Participant's Manual

IMO MODEL COURSE ON OIL POLLUTION, PREPAREDNESS, RESPONSE AND COOPERATION

3rd Edition, 2019

Introductory Level

Level 1

Level 2

Level 3

IMO INTERNATIONAL MARITIME ORGANIZATION

TABLE OF CONTENTS

INTRODUCTION

The purpose of this Participant's Manual is to provide you with guidance in the use of the course materials and hand-outs both during and after the training course.

GENERAL

The International Convention on Oil Pollution Preparedness, Response and Cooperation, 1990 (OPRC) calls for the International Maritime Organization (IMO), along with relevant international and regional organizations, oil and shipping industries, to develop a comprehensive training programme in the field of oil pollution preparedness and response, including the availability of expertise for the development and implementation of training programmes. In this regard, four model training courses were developed, aimed at the following:

Introductory Level:	Raising Awareness
Level 1:	First Responders (Operational)
Level 2:	Supervisors and On-Scene Commanders (Tactical)
Level 3:	Administrators and Senior Managers (Strategic)

These courses, when properly linked to a country's national contingency plan, can be used to train staff who are responsible for the conduct and management of an effective response to a marine oil spill.

The Level 2 course was designed to be conducted as a four-day training course and is aimed at Incident Commanders, On-Scene Commanders, Supervisors and all those working in an incident command centre in response to an oil pollution incident.

STRUCTURE OF THE COURSE

COURSE OBJECTIVES

Each module and the lessons contained within have clearly stated objectives. These objectives state what you are expected to achieve by the end of the lesson. It is important to note that the objectives are not guidelines for instructors of what is expected while facilitating the subject matter. The instructor's role during the session is to ensure that the participants are able to achieve the stated objectives.

Due to time constraints for the training course, it is only possible to provide an introduction to the subject matter. Further reading is required and there are extensive reference works published by IMO, IPIECA[*]/IOGP[†], ITOPF[‡] and CEDRE[§] amongst others. Suggested further reading sources are given at the end of each lesson. The sources have been compiled from documents that are commonly used and are readily available on line. This list in not exhaustive and you are encouraged to seek out and research topics that are applicable to you.

[*] IPIECA: The global oil and gas industry association for environmental and social issues
[†] IOGP: The International Association of Oil & Gas Producers
[‡] ITOPF: The International Tanker Owners Pollution Federation Limited
[§] CEDRE: Centre of Documentation, Research and Experimentation on Accidental Water Pollution (original: Centre de documentation, de recherche et d'expérimentations sur les pollutions accidentelles des eaux)

PARTICIPANTS' QUALIFICATIONS AND EXPERIENCE

The training course is designed as an intensive learning experience. The training course design assumes that the participants do not have extensive experience in oil spill response but do have a responsibility for either ensuring that such capability exists in their company, department or country or in participating in a response to an oil spill incident. The emphasis of the training course content is on the development of a tactical response to an oil spill incident. There are other IMO model courses which address the operational (Level 1) and strategic (Level 3) aspects of oil spill response.

The training course addresses the management of the response within an incident command structure and within an incident command centre, either in the public sector or in industry. It does so in the context of the application of management practices to an oil spill and does not attempt to teach basic management or theory.

During the training course participants are expected to:

- work hard;
- ask questions;
- complete assignments and exercises accurately and on time;
- assist the director and instructional staff;
- assist other participants during classroom and exercise discussions and assignments;
- participate fully in all discussions (classroom, exercises, assignments, briefings, etc.); and
- observe all HSE expectations and report any unsafe situations.

FURTHER READING

At the end of each lesson there is a list of suggested reading, specifying the publications and materials approved by IMO. The sources have been compiled from documents that are commonly used and readily available online. This list in not exhaustive and you are encouraged to source and read any locally relevant material.

