



PROMOTING EFFECTIVE
SPILL RESPONSE

Handbook



2020/21

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Emergency contact

To report a spill of oil, chemicals or other substance, please **call us** on the numbers below for advice and/or to mobilise us to site:

9 AM – 5 PM
(UK BUSINESS HOURS)
+44 (0) 20 7566 6999

This is our office number.
Please ask to speak to a member
of the technical team.

OUTSIDE UK BUSINESS HOURS
(spill emergencies only)
+44 (0) 20 7566 6998

Your call will be forwarded
to the member of the
technical team on duty.

It will be helpful to have as much of the following information as possible. However, please don't wait to get this before calling as early notification is important.

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 (e.g. latitude and longitude or distance and direction from the nearest port or landmark)
- Cause of the incident (e.g. 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 (e.g. fisheries or residential areas)
- Distribution of cargo and bunkers and proximity to damage

HNS Chemicals

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

Oil

- Density, viscosity, pour point, distillation characteristics, wax & asphaltene content (or bunkering certificate)

I TOPF in brief

I TOPF is maintained by the world's shipowners and their insurers on a not-for-profit basis to promote effective response to spills of oil, chemicals and other substances in the marine environment.

Our technical staff have attended on-site at over 800 shipping incidents in 100 countries to provide objective scientific advice on clean-up measures, the effects of pollutants on the environment and economic activities, and on compensation. These incidents can involve oil, chemicals and other bulk or packaged cargoes, as well as bunker fuel from all types of ship. We also provide advice in relation to oil spills from other potential sources of marine pollution, including pipelines and offshore installations; physical damage to coral reefs resulting from ship groundings; and environmental impacts associated with shipwrecks.

Our first-hand experience of pollution incidents is utilised during

contingency planning and other advisory assignments for government and industry. We are an authoritative source of information on marine spills and share our knowledge at training courses and seminars throughout the world, encouraging best practice through outreach and education.

The majority of our income comes from dues from shipowners, paid on their behalf by Protection and Indemnity (P&I) insurers. Shipowners are enrolled in I TOPF either as Members (for tankers, barges, LPG/LNG carriers, FPSOs/FSUs or combination carriers) or Associates (for other types of ship). Our services are provided to Members, Associates and their P&I insurers, usually at no cost, apart from expenses. We are also available to assist at the request of governments and intergovernmental organisations such as the International Maritime Organization (IMO) and the International Oil Pollution Compensation Funds (IOPC Funds).

Established Christmas Eve 1968

Supports over 90% of all ocean going tonnage

Observer status

IMO IOPC Funds

- 24 -

Highly skilled international team ready to assist 24 hours a day, 365 days a year

Operates internationally from London

Benefits freely available to ITOPF Members and Associates

- emergency 24/7 technical advice and, where necessary, attendance on-site at incidents involving a spill (or potential spill) of oil, chemicals or other substances;
- highly qualified and experienced technical staff to answer queries related to the fate and effects of these substances in the marine environment;
- objective technical advice on the most appropriate response techniques to minimise pollution damage;
- objective technical assessment of claims for compensation in conjunction with those paying compensation and claimants;
- advice on realistic scenarios for testing during exercises and drills and participation in these, either remotely or in person;
- advice on the preparation or updating of contingency plans;
- advice concerning national, regional and international approaches to preparedness and response to spills of oil, chemicals and other substances;
- educational seminars and workshops;
- historic information and statistics relating to oil and chemical spills;
- technical publications and films;
- access to ITOPF's London based library;
- 24/7 access to the online Membership Database to retrieve copies of Membership Record Forms (applicable to Members only).

Access to ITOPF's services is freely available and part of P&I cover.

8,200

Members owning or operating

13,900

tankers, barges, LPG/LNG carriers, FPSO/FSUs or combination carriers totalling

445
million GT



Member dues
0.42p/GT plus
£20
Administration
Fee per tanker

Associates,
the owners of
all other types
of ships, totalling

840
million GT



Associate
dues
0.38p/GT

We encourage our shipowners to make full use of the services available to them and to contact us directly if they would like further information.

ITOPF Directors

Chairman

Mr Erik Hånell

Stena Bulk AB, Sweden

Managing Director

Dr Karen Purnell

ITOPF Limited, UK

Directors

Mr Abdullah Aldubaikhi

Bahri, Saudi Arabia

Mr Billy Chiu

BW Maritime Pte Ltd, Singapore

Mr Clovis Garzia

Transpetro, Brazil

Mr Christen Guddal

Gard AS, Norway

Dr Grahaeme Henderson

Shell International Trading & Shipping Co Ltd, UK

Capt Tomoyuki Koyama

NYK Line, Japan

Mr Donald Kurz

Keystone Shipping Co, USA

Mr Kevin MacKay

Teekay Shipping, Canada

Mr Mark Martecchini

Stolt Tankers B.V., Netherlands

Mr Guy Mason

BP Shipping Ltd, UK

Mr Tony Paulson

West of England P&I Club, UK

Capt Thomas Pinto

Seven Islands Shipping, India

Mr Sergey Popravko

SCF – Unicom Management, Cyprus

Mr Cory Quarles

ExxonMobil, SeaRiver Maritime, Inc., USA

Mr Mark Ross

Chevron Shipping Company LLC, USA

Mr Hiroaki Sawabe

The Japan Ship Owners' Mutual P&I Association, Japan

Capt Alex Staring

Euronav NV, Belgium

Mr Kazuyoshi Takayama

JX Ocean Company Ltd, Japan

Mr Hannes Thiede

F. Laeisz Schiffahrtsgesellschaft, Germany

Mr Tommy Thomassen

Maersk Tankers AS, Denmark

Dr Nikolas Tsakos

Tsakos Energy Navigation, Greece

Dr Chao Wu

Thomas Miller P&I Club, UK

Ms Lois Zabrocky

International Seaways Inc, USA

Capt Zhu Mai Jin

China Shipping Tanker Company Ltd, China



ITOPF Board of Directors 2019

Staffing

Managing Director

Dr Karen Purnell is a Fellow of the Royal Society of Chemistry, a member of the Institute of Directors and a Shipwright. Before joining ITOPF in 1994, she was a project manager involved in nuclear/toxic waste management and environmental remediation. Karen was appointed MD in 2009 and focuses on ensuring that ITOPF is recognised as the leading provider of objective technical advice on accidental ship-source pollution.



Technical Director

Richard Johnson is a marine biologist and holds a master's degree in radiation and environmental protection. Before joining ITOPF in 1994, he worked on investigating the fallout from the Chernobyl accident and assessing radioactive contamination of the marine environment. Richard became Technical Director in 2009 and is responsible for the strategic oversight and delivery of ITOPF's technical services.



PA

Jo Woodward joined ITOPF in 2016 to provide PA support to Karen Purnell and Richard Johnson. Jo has worked extensively as a Board level PA and has spent much of her career working for large hotel and retail organisations.



Technical Team Managers

Dr Franck Laruelle is a marine biologist and previously worked with the French research organisation Cedre, acting as a technical adviser on behalf of the French government at a number of spills, including ERIKA and PRESTIGE. Franck joined ITOPF in 2006 and currently leads ITOPF's Africa and Middle East team.



Alex Hunt is a marine biologist with a master's degree in tropical coastal management, professional membership of the Marine Biological Association, and a background in coral reef damage assessment work. Since joining ITOPF in 2004 he has attended on site for numerous shipping incidents throughout the world. Alex is Technical Manager for the Asia-Pacific Team at ITOPF and has a focus on spill preparedness projects in this region.



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, Middle East and East Africa. Mark has attended pollution incidents worldwide, delivered national and regional training courses and supported national contingency planning projects. He currently leads ITOPF's Americas Team.





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.



Finance and Pensions Manager

Amanda Howarth joined ITOPF in 2000. She has an MBA and is a Fellow Chartered Management Accountant (FCMA and GMA). She has almost 25 years' experience of the tanker industry and has worked as Financial Controller for small entities for nearly 30 years. Her responsibilities at ITOPF include the management of its financial and tax affairs, as well as overseeing ITOPF's pension scheme accounts and administration procedures.



Information and Communications Manager

Lisa Woolgar has a degree in physics with satellite technology. She joined ITOPF in 2006, bringing with her previous work experience of satellite programme and information mapping services. Lisa is responsible for the development and implementation of ITOPF's services and applications for 'Information, Knowledge, Education and Communications'.



HR Manager

Vanessa Holliday has a business studies degree, a post graduate diploma in people management and is a Chartered Member of the CIPD, the professional body for HR and people development. She joined ITOPF in 2017, bringing experience from a varied background in HR management, most recently in the not-for-profit and public sectors.

Senior Technical Advisers



Dr Annabelle Nicolas-Kopec is a chartered chemist and member of the Royal Society of Chemistry. She has a PhD in organic chemistry and postgraduate research experience in analytical and synthetic chemistry. Since joining ITOPF in 2011, Annabelle has attended numerous incidents worldwide. Since joining ITOPF in 2011, Annabelle has attended numerous incidents worldwide and leads ITOPF's HNS Working Group.



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. Miguel has attended numerous incidents worldwide and heads up ITOPF's Environmental Damage Working Group.



David Campion is a marine biologist with a master's degree in tropical coastal management. He previously worked as Group Director of Corporate Social Responsibility for an Asian based resort company focused upon environmental management and sustainability reporting. Since joining ITOPF in 2014, he has attended numerous incidents worldwide and is a member of ITOPF'S Environmental Damage and Fisheries Working Groups.

Technical Advisers

Phil Ruck has a degree in physical geography and an MSc in environmental technology. Before joining ITOPF in 2016, he worked for IPIECA, the global oil and gas industry association for environmental and social issues, as Project Manager for the Oil Spill Working Group. Phil has attended many pollution incidents worldwide and is a member of ITOPF's Fisheries Working Group.



Dr Duarte Soares is a geologist with an MSc in petroleum geoscience and a PhD in seismic stratigraphy. He has attended spills in Asia, South America, Oceania and Europe, and is coordinator of the ITOPF R&D Award. Before joining ITOPF in 2017, Duarte worked for the hydrocarbon industry (UK), in mining (Angola), and on geoarchaeology and environmental impact studies (Portugal).



Julke Brandt holds a master mariner certificate of competency, a BSc in nautical science and an MSc in international marine environmental consultancy. Before joining ITOPF in 2017, she worked as Navigation (Deck) Officer on board cargo ships and private yachts and as visiting researcher for Newcastle University. She leads ITOPF's Monitoring Modelling Mapping Working Group and is a member of the HNS Working Group.



Samuel Durrance is a marine biologist with an MSc in international marine environmental consultancy and a BSc in marine biology. Before joining ITOPF in 2018, he worked as a fisheries management consultant at an international marine resource management consultancy. Sam is a member of ITOPF's Fisheries Working Group.



