periods of Associate status, either directly or by another body on the Associate's behalf and in respect of all Ships notified pursuant to paragraph 3 of which the Associate is the Owner. If in a winding-up of ITOPF there remains any surplus which is attributable to Associates' subscriptions, that surplus shall be distributed among Associates in proportion to the amounts subscribed by them.

6. Although under no obligation to solicit or obtain such information, ITOPF reserves the right from time to time to request any Associate or its insurer to provide information satisfactory to ITOPF concerning the Associate's pollution liability insurance cover. It is a condition of entitlement to Services that any Associate or its insurer of which such a request is made will duly comply.

7. ITOPF reserves the right to recover costs incurred in respect of the provision of any Services from an Associate on whose behalf such costs are incurred. ITOPF will not normally charge a fee for providing Services to an Associate but may do so from time to time when circumstances warrant at ITOPF's discretion. It is a condition of entitlement to Services that an Associate will agree to, and arrange for, the payment of such costs and fees when so requested by ITOPF.

8. (a) ITOPF shall, where the Directors in their absolute discretion so determine, be entitled to:(i) terminate the Associate status of any Associate where the continuation of such Associate status; and/or (ii) decline to respond or cease responding either in whole or in part to any request by or on behalf of an Associate for the provision of services where such response or its continuation; may in any way howsoever expose ITOPF to the risk of being or becoming subject to any sanction, prohibition or adverse action in any form whatsoever by any state or international organisation; and (b) ITOPF reserves the right not to respond either in whole or in part to any request by or on behalf of an Associate for the provision of Services whether because of a failure on the part of the Associate to meet a condition set by ITOPF, or because of a lack of available ITOPF staff capacity, or for any reason which in ITOPF's opinion might adversely affect ITOPF, the safety of its staff, or the provision of the Services requested. In the case of competing demands for its Services, ITOPF will normally give priority to its Members.

9. To the extent permitted by law, ITOPF shall have no liability to any Associate or other person for any direct, indirect, special or consequential loss, expenses and/or costs arising out of or in connection with the provision of, or failure to provide, any Services.

10. Notices to Associates may be given in such manner as ITOPF may determine and shall be deemed given if given to an Associate's insurer or by way of press advertisement.

Note: ITOPF Associate Status and payment of the relevant subscription referred to in paragraph 5 of these Terms and Conditions of Associate Status is normally arranged by a shipowner's P&I insurer. This subscription is currently calculated on the basis of 0.41 of a UK penny per gross ton of entered ships.

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