COURSE MATERIALS

The training course material on the course CD or USB pen drive consists of the following components:

- A complete set of PowerPoint presentations
- The Participant's Manual
- A Further Reading section with a selection of useful guidance documents and reference papers

ACKNOWLEDGEMENTS

The training material is based on the Model Courses developed by IMO and approved by the Sub-Committee on Pollution Prevention and Response (PPR) and by the Marine Environment Protection Committee (MEPC) at its Seventy-first session (3–7 July 2017).

Where known, the source of images, graphics and information is gratefully acknowledged on the presentation slides.

DISCLAIMER

Although all possible efforts have been made to ensure the correctness and completeness of the information provided. The content and materials presented in this Model Course do not

necessarily reflect the relevant national policy and procedures of all member states involved in its development.

MODULE 2.1: OVERVIEW OF OIL SPILL RESPONSE

MODULE OBJECTIVE

The overall objective of this module is to enable participants to understand the various tactical aspects to be considered during an oil spill response.

This section of the course focuses on the function and operation of the incident command centre. It commences by looking at the sources and impacts of oil spills and continues with an overview of contingency planning and preparedness, followed by the principles of incident management, including a short exercise on Incident Management Systems (IMS). It concludes by considering what response tools may be available to facilitate decision-making during an oil spill.

This module is composed of five lessons, one video and one exercise:

- L.2.1: Course introduction
- V.2.1: Video – Introduction to oil spills
- L.2.2: Sources and impacts of oil spills
- L.2.3: Overview of contingency planning and preparedness
- L.2.4: Principles of incident management
- Ex.2.1: Exercise: IMS
- L.2.5: Response Tools

The objectives for each lesson are described below:

LESSON 2.1: COURSE INTRODUCTION

Objective:

The objective of this lesson is for participants to understand the aims and objectives of the training course.

At the end of this lesson, participants will:

- understand the timetable and course content of the training course;
- understand the organizational and domestic arrangements for the training course;
- have received a full safety briefing; and
- have been introduced to your fellow participants and facilitators.

Lesson summary:

It is important that participants are briefed on the safety, domestic and organizational aspects of the course. This lesson plays a vital role in welcoming participants to the training course, the facilitators and fellow attendees, to ensure that participants are aware of the content of the training course and what will be required of you.

Points to remember:

Active participation in the training course discussions and exercises will contribute greatly to the success of the training course.

VIDEO 2.1: INTRODUCTION TO OIL SPILLS

Objective:

The objective of this video is for participants to gain an understanding of the size, scale and complexity of oil spills.

At the end of this lesson, participants will:

- understand the range and scale of oil spill incidents; and
- have an appreciation of the difficulties and complexities of oil spill response.

Lesson summary:

It is important that participants have an appreciation of the potential size, scale and complexity of an oil spill or potential oil spill incident. This lesson plays a vital role in setting the scene for the remainder of the course.

Not all oil spills or potential oil spills are the same. They vary from low-level operational spills of limited quantities to significant releases with the attendant degree of response difficulty and complexity. It is vital that participants are prepared, in advance, for any spill or potential spill.

Further reading:

- IMO. *International Convention on Oil Pollution Preparedness, Response and Cooperation, 1990 (OPRC),* 1991 Edition, International Maritime Organization, London, 1991 **(Approved by IMO);**
- IMO. *Manual on Oil Pollution, Section I – Prevention,* 2011 Edition. International Maritime Organization, London, 2011 **(Approved by IMO);**
- IMO. *Manual on Oil Pollution, Section II – Contingency Planning,* 2017 Edition, International Maritime Organization, London, 2017 **(Approved by IMO)**; and
- IMO. *Manual on Oil Spill Risk Evaluation and Assessment of Response Preparedness,* 2010 Edition, International Maritime Organization, London, 2010 **(Approved by IMO).**

LESSON 2.2: SOURCES AND IMPACTS OF OIL SPILLS

Objective:

The objective of this lesson is for participants to gain an understanding of the potential sources of oil spills, to recognize the potential impact of oil spills on social and economic activities, the marine environment and fisheries.