Lauren Fear is a biologist with an MSc by research in biology. Her project studied the effects of anthropogenic noise on coral reef fish communities. Before joining ITOPF in 2019, she was a consultant ecologist, involved in assessing the impacts of large infrastructure projects on protected species and habitats in the UK. Lauren is a member of the Chartered Institute of Ecology and Environmental Management.



Dr Angela Pinzón has a BSc in microbiology, an MSc in chemistry, an MSc in analytical chemistry, and a PhD in environmental chemistry and toxicology. She helps coordinate the ITOPF R&D Award and is a member of ITOPF's HNS Working Group. Angela has previously worked on projects related to the identification of toxic petroleum-derived chemicals and the clean-up of oil refining waste; the evaluation of chemical diversity in marine organisms; and the recovery of coral populations in the Caribbean. She joined ITOPF in 2019.



Dr Conor Bolas has a master's degree in chemistry and holds a PhD in atmospheric and analytical chemistry. He has experience of environmental monitoring of tropical field sites in Southeast Asia and temperate ecosystems in the UK, as well as research in materials and organic chemistry in industrial laboratories. He joined ITOPF in 2019 and is a member of ITOPF's HNS Working Group.





Susannah Domaille joined ITOPF as a Technical Support Coordinator in 2016 after completing a BSc degree in mathematics and an MSc degree in atmosphere, ocean and climate science. In 2019, Susannah changed roles to become a Technical Adviser. Throughout her career at ITOPF, she has had a focus on oil trajectory modelling, remote sensing and aerial surveillance techniques.



Andrew Le Masurier is an environmental scientist with a master's degree in environmental monitoring and assessment. He previously worked for four years in the contaminated land sector, dealing with the assessment and remediation of impacted soils and groundwater across the UK. Andrew joined ITOPF in 2019.



Thomas Sturgeon holds a Bsc in environmental science and an MSc in oceanography. Before joining ITOPF in 2020, he spent two years working as an offshore installation engineer in the offshore energy and renewables industry, installing subsea fibre and power cables.



Senior Claims Coordinator

Pauline Marchand has master's degrees in maritime, international and business law. Prior to joining ITOPF in 2014, she worked for the International Group of P&I Clubs (IG). Her primary role at ITOPF is to coordinate the assessment of claims for compensation.



Technical Support Coordinator

Christopher Black holds a bachelor's degree in biological sciences and a diploma in insurance. Before joining ITOPF in 2019, he worked as Claims Team Manager at a global commercial insurance company. His main responsibilities at ITOPF are assessing claims and assisting the wider team with queries regarding spill response equipment and resources.



IT Systems Manager

Alan Smith has worked in IT for over 20 years in a variety of companies from SME to enterprise. He joined ITOPF in 2019 and is responsible for developing and supporting its information systems.



Senior Information Officer

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

Information Data Analyst

Naa Sackeyfio has a degree in natural resources management, a master's in GIS and previously worked for an environmental consultancy. She joined ITOPF in 2016 and her responsibilities include management of geodatabases and web applications, maintenance of the incidents and claims database, data analysis and GIS mapping.



Membership Secretary

Karen Young joined ITOPF in 2008, having previously worked in a membership 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

Jenny Maher has over 25 years' experience in preparing, managing and reporting financial information as well as implementing new accounting procedures, job costing systems and customised reports. She is responsible for ITOPF's financial management information systems and accounting transactions, which includes the collection of Membership and Associate dues.



Finance Assistant

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



Office Coordinator

Jayne Foster first joined ITOPF in 1998 as Team Secretary and, following a career break, re-joined in 2012 as Secretary to the Technical Director. Now Office Coordinator, Jayne manages the Office & Administration Team and has overall responsibility for administrative activities to facilitate the smooth and efficient running of the office.



Team Administrator – Travel and Project Support

Sarah Grant joined ITOPF in 2019 and is responsible for organising national and international travel and risk assessments for the team. Sarah also assists with other administrative needs, including coordinating the central diary for the office, minute taking, and tracking commitments.



Technical services

ITOPF promotes effective response to marine spills of oil, chemicals and other substances by providing five core services. These are usually provided at no cost to our Members,

Associates and their P&I insurers, apart from expenses. Our technical services are also available to other groups around the world involved with marine spills.

RESPONSE



Spill Response

We are available 24 hours a day, 365 days of the year to attend spills of oil, chemicals and other substances in the marine environment worldwide.



Claims Analysis & Damage Assessment

We give advice on pollution damage caused by spills and assess the technical merits of claims for compensation.



Contingency Planning & Advisory Work

We regularly advise governments and industry on the preparation of contingency plans and other matters related to accidental pollution from ships.



Training & Education

We run training courses and seminars worldwide where we share our technical knowledge and first-hand experiences.



Information Services

We are a primary and trusted source of information on accidental ship-source pollution.

PREPAREDNESS



Responding to marine spills of oil, chemicals and other cargoes is our priority service.

Notification

We can be notified of an incident in a number of ways. Most often we will be contacted by the vessel's P&I insurer via our emergency contact numbers (see page 1). We can also be notified by our extensive network of contacts, which include correspondents, surveyors, spill response organisations, government agencies and port authorities.

Mobilisation

If the incident requires our immediate attendance, we will determine the quickest and most effective way of getting on site.

We will also identify any potential health or personal risk concerns as one of our Technical Advisers prepares to travel.

As we provide assistance throughout the world from our office in London, we pride ourselves on our ability to mobilise rapidly when needed.



ITOPF office



ITOPF advising on clean-up issues, Brazil

Evaluation

At this stage, we will gather information and contact key parties so that the Technical Adviser arriving on scene can ‘hit the ground running’.

We will carry out a preliminary evaluation of the likely extent of the pollution, its probable behaviour, fate and potential impact. For

this, we use a variety of resources, including models and global mapping applications.

Sensitive resources at risk are identified and mapped using our in-house GIS. Information is also collated on previous spill experience, meteorological and oceanographic conditions and local



Taking samples, Brazil



Photographing the incident site, USA

preparedness, such as the availability of contingency plans and equipment stockpiles. This gives us a better basis for understanding how the incident might develop.

On-site

Upon arrival, we are usually met by the P&I insurer's local correspondent or appointed surveyor, who will brief us on any recent developments and act as an initial guide to the area.

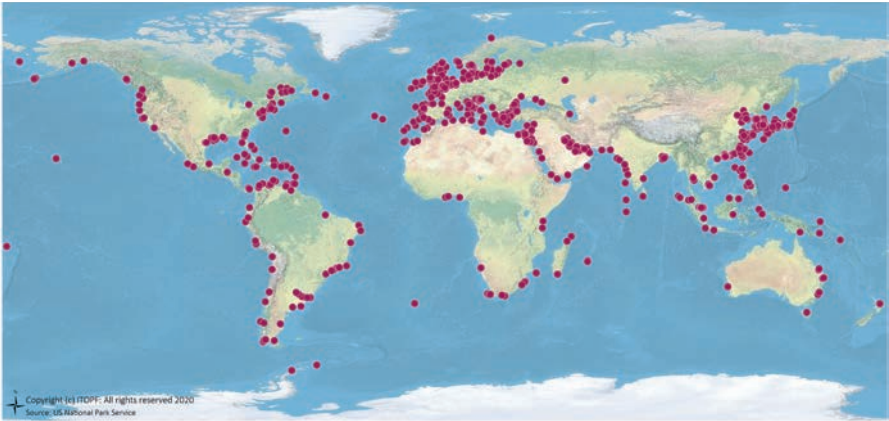
Our role on site will vary according to the circumstances of the incident, but it is always advisory. Decisions on the response are made by the relevant authorities. The advice we provide is based on scientific principles and our past experiences attending spills in a large range of habitats and economies.

Our role normally includes one or more of the following activities:

- advising all parties on the potential fate and effects of the pollutant;
- assisting and advising all parties on the most appropriate clean-up techniques, with the aim of mitigating any damage;
- helping to source equipment and, in cases where the shipowner is required to mount the response operation, helping to organise the clean-up;
- undertaking surveys, monitoring the clean-up and advising all parties on the technical merits of the actions;
- investigating the damage to the marine environment and to coastal resources, such as fisheries and aquaculture;
- advising on methods to mitigate environmental and economic losses, including restoration options.



Working in remote locations, Indonesia



Spills attended by ITOPF since 1970

Command and control is vital in spill response, and early decisions may have a lasting benefit. For this reason, we usually try to integrate ourselves into the command centre as quickly as possible.

In all cases, our aim is to cooperate and work closely with the government agencies, contractors and other parties involved in an incident, and to reach agreement on measures that are technically justified in the particular circumstances. This not only helps to ensure that the clean-up is as

efficient and effective as possible and that damage is minimised, but that subsequent claims for compensation can be dealt with promptly and amicably.

Remote advice

We are also available to provide generic advice remotely from the office for cases that may not require full mobilisation. Common requests include advice on the fate and effects of a pollutant, the resources at risk or the location of response equipment.

Attends on average **15** cases per year

Provides remote advice for an average of **25** incidents per year

Marine biologists, chemists, environmental scientists, engineers, geologists

Fluent in English, French, German, Portuguese, Spanish

>800 incidents in **100** countries over the last **50** years



We provide advice on the technical merit of claims for compensation arising from spills. In many cases this is a natural extension of our attendance on-site at the time of an incident. Claims assessment usually involves evaluating the reasonableness of clean-up costs and the merit of claims for damage to economic resources, such as property or businesses, according to internationally established criteria. The assessment of damage to fisheries, especially mariculture facilities, is a specialist area, which often requires detailed analysis of complex claims. We may work in conjunction with experts who have in-depth knowledge of the affected area and the economics of its particular fisheries.

Our advice is also regularly sought in relation to environmental damage caused by spills, and on the feasibility and technical justification of the restoration measures proposed.

Our role is to encourage a cooperative approach to the assessment of pollution damage with a view to facilitating the prompt and amicable settlement of claims. In this regard, we provide support both to claimants and to those who actually pay the compensation, usually the P&I insurer and/or the IOPC Funds.

These bodies – not ITOPF – ultimately decide whether or not a particular claim should be paid as factors, other than purely technical considerations, may influence the final decision.



National workshop on claims and compensation, Malaysia



GIWACAF national exercise, Cote d'Ivoire

We use our extensive practical experience to advise governments, industry, international agencies and other organisations on contingency planning and other matters related to preparedness in case of marine pollution.

These activities give us the opportunity to communicate best practice outside the pressurised environment of a spill. This also enables us to build and maintain contacts within governments and organisations with whom we might work in the future.



Attending meetings at IOPC Funds
(photo courtesy of IOPC Funds)



Providing training at a seminar in Mexico

We organise and participate in training courses and seminars for government and industry around the world. These are often undertaken with key inter-governmental partners, such as IMO and the IOPC Funds, or industry bodies like IPIECA.