At the end of this lesson, participants will be able to:

- recognize the potential sources of oil spills;
- recognize the potential impact of oil spills; and
- use this information to develop a tactical response to oil spills.

Lesson summary:

It is important that participants have an understanding of the potential impact of oil spills on social and economic activities, the marine environment and fisheries in order to develop a tactical response to any oil spill incident that they are called upon to respond to.

The transport of oil by sea presents the risk of marine oil pollution from a number of causes such as collision, grounding and the transfer of oil cargo and bunkers. Oil exploration and production provides further risks of pollution.

Such pollution can threaten sea-birds, marine life, fisheries, coastal installations and recreation areas; therefore the response requires careful advance planning.

Shipping transports 90% of our global trade and is a very powerful and positive force, making a major contribution to global trade and prosperity. It has a relatively small negative impact on the global environment and when its productive value is taken into consideration, it is statistically the least environmentally damaging mode of transport. However, the risk of pollution remains and the OPRC Convention seeks to address our preparedness and response capabilities.

In this lesson, we will consider the different types of incident that may give rise to pollution from both ships and offshore industry operations. We will consider the impacts of oil spills on social and economic activities, the marine environment and fisheries.

However, due to time constraints, it is only possible to provide an introduction to these topics and would urge participants to read the papers produced by IMO, ITOPF and IPIECA on this subject.

Further reading:

- IMO. *International Convention on Oil Pollution Preparedness, Response and Cooperation, 1990 (OPRC),* 1991 Edition, International Maritime Organization, London, 1991 **(Approved by IMO);**
- IMO. *Manual on Oil Pollution, Section I – Prevention,* 2011 Edition. International Maritime Organization, London, 2011 (Approved by IMO);
- IMO. *Manual on Oil Pollution, Section II – Contingency Planning,* 2018 Edition, International Maritime Organization, London, 2018 **(Approved by IMO);**
- IMO. *Manual on Oil Pollution, Section IV – Combating Oil Spills,* 2005 Edition, International Maritime Organization, London, 2005 **(Approved by IMO);**
- IMO. *IMO/UNEP Guidance Manual on the Assessment and Restoration of Environmental Damage Following Marine Oil Spills, 2009 Edition,* International Maritime Organization, London, 2009 **(Approved by IMO);** and
- IMO. *Manual on Oil Spill Risk Evaluation and Assessment of Response Preparedness,* 2010 Edition, International Maritime Organization, London, 2010 **(Approved by IMO).**

LESSON 2.3: OVERVIEW OF CONTINGENCY PLANNING AND PREPAREDNESS

Objective:

The objective of this lesson is for participants to gain an understanding of the main elements of the OPRC Convention and its requirements, the differing levels of contingency plans required for oil spill planning, preparedness and response, the tiered approach to oil spill planning, preparedness and

response and the general planning requirements at the Strategic Level. In addition, particpants will need to understand not only why plans are necessary but how to use them effectively.

At the end of this lesson, participants will understand:

- the requirements of the OPRC Convention;
- the differing levels of contingency plans;
- the tiered approach to oil spill planning, preparedness and response;
- the general planning requirements at the Strategic Level; and
- the need for an efficient and effective contingency planning system.

Lesson summary:

It is important that participants have an understanding of the requirements of the OPRC Convention, the differing levels of contingency plans and the tiered approach to oil spill planning, preparedness and response. It is also important that participants understand the general planning requirements at the Strategic Level, not only why we have plans but how to use them effectively.

Good prevention initiatives can go a long way in reducing the risk of pollution from ships. However, in spite of best efforts, spills inevitably occur. When this happens, it is necessary to ensure that effective preparedness measures are in place to ensure a timely and coordinated response to limit the adverse consequences of pollution incidents.