Training courses provide an excellent opportunity for us to share our technical knowledge and first-hand experience with those likely to be involved with an incident.

We also regularly assist with spill drills and exercises conducted by shipowners, oil companies, governments and other groups.

ITOPF R&D Award

To mark the 10th anniversary of the establishment of ITOPF's R&D Award, from 2021 the amount of the award will be increased to £75,000 to support a combination of PhD and short-term projects.

The Award is made available for projects that have the potential to lead to improvements in spill preparation and response, as well as new techniques for monitoring and restoring environmental resources.

It is open to any reputable R&D establishment or other organisation worldwide intending to fund a candidate or project team to undertake research related to accidental marine pollution. The funding typically supports research costs, plus a student stipend and university fees in the case of a PhD project.

Proposals are evaluated by the ITOPF R&D Award Committee, comprised of external and internal evaluators with a wealth of experience in maritime and environmental issues and a keen focus on developing young talent in these areas.



We are a primary and trusted source of information on ship-source pollution. Unless otherwise stated, the following resources are available free of charge via our website:

Technical Information Papers (TIPs), providing practical guidance on oil and chemical spill response and effects in the marine environment, available in multiple 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



I TOPF on the presentation panel at a seminar for correspondents in Singapore (photo courtesy of the International Group of P&I Clubs)



Presenting at a workshop in Japan (photo courtesy of Petroleum Association of Japan)

Response to Marine Oil Spills Films, an award winning series of eight films tackling key issues related to oil spills and how to deliver a well-planned and executed response, subtitled in multiple languages. The first seven films are available to buy as a DVD priced £10.

- 1 Introduction to oil spills
- 2 Aerial surveillance
- 3 At-sea response
- 4 Shoreline clean-up
- 5 Waste management
- 6 Environmental impacts
- 7 Oil spill compensation
- 8 Oil spills in cold climates

Response to Marine Oil Spills book (2012), a comprehensive review of the problems posed by marine oil spills and appropriate response measures,

available for sale priced £95 from Witherbys (www.witherbys.com).

Oil Tanker Spill Statistics, an annual publication providing data on accidental oil spills from tankers, combined carriers and barges since the 1970s, derived from ITOPF's database.

Country & Territory Profiles, short reports summarising the spill response arrangements and clean-up resources within individual maritime states.

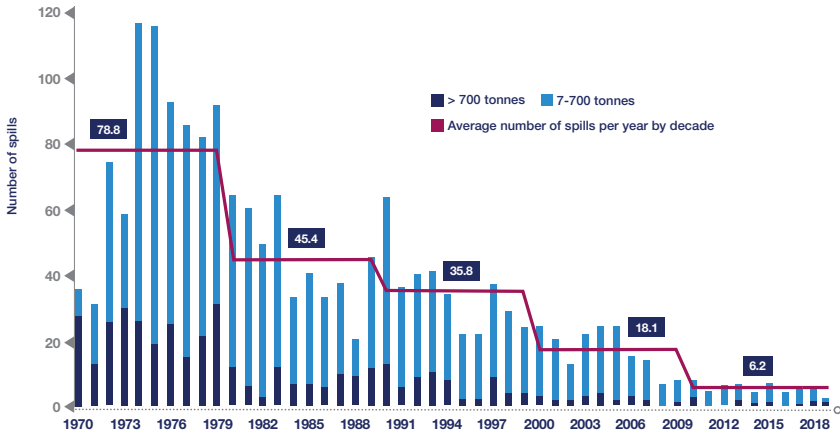
We also have a comprehensive library containing a unique collection of publications on marine spills, clean-up techniques, environmental effects and other related issues. This is open to students and other visitors for reference purposes by appointment.

Oil tanker spill statistics

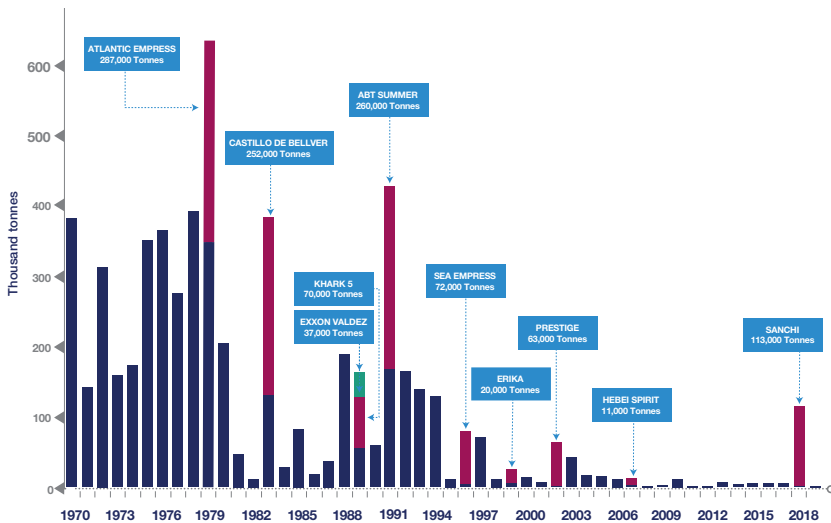
ITOPF's database contains information on approximately 10,000 oil spills from tank vessels, including combined carriers, FPSOs and barges, over 81% of which are less than seven tonnes.

Numbers and amounts

For the last five decades, the frequency of oil spills from tankers has shown a progressive downward trend. The



Numbers of large (over 700 tonnes) and medium (7-700 tonnes) spills, 1970-2019



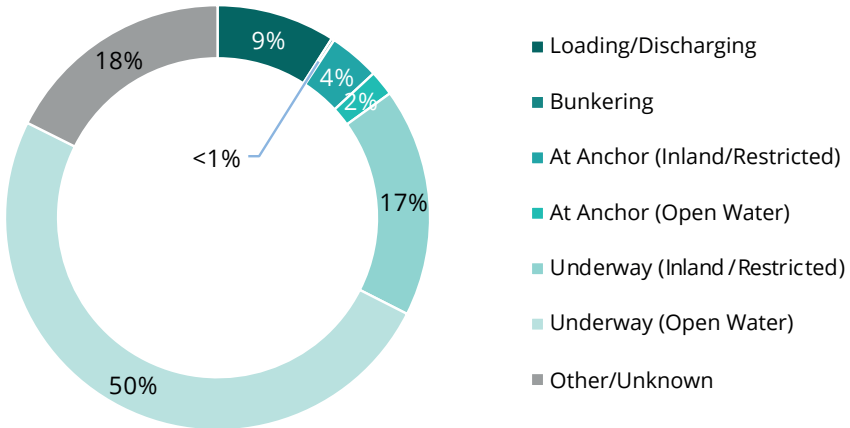
Quantities of oil spilt, 1970-2019

average number of spills of 7 tonnes or more is now about six per year, from a high of 79 in the 1970s. This reduction has been due to the combined efforts of the oil/shipping industry and governments (largely through IMO) to improve safety and pollution prevention.

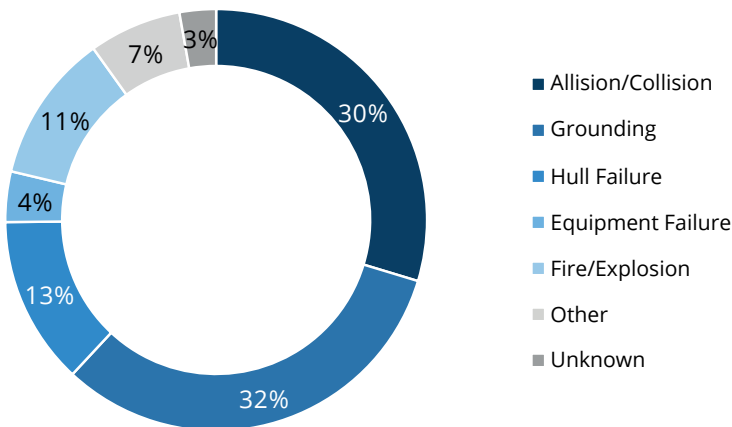
Statistics for the quantity of oil spilled through the decades show a similar trend. However, this trend can be distorted by a single large spill.

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 1970-2019, 50% of large spills (>700 tonnes) occurred while the vessels were underway in open water and 17% while underway in inland or restricted waters. The main causes of large spills were allisions/collisions (30%) and groundings (32%).



Operation at time of incident for large spills (>700 tonnes), 1970-2019



Causes of large spills (>700 tonnes), 1970-2019

Different types of marine spills

Spills of hydrocarbon-based oils from ships have been the focus of ITOPF's work from the beginning, initially from tankers and later from a wide range of ships. Over time, our activities have expanded to include other types of pollution at sea – including spills of vegetable oils, a wide range of hazardous chemicals and dry-bulk cargoes including coal and wood. The contents of containers also present a multitude of pollution risks. Here we provide an overview of some of the pollutants that ITOPF is called to deal with.

Hydrocarbon oils

Spills of hydrocarbon oils carried as cargo or bunker fuel remain our core activity. Further information on their fate and effects and appropriate clean-up activities are provided on pages 27–41.

Vegetable oils

The carriage of vegetable oils, such as palm, canola and soybean oil, has increased in recent years. Although less toxic than hydrocarbon oils, spills of vegetable oils in the marine environment can prove problematic, nonetheless.

In general, vegetable oils will behave similarly to hydrocarbon oils in the initial stage of a spill, in that they tend to float and spread on the surface of the water. However, vegetable oils are not very soluble in water; they do not undergo dispersion in the water

column nor will they evaporate to any extent. Depending on their particular characteristics, they may form solid lumps or polymerise into floating rubbery strings.

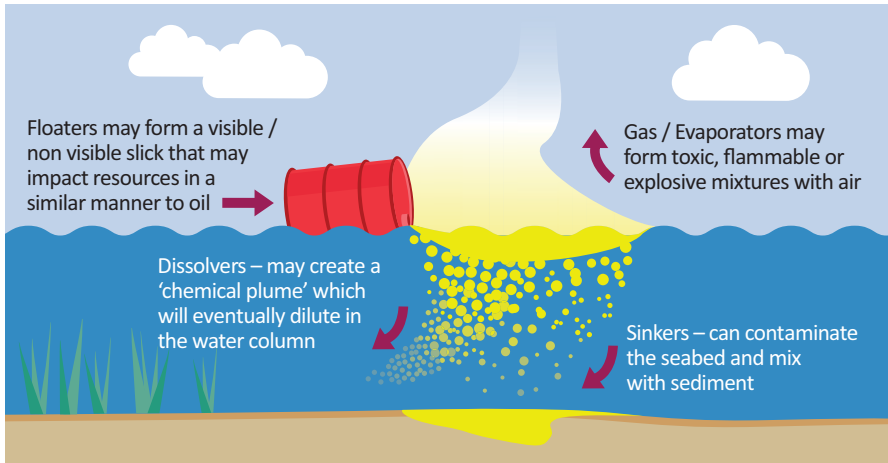
Vegetable oils are comprised primarily of triacylglycerols or fatty acids and in their fresh state may be broken down by marine micro-organisms. This decomposition contributes to the rancid odours typical of these spills.

The primary environmental consequences of spills of vegetable oils are seen in relation to surface dwelling organisms where oil can lead to smothering, suffocation and starvation. Examples include oiling of bird plumage and animal fur, or oxygen depletion and asphyxiation.

The most appropriate response technique is containment and recovery, such as using conventional booms combined with scoops, nets or grabs. Ideally, the floating lumps should be removed before they have chance



Floating palm stearin, Hong Kong



Behaviour of spilled chemicals

to fragment, incorporate sediment and sink to the seabed or reach the shoreline. Dispersants formulated for use on hydrocarbon oils have been shown to have little or no effect on vegetable oils.

Chemicals

Spills of chemicals are less frequent than spills of oil. However, due to the wide variety of chemicals transported, their differing properties and fate in the marine environment, as well as potential effects on human health and safety, they can often prove to be a more complex challenge.

Chemicals can be categorised in a number of ways, for example whether they are a solid, liquid or gas when transported or spilled; whether they exhibit one or more of five hazards: flammable, explosive, toxic, corrosive or reactive; and whether they sink, dissolve, float or evaporate in water (or a combination of these processes), as illustrated above.

The effects of a spilled chemical will depend on a number of factors such as its toxicity, the quantities involved and the resulting concentrations in the environment. Even sub-lethal concentrations of hazardous chemicals can lead to long term impacts within the marine environment. For example, chemically-induced stress can reduce the overall ability of an organism to reproduce, grow, feed or otherwise function normally.

Some substances can persist for long periods in the marine environment once lost to sea, including heavy metals and some organic compounds. This can result in bio-accumulation, whereby the chemical builds up in tissue at a faster rate than it can be broken down. Sessile marine species that filter seawater for food, such as bivalve molluscs, are particularly vulnerable to this effect. Subsequent bio-magnification may also occur if the chemicals travel up the food chain and ultimately to humans.

The potential consequences of spills



Chemical spill training, UK

of hazardous chemicals mean that effective response planning is crucial. A response should be mounted only once a thorough safety assessment of the situation has been completed. A number of different models are available to predict how a substance will behave and its likely trajectory, as well as assessing fire, explosion and toxicity risks.

Response options for many chemicals are limited and monitoring, without necessarily undertaking an active response, must always be considered. If a response is required, responders should wear appropriate personal protective equipment (PPE). For gases and evaporators, techniques available include “knocking down” the vapour cloud or trying to stop or deflect it using water sprays. For dissolvers, acceleration of the natural processes of dispersion and dilution may be possible. Containment and recovery may be an option for some floating chemicals, depending on their flammability, whilst mechanical dredgers and pump/vacuum systems might be used to recover chemicals that have sunk to the seabed.



Cleaning up a coal spill, Indonesia

For all types of chemical spill, maintaining adequate health and safety for vessel crew, responders and the public is key. In a major casualty, the presence of spilled hazardous chemicals can affect the clean-up of spilled oil, requiring detailed risk assessments for all involved.

Dry bulk – coal

Although fairly infrequent, coal spills recently attended by ITOPF have typically occurred in sensitive tropical regions where reefs and fisheries are present.

Common problems with large spills of coal include smothering and abrasion. The coal may sink, blocking light to sea bed flora and fauna and restricting water circulation. Any fixed or slow moving benthic organisms, including corals, may be crushed or trapped and have limited access to food sources, potentially causing mortality. Negative impacts are exacerbated by high wave energy which can throw coal repeatedly against shoreline substrates causing physical damage through abrasion.

Small particles of coal (or fines) may remain suspended in the water column for some time and in calm waters coal 'clouds' can block light and reduce the photosynthetic ability of organisms. Mobile organisms will move to better light sources, but fixed organisms are vulnerable to starvation, with corals particularly at risk. Fines released close to mariculture facilities or water intakes can clog pumping equipment or affect stock.

The removal of large amounts of stranded coal can present logistical challenges in remote environments; manual recovery is usually required rather than reliance on mechanical resources due to access or availability issues. Furthermore, coal may become buried by subsequent tides and become difficult to remove, particularly in dynamic environments.

Storage of recovered coal should be managed with care. An awareness of the potential for self-combustion of stored coal is important. In areas of high rainfall, leachate should be

managed to prevent contamination through runoff.

The above issues, particularly smothering, can apply equally to spills of other types of dry bulk cargoes, for example, iron and nickel ores, fertilisers, sulphur and cement.

Other cargoes

The loss of other cargoes, such as wood, foodstuffs (bulk and packaged) and livestock or the myriad other products carried in containerships bring their own set of variables and challenges. Rotting or decomposing organic materials, for example, grain, thawing fish or rotting carcasses, can result in the generation of hydrogen sulphide gas which is particularly hazardous when allowed to accumulate in confined spaces as it is highly toxic and flammable.

For container ship incidents, an understanding of the integrity of the container and the packaged contents inside may provide an indication of



Stricken container vessel, India



Manual collection of nurdles washed ashore, South Africa

whether the containers are likely to remain intact, float or sink if lost overboard. The response actions, as with oil, will depend on the specific properties and characteristics of the materials in question. Floating solids can be corralled from boats using nets and then recovered using grabs or shovels. Sunken materials may require dive surveys, dredges or crane grabs, where recovery is considered necessary.

Even seemingly inert and innocuous container contents can be problematic if spread over a shoreline or the seabed. Nurdles, small plastic pellets, present a particular problem if released

to sea as they can spread over vast distances and are difficult to detect and recover from shore.

Incidents can become particularly complex when non-oil cargoes mix with spilled oil, most commonly from the casualty's fuel tanks.

For example, large quantities of stranded oil-soaked plastic will need to be removed manually. Oiling also makes the identification of hazardous materials amongst other cargoes more difficult and the classification of recovered material for waste disposal more complex.

Fate of oil spills

The fate of oil spilled in the marine environment is dependent upon factors such as the initial physical and chemical properties of the oil, the quantity spilled, the prevailing climatic and sea conditions and whether the oil remains at sea or is washed ashore.

Oil properties

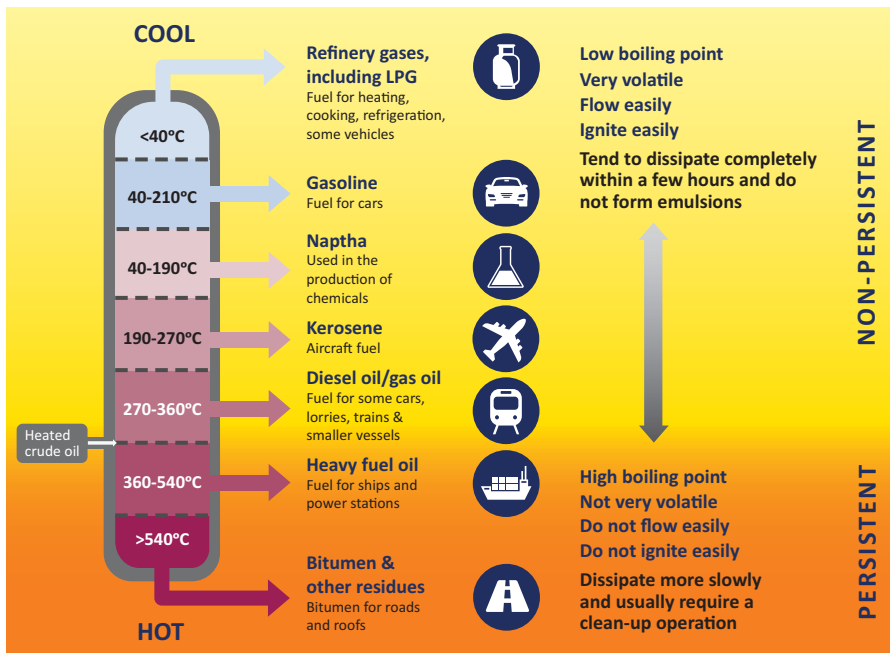
Crude oil is made up of a complex mixture of compounds. These range from very volatile, light materials such as propane and benzene, through medium-weight liquids, which include kerosene and diesel, to more complex heavy compounds such as bitumens,

asphaltenes, resins and waxes.

Different fractions have different boiling points and can be separated during the refining process by distillation. The schematic below summarises the main fractions obtained from crude oil, as well as their uses, properties and fate when spilled.

The main properties of oil which affect its behaviour when spilled oil at sea are:

- specific gravity (its density relative to pure water - often expressed as °API or API gravity); (Oil can be classified into four groups according to API. The table on page 28 shows example oils



Crude oil and its distillation fractions

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
Asgard	49	-28	2 @ 10°C	58	14
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
Wolybutt	49	-53	2 @ 20°C	55	4
Gasoline	58	-62	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

	A	B	C	D	E
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

	A	B	C	D	E
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
Shengji	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.

- from the four groups.)
- distillation characteristics (its volatility);
 - viscosity (its resistance to flow);
 - pour point (the temperature below which it will not flow).

In addition, wax and asphaltene content influence the degree to which the oil will mix with water to form a water-in-oil emulsion.

Weathering

When oil is spilled at sea it normally spreads out and moves on the sea surface with wind and currents while undergoing a number of chemical and physical changes. These processes are collectively termed weathering and include:

Spreading – the speed at which this occurs depends greatly upon the viscosity of the oil and the volume spilled.

Evaporation – the more volatile components of an oil will evaporate to the atmosphere at a rate dependent upon the ambient temperature and wind speed.

Sinking – oils of sufficiently high density may sink, occurs more readily in brackish or fresh water.

Dispersion – the breakup of the slick into fragments and droplets of varying sizes, proceeds most rapidly with low viscosity oils in the presence of breaking waves.

Emulsification – the incorporation of water into oil, can increase the volume of pollutant up to five times.

Stranding – the type of shoreline substrate can affect the fate of stranded oil.

Dissolution – the dissolving of soluble components, makes only a minor contribution to the removal of oil from the sea surface.

Oxidation – the reaction with oxygen, promoted by sunlight, means oil can form persistent tars most commonly seen as tarballs.

Sedimentation – dispersed oil can interact with sediment particles and organic matter to sink to the seabed.