The International Convention on Oil Pollution Preparedness, Response and Cooperation 1990 (OPRC 90) is the international instrument that provides a framework designed to facilitate international cooperation and mutual assistance in preparing for and responding to major oil pollution incidents. It requires States to plan and prepare to address oil pollution emergencies by developing national systems for pollution response in their respective countries, and by maintaining adequate capacity and resources.

The Protocol on Preparedness, Response and Cooperation to Pollution Incidents by Hazardous and Noxious Substances, 2000 (OPRC-HNS Protocol) extends this regulatory framework to address pollution incidents involving hazardous and noxious substances, i.e. chemicals. This is covered in other IMO OPRC Model courses.

States which are party to OPRC 90 and OPRC-HNS Protocol are required to establish a national system for responding to oil and HNS pollution incidents, including a designated national authority, a national operational contact point and a national contingency plan. This needs to be backstopped by a minimum level of response equipment, communications plans, regular training and exercises.

In addition to the requirement for implementing national response systems, these two instruments also promote cooperation amongst Parties through the establishment of bilateral and multilateral agreements to augment national-level response capacity, when needed. Most importantly, OPRC 1990 and OPRC-HNS Protocol 2000 provide the mechanism for Parties to request assistance from any other State Party, when faced with a major pollution incident.

There are a number of key benefits for those States acceding to the instruments, notably:

- Access to an international platform for cooperation and mutual assistance in preparing for, and responding to, major oil and HNS pollution incidents and a mechanism for establishing cooperative arrangements with other States Parties;
- A means for urgently accessing relevant technical assistance and response resources in the event of an oil or HNS incident;

- A framework for the development of national and regional capacity to prepare for, and respond to, oil and HNS incidents; and
- Participation in a network for the exchange of new research and development information, best practices and practical experiences in oil and HNS response.

It is also important to understand how best to prepare for response to an oil pollution incident, as well as the need for an efficient contingency planning system.

Furthermore, all components of a contingency plan should be periodically and practically tested to prepare for a real emergency. In this regard, Article 6(2) of the OPRC Convention requires each Party to establish a programme of exercises for oil pollution response organizations and training of relevant personnel.

Four categories of exercises are identified, which allow different aspects of a plan to be exercised separately and promote understanding of the purpose and scope of the whole plan:

- Notification exercise - test the procedures to alert and call out the response teams via telephone or other means;

- Table-top exercise – interactively discuss a simulated scenario among members of a response team without involving the mobilization of personnel and equipment;

- Equipment deployment exercise – exercise deployment of oil spill response equipment at particular locations in response to an oil spill scenario; and

- Incident management exercise – simulate several different aspects of an oil spill incident with third parties who would actually be involved in a real emergency to test and train a whole response team.

Training of relevant personnel should include theoretical training at the appropriate level and practical deployment of equipment, as required. The IMO OPRC Model Training Courses could be used as guidance to plan and conduct such training.

Access to training and support for developing the essential preparedness and response structures and legislation, at national and regional levels, is available through IMO's Integrated Technical Cooperation Programme alongside the Global Initiative with IPIECA.

It is useful to understand the following essential points on "Recommended Steps in Plan Development", referring to the *Manual on Oil Pollution – Section II: Contingency Planning*.

1. Define scope of the plan

The first step is to define the scope of a contingency plan to be developed: i.e. a national contingency plan; a bilateral or multilateral agreement/contingency plan for regional cooperation; shipboard oil pollution emergency plan (SOPEP); or oil pollution emergency plans for offshore installations, sea ports or oil handling facilities.

References (*Manual on Oil Pollution – Section II: Contingency Planning*):

- National Oil Spill Contingency Plan (section 1.6);
- Industry oil spill contingency plans (section 1.9 and chapter 3); and
- Bilateral or multilateral agreements/contingency plans (chapter 4).

The following steps 2 to 7 are examples for the case of a national contingency plan.