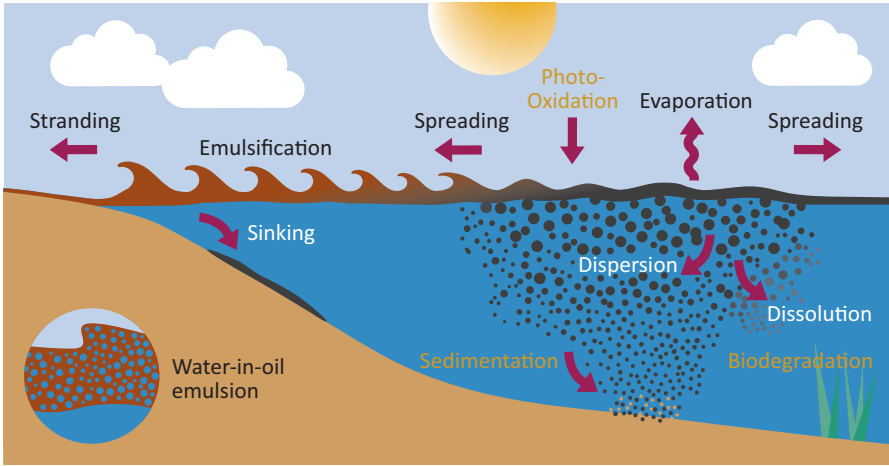
Biodegradation – metabolisation of oil by micro-organisms, dependent on temperature and upon the availability of oxygen and nutrients.

As a general rule, each process can be put into one of two chronological categories in terms of when their effect is most significant:

Early stage of a spill: spreading, evaporation, sinking, dispersion, emulsification, dissolution, and stranding.

Later stage of a spill: oxidation, sedimentation and biodegradation. These are longer term processes that will determine the ultimate fate of the oil spilled.

Some of these processes, like natural dispersion of the oil into the water, lead to the removal of the oil from the sea surface, and facilitate its natural breakdown in the marine environment. Others, particularly the formation of water-in-oil emulsions, cause the oil to



Weathering processes acting on oil at sea

become more persistent, and remain at sea or on the shoreline for prolonged periods of time.

The speed and relative importance of the processes depend on factors such as the quantity and type of oil spilled, weather and sea conditions. Once washed ashore, the fate of an oil depends on factors such as the type of substrate and wave energy. Ultimately,

spilled oil is usually dealt with in the marine environment through the long-term process of biodegradation.

A number of models are available for predicting the trajectory and weathering of oil spills at sea. These can serve as a useful guide to understanding how a particular oil is likely to behave and help when assessing the scale of impact.



Freshly spilt HFO beginning to fragment and spread, North Sea



Emulsified oil arriving onshore, India

Persistence

When considering the fate of spilled oil at sea, a distinction is frequently made between persistent oils and non-persistent oils.

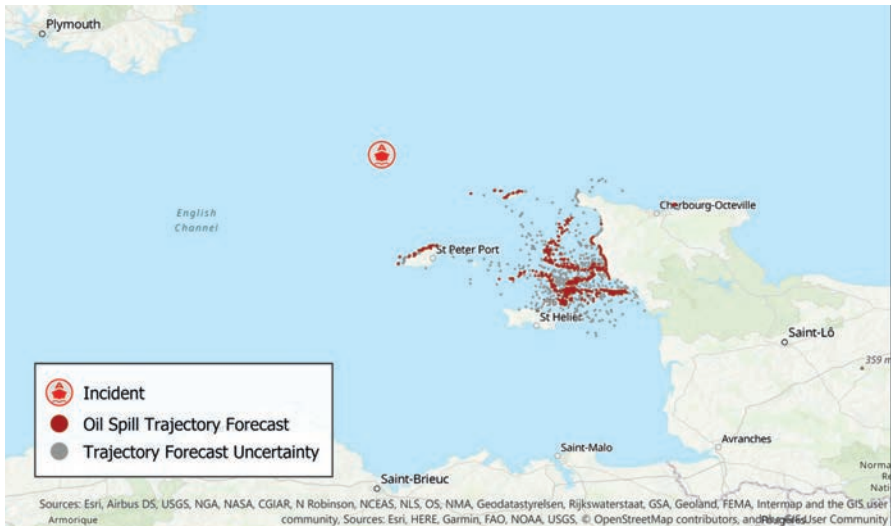
As a rule, persistent oils break up and dissipate more slowly in the marine environment and usually require an active clean-up response. Persistent oils typically include crude oils, fuel oils, lubricating oils and heavier grades of marine diesel oil. These oils pose a potential threat to natural resources when released, for example, through impacts to wildlife, smothering of habitats or oiling of amenity beaches and mariculture facilities.

In contrast, non-persistent oils will dissipate rapidly, primarily through evaporation. As a result, spills of these lighter oils rarely require an active response beyond monitoring. Non-persistent oils include gasoline, light

diesel oil and kerosene.

Impacts from non-persistent oils may include effects on paint coatings in marinas and harbours and, at high concentrations, acute toxicity to marine organisms.

Persistence is also important when it comes to the international compensation regimes. The IOPC Funds have developed guidelines which define persistence according to the distillation characteristics of the oil. Under these guidelines an oil is considered non-persistent if at the time of shipment at least 50% of the hydrocarbon fractions, by volume, distil at a temperature of 340°C (645°F) and at least 95% of the hydrocarbon fractions, by volume, distil at a temperature of 370°C (700°F) when tested in accordance with the American Society for Testing and Materials (ASTM) Method D86/78 or any subsequent revision thereof.



Models are available for predicting the weathering and trajectory of oil spills

Oil spill response techniques

The selection of the most appropriate response strategy will depend on many factors, including the resources available; the national and local regulations on oil spill response; the spill scenario; and the physical and ecological characteristics of the area affected by the spill.

Sometimes oil will dissipate and eventually degrade naturally without impacting the coast or wildlife. In these cases, monitoring the movement and fate of the floating slicks may be a sufficient response. For spills in coastal waters, the oil will often drift towards the shore and become stranded due to the action of waves and tides and an active clean-up response will be required.

At-Sea Response

Containment & recovery

Containing floating oil within booms for recovery by specialised skimmers is often seen as the ideal solution to a spill at sea as, if successful, this will physically remove the oil from the marine environment. As a result, it is the primary at-sea response strategy adopted by many governments around the world.

For a containment and recovery operation to be successful, there are some key challenges that must be overcome. The floating oil needs to be located and the equipment deployed in an effective arrangement. The sea state and weather conditions

should be sufficiently calm for the selected equipment to function as designed and to be operated safely by response personnel. The oil must also be in a state that is amenable for recovering with the skimmers that are available. Importantly, sufficient storage should be available to meet the pumping capability of the skimmers. These interrelated factors commonly combine to limit the proportion of spilled oil that can be recovered at sea. Nonetheless, where environmental conditions and equipment availability allow, containment and recovery is an important response strategy.

In-situ burning

The controlled burning of oil slicks at sea often at, or near, the spill source has the potential to rapidly remove relatively large amounts of oil from the sea surface. However, there are a number of operational constraints that limit the feasibility of this response method, including the difficulty of collecting and maintaining a sufficient thickness of oil to burn. The condition of the oil is also important; as it weathers the oil may lose lighter fractions through evaporation and start to form an emulsion making ignition difficult. Residues from burning may sink, with potential effects on sea bed ecology and fisheries, and there may also be human health concerns from the fire or smoke plume. Given the many factors to consider, the decision-making process for in-situ burning should be addressed during the contingency planning process.



Pressure washing port area, Israel

Dispersants

Dispersants work by enhancing the natural dispersion of the oil into the sea. They do this by facilitating the formation of numerous small droplets which rapidly dilute into the water column and are subsequently degraded by naturally occurring micro-organisms. Significant environmental and economic benefits can be achieved with dispersants, particularly when other at-sea response techniques are limited by weather conditions or the availability of resources.

Dispersants can be applied by a variety of methods. In general, spraying dispersant from vessels and small aircraft or helicopters is more suitable for treating smaller spills and nearshore areas; large multi-engine planes are better for handling large offshore spills. The key to successful chemical dispersion is the ability to target the thickest part of the oil slick in a timely manner, before it becomes viscous through evaporation or has formed an emulsion. Some types of oil, such as heavy fuel oil and viscous crude, are less amenable to dispersion from the outset.

Dispersant use can be controversial, at times generating widespread debate in the media and public forums. Whilst its use can be viewed as a way of minimising the potential impacts of oil on sensitive resources, it is also sometimes seen as adding another unwanted pollutant into the environment.

The decision on whether or not to use dispersants is seldom clear-cut and a balance has to be struck between the advantages and limitations of the different available response options, conflicting priorities for protecting sensitive resources from pollution damage and cost-effectiveness.

As with all clean-up options, detailed contingency planning will aid in the decision process. In particular, dispersant use is usually regulated by government agencies and planning for its use may allow the necessary licenses and permissions to be expedited.

Shoreline clean-up and response

Once oil has reached the shoreline, the selection of the most appropriate clean-up techniques requires a rapid evaluation of the degree and type of contamination, together with the length, nature and accessibility of the affected coastline. Where possible, it is important to start removing oil from affected shorelines as quickly as possible to minimise its remobilisation and potential to affect other areas. As time passes and the oil weathers, it may adhere to rocks and sea walls or become mixed or buried in sediments.

Shoreline clean-up operations are often considered in three stages; Stage 1 – removal of bulk oil; Stage 2 - removal or treatment in-situ of oiled shoreline substrate, for example oiled sand or gravel (often the most protracted part of shoreline clean-up); and Stage 3 – final clean-up of light contamination and removal of stains, if required. Consideration needs to be given to the environmental sensitivity of the shoreline to ensure that the planned level of cleaning will not cause more harm than allowing the oil to degrade naturally.

During Stage 1 clean-up, the use of vacuum trucks, pumps and skimmers may be useful on pooled liquid bulk oil. For very viscous or emulsified bulk oil or oil-soaked sediment, a variety of non-specialised civil engineering or agricultural machinery may be used to collect and remove stranded oil and contaminated material. In many parts of the world, manual collection is an important strategy and can be particularly useful on sensitive shores and areas inaccessible to vehicles.

Importantly, with Stage 2 clean-up, collection of unoiled material should be kept to a minimum to prevent shoreline erosion and avoid excessive waste. Preferably, oiled material should be treated in-situ, for example by flushing (a technique using high volumes of low-pressure water to wash stranded or buried oil from shorelines) or surf washing (whereby the natural cleaning action of shoreline waves are used to release oil from shore sediment).

During the latter stages of a shoreline clean-up, other techniques may be deployed to complete the work. These

include high pressure washing (using either hot or cold water), particularly on man-made structures; drum washing of pebbles and cobbles in concrete mixers or purpose built facilities; and ploughing or harrowing using tractor-towed implements or sand sieving/ beach cleaning machines for high amenity use beaches.

In situations where restricted access to rocky or cobble shorelines prevents the use of pressure washing or other equipment, manual cleaning may be the only option for the active removal of oil.

The use of bioremediation products, which accelerate the natural degradation of oil, is not normally recommended on open shorelines as biodegradation is rarely limited by nutrients and/or biodegrading organisms. Furthermore, the time required for complex oil compounds to degrade is longer than the timescales usually desired to return an area to its normal use.

In time, most shorelines will clean naturally as the oil weathers and degrades. On high-energy sites, natural cleaning can be very effective, and the majority of oil is likely to be removed within a seasonal cycle. However, along sheltered shorelines, particularly with fine sediment, such as saltmarshes, or in cold climates, natural degradation can proceed very slowly and oil may persist for many years.

Disposal

Cleaning up oil spills can generate significant amounts of waste. This includes not just the recovered oil



Skimming operations in port, Thailand

itself, but oiled cargo, debris, shoreline sediment, fauna and flora, mariculture infrastructure, response equipment and materials, and protective clothing (PPE). The waste generated may amount to over ten times the volume of oil originally spilled, particularly if non-selective shoreline clean-up techniques are employed. As a consequence, waste can cause major logistical problems and delays for the clean-up operation and even bring the response to a standstill, unless adequate arrangements are in place, including temporary storage and transportation, as well as final disposal.

The best and most obvious option for waste is to minimise the recovery of unoiled material and treat as much oiled substrate in-situ as possible.

Different types of waste are often disposed of differently, so it helps to separate the waste and keep it

segregated from the outset. This is not always easy, but it saves time and money and makes it much easier to direct the waste towards the appropriate treatment or disposal method.

In many countries, the most practical and cost-effective disposal options still take precedence over more sustainable waste management choices. This means that much oily waste goes for incineration or into landfill. However, some waste streams can be treated to facilitate re-use. For example, recovered liquid oil can be blended into feedstock for use in oil refineries or with fuel oils for burning in power stations. This is an option that works best with oil collected from the sea rather than the shoreline, as the former typically contains less debris. Oily sand that does not contain too much debris can also be minimised by stabilising it using quicklime for use in land reclamation and road construction.

Contingency planning & response management

The effectiveness of the response to an oil spill depends largely on the quality of the contingency plan and the organisation and control of the clean-up operation. Once oil has spilled, events can move rapidly and having the necessary infrastructure, logistical support and leadership in place makes for a more effective response.

Pre-planning

Careful planning before an incident occurs allows key decisions to be made outside the pressurised environment of a real incident. The process of producing a plan provides the opportunity to define the roles and responsibilities of the different parties likely to be involved in a spill and the organisational structure for effective command and control. It also allows for the assessment of the particular risks of a spill and its expected consequences, and identifies sensitive environmental and economic resources, priorities for protection and clean-up, effective response strategies and operational procedures.

It is crucial that plans are living documents, prepared by those agencies, organisations and stakeholders that might be involved in a response, and incorporate a high degree of local knowledge. Thorough testing of the plan through regular exercises will help ensure that all participants are familiar with their roles.



GIWACAF transboundary exercise, Namibia

In line with best practice, contingency planning often follows the concept of 'tiered' response. This is a widely accepted and convenient way to categorise response levels and provides a practical basis for planning. Spills that are small can often be dealt with locally (Tier 1). Should an incident prove beyond the local capability or affect a larger area, an enhanced but compatible response will be required, drawing upon resources based further afield (Tier 2). The foundation of this tiered response is the local plan for a specific facility, such as a port or oil terminal, or for a specific length of coastline at risk from a spill. These local plans may form part of a larger district or national plan (Tier 3). National plans may in turn be integrated into regional response arrangements covering two or more countries. In general, contingency plans should follow a similar format. This will enable the plans to be easily understood, assist compatibility and

ensure a smooth transition from one tier level to the next.

As events unfold

Aerial surveillance is an important element of planning during a response, and can establish the scale and nature of an incident at an early stage, verifying predictions of the movement and fate of oil. Once operations are underway, it provides information that facilitates the appropriate deployment of resources at sea, the timely protection of sites along threatened coastlines and the prioritisation of resources for shoreline clean-up. Advances in remote sensing – using satellites or unmanned aerial vehicles (UAVs) – offer huge potential for monitoring and responding to oil spills safely and efficiently.

The efficient management of resources engaged in shoreline clean-up is vital to the success of the operation. In deciding which clean-up techniques are to be used, the management team

have to consider the interests of all concerned with the various local uses of the marine environment, for example, recreation, tourism, fisheries, industry and marine conservation. Proper organisation of the workforce and activities on the shoreline is also crucial so that the clean-up is undertaken in the safest and most effective way possible, and that unnecessary impacts on the environment are avoided.

All clean-up activities should be monitored regularly and re-evaluated constantly using information gained from aerial surveillance and personnel on site. Strategic decisions can be reassessed to determine whether the scale of the response remains appropriate to the size and severity of the spill.

Joint surveys, undertaken by representatives of the various interested parties, are commonly undertaken in order to bring operations to a successful close.



Aerial survey, Brazil



Taking samples, USA

Effects of marine oil spills

Environmental

Oil spills can have serious and wide-ranging impacts on wildlife, fisheries, and coastal and marine habitats, but long-term damage at an ecosystem level is rare.

Oil spills are often portrayed as “environmental disasters” in the media and such perceptions, fuelled by distressing images of oiled birds and contaminated shorelines, are understandable. A science-based appraisal of typical oil spill effects, however, reveals that while damage occurs and may be severe at the level of individual organisms, populations are more resilient. With time, ecosystems can re-establish, even after severe disruptions and/or extensive mortality. Recovery can be assisted by the removal of oil through well-conducted clean-up operations and may sometimes be accelerated with carefully planned restoration measures.

General effects

The effects of oil on marine organisms is caused either by its physical nature or by its chemical components.

Physical smothering will affect an organism’s ability to continue critical functions, such as respiration, feeding and thermoregulation. This is most common with heavier oils and weathered residues.

Chemical toxicity may arise as a result of chemical components being



Oil arriving ashore, Brazil

absorbed into organs, tissues and cells. This does not always cause mortality, but may induce temporary effects like narcosis and tainting of tissues, which usually subside over time. This is more common with light oils and refined products.

Marine life may also be affected by clean-up operations, indirectly through physical damage to the habitats in which they live, or through the loss of key organisms that alter the ecosystem dynamics.

The effects of an oil spill will depend on a variety of factors. These include the quantity and type of oil spilled, and how it interacts with the marine environment; the season and prevailing weather conditions; the biological and ecological attributes of the area and its sensitivity to oil pollution; and the type and effectiveness of the clean-up response.

Effects on specific marine organisms and habitats

Plankton

The upper layers of the sea support a myriad of planktonic organisms, including bacteria, eggs and larvae, and a variety of animal and plant species. It is well established that plankton is sensitive to oil exposure and consequently short-term impacts would be expected in the immediate vicinity of the oil. However, plankton is abundant and will naturally suffer very high levels of mortality. As a result, a large proportion of a given species will remain unaffected by the oil and it is rare for plankton mortalities following a spill to have lasting consequences.

Fish

Although the eggs and larvae of fish may be susceptible to the effects of oil, adult fish tend to be more resilient. Reductions in wild fish stocks in offshore and coastal waters following

oil spills have rarely been detected, as fish can detect unfavourable water conditions and actively swim away to avoid them. Where mass mortalities have arisen, it has been because of very high, localised concentrations of dispersed oil in shallow or confined waters. Fish mortalities can occur with caged fish stocks where individuals are unable to actively avoid the oil.

Seabirds

In open water, seabirds are some of the most vulnerable of all animals to oil spills, and in some incidents large numbers may perish. Fouling of plumage (which is essential for thermoregulation and buoyancy control) is the most visible effect. Although cleaning and rehabilitation of birds may be attempted, success is often linked to the species of bird, and in many cases only a small fraction of those treated will survive or breed successfully after release. However, it is encouraging that with experience and research, best practices for bird cleaning are emerging and rehabilitation success is improving. Increasingly, oil spill contingency plans define policies on how to deal with oiled seabirds and wildlife.

Sea mammals and reptiles

Oil can potentially cause harm to the nasal tissues and eyes of marine mammals and reptiles as they come to the surface to breathe. Mammals that rely on fur to regulate body temperature may also be harmed or die from hypothermia or overheating if their fur becomes matted with oil. For species that breed on shorelines, the greatest impact is likely to be on their breeding sites if they become contaminated with oil.



Oiled brown pelican, USA



Oiled mangrove roots, Indonesia

Coastal waters and shorelines

The impacts of a spill in nearshore waters are most often related to exposure to high concentrations of naturally or chemically dispersed oil. Where tidal flushing is insufficient to dilute the dispersed oil below harmful levels, high mortalities of benthic organisms can occur.

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. Shorelines can be impacted both by the toxic effects of high concentrations of dispersed oil at high tide or suffer the smothering effect of oil stranded at low tide. Many species and individual organisms found here are inherently tough and resilient, however, because they have evolved to survive in a highly dynamic environment with periodic fluctuations in temperature and salinity, storms or other severe stresses. This tolerance also gives many shoreline organisms the ability to withstand and recover from oil spill effects.

Within shallow inshore waters and the shoreline zone, three habitats are particularly sensitive to oil

pollution; coral reefs, saltmarshes and mangroves. These ecologically rich and diverse habitats are important for providing coastal protection and as nursery grounds for many invertebrate and fish species. They tend to be found at, or close to, the border between sea and land, and are, therefore, at high risk of contamination during oil spills. Because of the turbulence and wave action associated with reefs, corals may be exposed to naturally dispersed oil droplets. This may cause interference with reproductive processes and lead to abnormal behaviour and reduced, or suspended, growth. The communities that reef habitats support are also sensitive to oil.

Saltmarshes and mangroves are typically found on sheltered shores and natural recovery of these complex ecosystems may take a long time. It is in these marsh and mangrove areas where reinstatement measures, such as planting mangrove seedlings, may have potential to accelerate recovery.

Recovery

The natural variability of animal and plant populations, which are subject to ever-changing environmental phenomena such as hurricanes, tsunamis and anthropogenic pressures, makes it difficult to determine the point of recovery following an oil spill, and the time that this will take.

A return to exact pre-spill conditions is unlikely, but it is generally accepted that recovery is reached when a community of plants and animals characteristic of that habitat is established and functioning normally.

Long-term damage has been recorded in a few instances. However, in most cases, even after the largest oil spills, the affected habitats and associated marine life can be expected to have broadly recovered within a few seasons.

Economic

Significant economic losses can be experienced by industries and businesses dependent on coastal resources. Usually, the tourist and fisheries sectors are where the greatest impacts are felt.

Tourism

Contamination of coastal amenity areas is a common feature of many oil spills, but disruption to recreational activities is usually relatively short-lived. Once shorelines are clean, normal activities and tourist-related trade would be expected to resume. However, longer-term economic impacts can occur when public perception of prolonged and widescale pollution remains long after the oil has gone. In some cases, promotional campaigns may help to counteract negative publicity generated by the spill.