2. Conduct the risk assessments

In advance of developing a national contingency plan, it is necessary to conduct an assessment of oil spill risks in the waters and, if applicable, terrestrial or other areas under the national jurisdiction. To complete an oil spill risk assessment, the government will need to determine all of the operations that could result in the release of crude oil or refined oil products and calculate the probability and consequences of the potential spills.

It is also necessary to identify coastal environmental, socio-economic and cultural sensitivities in the threatened area so as to develop an effective response strategy, facilitate the prioritization of the sensitive areas for protection and thereby enable the most effective use of available response resources. In this regard, the preparation of sensitivity maps should be mandated under the national contingency plan and the associated national legislation.

References (*Manual on Oil Pollution – Section II: Contingency Planning*):

- Oil spill risk assessment (section 2.2); and
- Sensitivity maps (section 2.6).

3. Develop a strategy

To develop a strategy for oil spill preparedness and response and construct key contents of a national contingency plan, the following systems, procedures and elements should be considered.

- Pre-positioned oil spill response equipment

  It is important to establish a minimum level of pre-positioned oil spill response equipment based on the identified risks, either individually or through bilateral or multilateral agreements and in cooperation with the oil and shipping industries, port authorities and other relevant entities.

  The national contingency plan should describe the process by which response resources owned by, or available to, the government will be inventoried and available for rapid mobilization of the resources.

- Tiered response

  Tiered response arrangements, including possible regional and international cooperation in case of major oil spills, may be established as a part of the national contingency plan, taking into account the local and national capability of oil spill preparedness and response and the result of the oil spill risk assessment and sensitivity mapping.

- Incident management system

  As effective responses to a major oil spill are complex operations, an incident management system may be developed to achieve the seamless integration of material resources, operational processes and personnel from many different organizations under a commanding team qualified to lead the oil spill response.

- Roles and responsibilities

  The national contingency plan should explain the roles and responsibilities of a National Competent Authority (or a lead government agency) and other government agencies that

could be involved in an oil spill response. It should also describe the organizational structure to be used for the above-mentioned management system.

- Notification, reporting and alerting

  The national contingency plan should identify an entity whose responsibility is to receive and disseminate a notification or report of a marine emergency, which could result or has resulted in an oil spill, to relevant government agencies and representatives to facilitate rapid communication among them.

- Assessment and monitoring of an oil spill

  An immediate assessment of an oil spill is essential in determining the most appropriate response tactics and strategies. Such an assessment can be achieved by: estimating the volume and extent of the spill; conducting a health and safety hazard assessment posed by the floating oil; and predicting the spill's probable movement using drift or trajectory models and available meteorological and hydrographic data. In addition, a spill surveillance and monitoring programme (e.g. aerial observation) should be implemented to validate any model results and determine the actual movement, extent and characteristics of the oil slick. These assessment and monitoring measures should be described in the national contingency plan.

- Oil spill response strategy

  An oil spill response strategy should be developed which involves the use of multiple response techniques selected as being the most effective at containing and/or removing spilled oil, while minimizing the negative effects of the spilled oil and response operations to the environment. It is essential to identify any policies, restrictions or prohibition on, or preference for, the use of selected response techniques based on spill location, environmental conditions, proximity to sensitive areas, etc.

- Waste management

  A robust waste management plan should be included in the national contingency plan to achieve an efficient and effective oil spill response. Such a plan may contain: regulatory requirements or protocols associated with the characterization, storage, transport and treatment, recycling or disposal of oil spill wastes; the types or names of recycling, treatment and disposal facilities approved to accept oil spill wastes; and any waste management resources or services that can be provided by the government.

- Demobilization and termination of response

  The national contingency plan should describe the general process for the demobilization of response equipment and other resources and what, if any, government approvals may be required for demobilizing key response resources. The plan should also outline a process for establishing clean-up/response end-points.