Fisheries and mariculture

Oil spills can cause serious damage to fisheries and mariculture resources. Physical contamination can affect stocks and disrupt business activities by fouling gear or impeding access to fishing sites. In order to preserve market confidence and to protect fishing gear, fishing or harvesting bans may be imposed or voluntarily implemented. In some cases, bans are

imposed if contamination in seafood exceeds acceptable limits.

All fishery damage needs to be documented and, where possible, supported by evidence in order to facilitate the compensation process. This often requires rigorous scientific sampling and analysis. It is often difficult to separate the effects of an oil spill from other factors, such as over-fishing and industrial pollution. In order to make the best assessment of spill-related damages, it is necessary to compare post-spill recovery with pre-spill conditions.

Other industries/businesses

Heavy industry, such as power stations and desalination plants, that rely on seawater for normal operations can be at high risk from oil spills, particularly if water intakes are close to the surface. If such plants are responsible for meeting needs on a national scale, disruptions can be far reaching. Other types of coastal industry, such as shipyards, ports and harbours, can also be disrupted both by oil spills and subsequent clean-up operations.



Oiled fish farm, China

Pollution liability and compensation

Oil spills may result in expenditure and financial loss for a variety of affected organisations and individuals. Despite the best efforts of those concerned, the response and clean-up can be protracted and costly. Oil may arrive on a shoreline resulting in damage to property and the environment, with economic loss to fishing, tourism and other commercial activity. Those placed at a financial disadvantage as a result of a spill of oil may be eligible for compensation.

Four international conventions, developed through IMO and described below, provide the basis for compensation for oil spill damage and clean-up costs in many countries. To be applicable, governments must sign up to each convention and implement them into their own national law.

The conventions apply in the waters of signatory countries (party states) regardless of the nationality of the shipowner or the registered flag of the vessel.

Convention	Applicability	Source of compensation	Financial limit ¹	Signatory States ²
1992 Civil Liability Convention ³	Tankers carrying persistent oil cargo & bunker fuel oil or residues of persistent oil cargo	Shipowner/insurer	Dependent on GT up to ~\$125 million	140
1992 Fund Convention		1992 Fund	~\$280 million	117
2003 Supplementary Fund Protocol		Supplementary Fund	~\$1,040 million	32
2001 Bunkers Convention	Bunker fuel oil from all ships	Shipowner/insurer	Dependent on GT	95
2010 Hazardous and Noxious Substances Convention (not yet in force)	Ships carrying cargoes of HNS, including non-persistent oils	Shipowner/insurer	Dependent on GT, bulk goods up to ~\$140 million; packaged goods up to ~\$160 million	5
		HNS Fund	~\$350 million	

Summary of international conventions applicable to ship-source marine pollution

¹ Limits converted to US \$ from SDR (Special Drawing Rights) as defined by the International Monetary Fund.

² As at 4th February 2020. An up-to-date list of Contracting States is available at www.imo.org/en/About/Conventions/StatusOfConventions/Pages/Default.aspx.

³ Six additional countries are signatory solely to the 1969 Civil Liability Convention. This earlier iteration of the CLC provides a significantly reduced liability limit and applicability, and has been superseded by the 1992 Protocol.

Civil Liability and Fund Conventions

The Civil Liability and Fund Conventions provide a mechanism for compensation for a spill, or the threat of a spill, of persistent⁴ oil carried in tankers⁵.

The CLC provides the first level of compensation, paid by the owner or insurer of the tanker. CLC places strict liability on the tanker owner (subject to a number of specific exceptions). This means that compensation may be available even if the pollution was not due to any fault of the owner and in most instances without the need for a claimant to involve the courts. At the same time, the CLC allows the tanker owner's liability to be limited to an amount of money dependent upon the size (gross tonnage) of the tanker. The limitation amount varies according to the version of the CLC in force in the affected country (ie CLC '69 or '92). Ships carrying more than 2 000 tonnes of persistent oil as cargo must maintain adequate insurance or other financial security to cover this liability. Evidence of insurance is normally provided by a 'Blue Card' issued by the insurer and a Convention certificate issued by a signatory country.

The 1992 Fund Convention provides a second level of compensation for a spill, or the threat of a spill, of persistent oil from a tanker, when claimants do not obtain full compensation under the CLC '92. In 2003, a protocol to the 1992 Fund was adopted. This established the Supplementary Fund, providing a third level of compensation.

To date, no incidents have involved the Supplementary Fund. The Fund Conventions are administered by the International Oil Pollution Compensation Funds (IOPC Funds), an intergovernmental organisation based in London, and financed by a levy on receivers of persistent oil in its Member states.

The Civil Liability and Fund Conventions cover claims for pollution response (preventive measures), damage to property and the environment, economic loss, and post-spill studies.

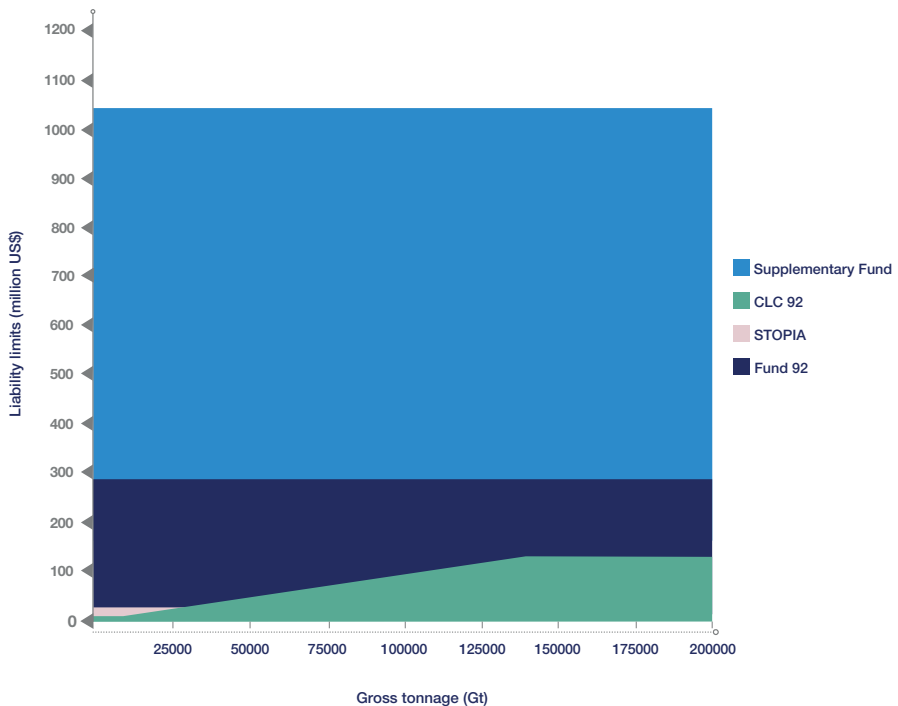
STOPIA and TOPIA

To ensure the equitable sharing of compensation payments between tanker owners and oil receivers under the Civil Liability and Fund Conventions, two voluntary agreements were introduced in 2006. The Small Tanker Oil Pollution Indemnification Agreement (STOPIA) applies to small tankers, insured by a P&I Club within the International Group of P&I Clubs (IG), that cause pollution damage in a country in which the 1992 Fund Convention is in force. Under STOPIA 2006, the liability under CLC 1992 for owners of tankers up to 29,548 gross tonnes (GT) is increased to about \$28 million.

A second agreement, known as the Tanker Oil Pollution Indemnification Agreement (TOPIA), allows the owner of a tanker, insured by an IG P&I Club to reimburse the 2003 Supplementary Fund for 50% of the amounts paid in compensation by that Fund.

⁴A definition of persistence is provided on page 31.

⁵A tanker is defined under the two Conventions as a seagoing vessel or seaborne craft constructed or adapted to carry oil in bulk as cargo.



Compensation limits under the 1992 Civil Liability and Fund Conventions (including 2003 Supplementary Fund Protocol and Small Tanker Oil Pollution Indemnification Agreement–STOPIA)

Bunkers Convention

The Bunkers Convention provides compensation for pollution damage, including clean-up costs, caused by oil used for the operation or propulsion of a ship, including lubricating oil⁶. It is applicable to any type of sea-going vessel.

The Bunkers Convention is a single-tier compensation regime modelled on the CLC, but has no provision for additional compensation above the shipowner’s limit. As with CLC,

a key requirement of the Bunkers Convention is the need for the registered owner of a vessel (over 1,000 GT for the Bunkers Convention) to maintain compulsory insurance to cover liability, evidenced by a Blue Card and Convention certificate. The limit of liability of the shipowner is determined by separate applicable national legislation or an international limitation regime, such as the Convention on Limitation of Liability for Maritime Claims (LLMC). The Bunkers Conventions covers the same type of claims as the CLC.

⁶ Bunker oil is defined as any hydrocarbon mineral oil, including lubricating oil, used or intended to be used for the operation or propulsion of the ships and any residues of such oil.

Hazardous and Noxious Substances (HNS) Convention (not yet in force)

The 2010 HNS Convention applies to incidents at sea involving hazardous substances carried by any sea-going craft, for example tankers and bulk carriers carrying bulk cargoes, as well as container ships carrying packaged goods. A large number of substances are included under the HNS Convention, including non-persistent oils such as gasoline and kerosene, vegetable oils and chemicals, as referenced in various IMO conventions and codes. Radioactive materials and some bulk solids, such as coal and iron ore, are excluded.

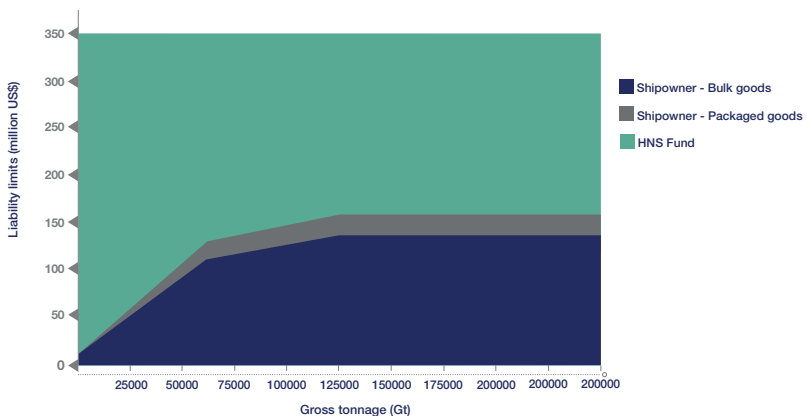
The HNS Convention is modelled largely on the Civil Liability and Fund Conventions, with a two-tier system for compensation, strict liability for the shipowner and a system of compulsory insurance and insurance certificates. However, it goes further in that it covers not only pollution damage (including preventative measures), but also the

risks of fire and explosion, including loss of life or personal injury.

As with the CLC/Fund regime, the first level of compensation is paid by the shipowner or insurer of the vessel, up to an amount dependent upon the size of the ship, and whether the HNS is in bulk or packaged form. An HNS Fund, made up of contributions from the receivers of HNS cargo, provides a second level of additional compensation when full compensation is not available from the shipowner.

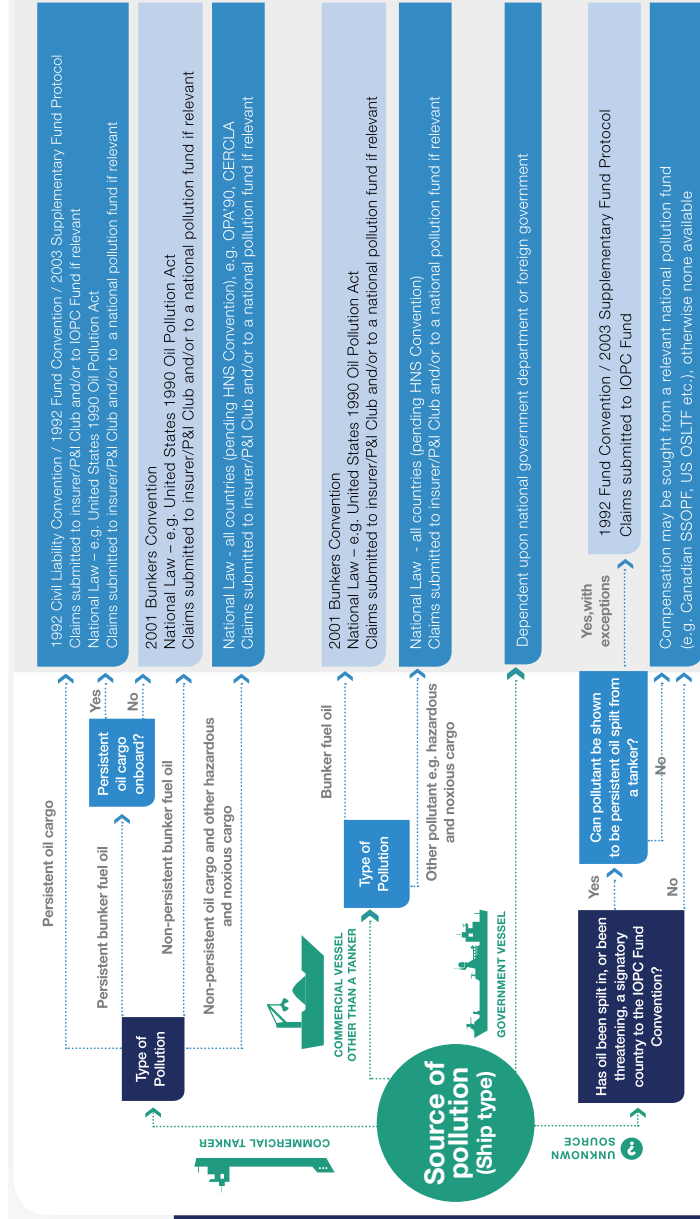
The 2010 HNS Convention does not apply to oil pollution damage from tankers, covered under CLC '92. However, non-pollution damage caused by persistent oil, for example damage caused by fire or explosion, will be covered.

More detailed information on the international pollution liability and compensation regime is available on the websites of IMO, the IOPC Funds and the International Group of P&I Clubs, as well as ITOFF.



Compensation limits under the 2010 HNS Convention showing the limits in US\$ for vessels of Gross Tonnage up to 200,000GT.

Pollution liability and compensation for a ship-source marine oil spill



Claims

Claims arising under the four primary conventions are usually handled by the shipowner's insurer in the first instance. Where applicable, the insurer (usually one of the P&I Clubs) and the IOPC Funds cooperate closely in the assessment of claims, often using joint experts such as ITOPF. Guidance is available on the admissibility of claims, the types of evidence required to support a claim, and how a claim should be formulated and submitted⁷. 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.

It is the responsibility of the claimant to provide adequate evidence of a loss, and further information and evidence may be requested during the claim assessment process. The assessment may therefore take the form of iterative exchanges between the claimant and those responsible for settling the claim, until the process has been completed. In most cases, agreement on the amount of compensation to be paid is reached on an amicable basis, without the need for legal action and associated costs.

National legislation

While the regime of international compensation conventions aims

Source tank vessel (US\$)	Liability limits for five ship sizes (US\$ rounded)
For an oil cargo tank vessel less than or equal to 3,000GT with a single hull, including a single-hull tank vessel fitted with double sides only or a double bottom only. The greater of \$3,700 per GT or \$7,478,800	2,000 GT = \$7.4 million
For a tank vessel less than or equal to 3,000 GT, other than a vessel referred to above. The greater of \$2,300 per GT or \$4,985,900	2,000 GT = \$4.6 million
For an oil cargo tank vessel greater than 3,000 GT with a single-hull, including a single-hull tank vessel fitted with double sides only or a double bottom only. The greater of \$3,700 per GT or \$27,422,200	10,000 GT = \$37 million 50,000 GT = \$185 million 100,000 GT = \$370 million 200,000 GT = \$740 million
For a tank vessel greater than 3,000 GT, other than a vessel referred to above. The greater of \$2,300 per GT or \$19,943,400	10,000 GT = \$23 million 50,000 GT = \$115 million 100,000 GT = \$230 million 200,000 GT = \$460 million

Tank vessel liability limits under OPA '90 (as updated 12th November 2019)

⁷ See ITOPF Technical Information Paper 15: Preparation and submission of claims from oil pollution.

to provide global uniformity for all scenarios of ship-source marine oil pollution, these conventions have not been ratified universally or, as in the case of the HNS Convention, are not yet in force. In incidents where an international convention does not apply, liability and compensation will be dependent upon legislation established nationally. This legislation can be highly specific, such as the Oil Pollution Act of 1990 (OPA '90) in the USA (described below), or be based on broader laws developed originally for other purposes. As a result, liability and the availability of compensation can vary widely from country to country.

USA—Oil Pollution Act of 1990 and Oil Spill Liability Trust Fund

The Oil Pollution Act of 1990 (OPA '90) is a comprehensive piece of legislation that includes provisions for liability and compensation for spills of persistent and non-persistent oils from onshore and offshore facilities, ships and other watercraft. It also includes sections on planning and prevention activities. OPA '90 does not prevent individual US States from implementing more stringent laws for releases of oil and many have done so.

Under OPA '90, the owner, operator or bareboat charterer for a vessel or facility (the Responsible Party) from which oil is discharged (or which poses a substantial threat of discharge) is strictly liable for removal costs carried out in accordance with the national contingency plan, and certain specified damages resulting from the discharged oil. For ships, liability limits vary according to the type and size of the vessel.

In certain circumstances claims may be submitted to the US Oil Spill Liability Trust Fund (OSLTF), for example when the Responsible Party is unknown or refuses to pay a claim, or when the first level of liability is insufficient to satisfy all admissible claims for compensation. The Fund, funded by a tax on oil, is administered by the US Coast Guard's National Pollution Funds Center and can provide up to \$1 billion for any one pollution incident.

Other relevant conventions

Oil Pollution Preparedness, Response and Co-operation (OPRC) Convention

The primary objective of OPRC 1990, which entered into force in 1995, 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.

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.

Wreck Removal Convention

The Nairobi International Convention on the Removal of Wrecks 2007 provides 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 entered into force in 2015.

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, Bunkers and Wreck Removal Conventions as at 4th February, 2020. 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 Funds websites (www.imo.org; www.iopcfunds.org).

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

Terms and Conditions of Membership

(effective 12th July, 2018)

1. Membership of 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 12th July 2018, 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) of oil, or of HNS, whether as cargo or bunkers, or of any other cargo 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 of oil, or of HNS, whether as cargo or bunkers, or of any other cargo from a Tanker;
 - c) the technical assessment of claims for compensation resulting from a spill (or the threat thereof) of oil, or of HNS, whether as cargo or bunkers, or of any other cargo from a Tanker;
 - d) Contingency planning, response techniques, fate and effects, and compensation resulting from a spill (or threat thereof) of oil, or of HNS, whether as cargo or bunkers, and of any other cargo;
 - e) training courses, drills, exercises and similar events in respect of oil, or of HNS, whether as cargo or bunkers, or of any other cargo;
 - 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. ITOPF reserves the right in its absolute discretion:

- a) (i) to terminate the Membership of any Member; and/or
- (ii) to 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 the continuation of such Membership and/or 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;
- b) not to respond to a request by or on behalf of a Member for the provision of Services where in its absolute discretion ITOPF has determined that the spill (or the threat thereof) of oil, or of HNS or any other cargo from a Tanker has arisen other than directly in connection with the operation of the Tanker including, but not limited to, as a result of a blow-out, cratering, seepage or any other uncontrolled flow from a well or reservoir or any equipment not contained within the Tanker; and/or
- c) 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 absolute discretion 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. The subscription is currently calculated on the basis of 0.42 of a UK penny per gross ton plus £20 Administration fee per tanker.

Terms and Conditions of Associate Status

(effective 12th July, 2018)

- Associate status of ITOPF is subject to these Terms and Conditions, which apply to all Associates of ITOPF as at 12th July 2018, 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.
- 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.
- 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.
- 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 spill (or the threat thereof) of oil, or of HNS, whether as cargo or bunkers, or of any other cargo from a Ship, including on-site attendance to give technical advice with the aim of effecting an efficient response operation and mitigating any damage;
 - the technical assessment of damage caused by a spill of oil, or of HNS, whether as cargo or bunkers, or of any other cargo from a Ship;

- c) the technical assessment of claims for compensation resulting from a spill (or the threat thereof) of oil, or of HNS, whether as cargo or bunkers, or of any other cargo from a Ship;
 - d) Contingency planning, response techniques, fate and effects, and compensation resulting from a spill (or threat thereof) of oil, or of HNS, whether as cargo or bunkers, and of any other cargo;
 - e) training courses, drills, exercises and similar events in respect of oil, or of HNS, whether as cargo or bunkers, or of any other cargo;
 - 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. ITOPF reserves the right in its absolute discretion:
- a) (i) to terminate the Associate status of any Associate; and/or
 - (ii) to 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 the continuation of such Membership and/or 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;
 - b) not to respond to a request by or on behalf of an Associate for the provision of Services where in its absolute discretion ITOPF has determined that the spill (or the threat thereof) of oil, or of HNS or any other cargo from a Ship has arisen other than directly in connection with the operation of the Ship including, but not limited to, as a result of a blow-out, cratering, seepage or any other uncontrolled flow from a well or reservoir or any equipment not contained within the Ship; and/or
 - c) 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 absolute discretion 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. The subscription is currently calculated on the basis of 0.38 of a UK penny per gross ton of entered ships.



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