- Restoration and post-spill monitoring

  Restoration and post-spill monitoring activities can be covered in the national contingency plan. In such a case, the plan should generally describe the conditions or scenarios under which monitoring or restoration would be required or considered as well as a summary of the monitoring and restoration processes. Existing restoration or monitoring regulatory requirements, protocols or guidelines should also be referenced in the plan.

References (*Manual on Oil Pollution – Section II: Contingency Planning*):

- Pre-positioned oil spill response equipment (section 1.7);
- Oil spill response resource coordination (section 1.10);
- Tiered response (section 1.11);
- National oil spill response management system (section 1.12);
- Notification, reporting and alerting (section 2.3);
- Oil spill assessment (section 2.4);
- National oil spill response management organization (section 2.5);
- Response resources (section 2.7);
- Response strategies (section 2.8);
- Waste management (section 2.9);
- Demobilization and termination of response (section 2.10); and
- Restoration and post-spill monitoring (section 2.11).

4. Decide structure and layout

The structure and layout of the national contingency plan should be decided based on the key contents considered and established in Step 3 and the contents should include information on the designation of the Competent National Authority, national operational contact points and, as necessary, references to the relevant international conventions and national legislation.

References (*Manual on Oil Pollution – Section II: Contingency Planning*):

- International conventions (section 1.1);
- National legislation and regulations (section 1.2);
- Designation of Competent National Authority (section 1.3);
- National operational contact point (section 1.4); and
- National Oil Spill Contingency Plan (section 1.6).

5. Procure appropriate equipment

It is important to ensure the availability of adequate response equipment in case of an oil spill and maintain them in a serviceable condition and, if necessary, procure additional or replacement equipment. It is a common practice for national authorities to require the oil industry or private oil spill response organizations to maintain adequate response equipment on their behalf (in such a case, the requirements for them should be described in the national contingency plan).

References (*Manual on Oil Pollution – Section II: Contingency Planning*):

- Pre-positioned oil spill response equipment (section 1.7);
- Oil spill response resource coordination (section 1.10); and
- Response resources (section 2.7).

6. Conduct training and exercise

The national contingency plan should outline a training and exercise programme in cooperation with the oil and shipping industries, port authorities and other relevant entities, which is designed to ensure a high level of oil spill preparedness, to build the national oil spill response capability, as well as strengthen bilateral or multilateral agreements on cooperation during an oil pollution incident.

References (*Manual on Oil Pollution – Section II: Contingency Planning*):

- Exercises, training and health and safety (section 1.8); and
- Training, exercising, record keeping and plan updating requirements (section 2.12).

7. Update plan (section 2.12)

It is important to periodically assess the level of oil spill response preparedness to identify challenges, information needs and areas for improvement. In this connection, the national contingency plan should be regularly reviewed to incorporate lessons learned from training and exercises as well as actual incidents.

Regular updates of the contact points for notification and the inventory of available response equipment should also be made. In addition, any organizational or legislative changes that modify the response organizations or policies should be reflected in timely amendments to the affected contingency plan and communicated to all relevant parties.

References (*Manual on Oil Pollution – Section II: Contingency Planning*):

- Training, exercising, record keeping and plan updating requirements (section 2.12); and
- Assessing oil spill response preparedness (section 1.13).

Further reading:

- IMO. *International Convention on Oil Pollution Preparedness, Response and Cooperation, 1990 (OPRC),* 1991 Edition, International Maritime Organization, London, 1991 **(Approved by IMO);**
- IMO. *Manual on Oil Pollution, Section I – Prevention,* 2011 Edition. IMO, London, 2011 **(Approved by IMO);**
- IMO. *Manual on Oil Pollution, Section II – Contingency Planning,* 2018 Edition, International Maritime Organization, London, 2018 **(Approved by IMO);**
- IMO. *Manual on Oil Pollution, Section IV – Combating Oil Spills,* 2005 Edition, International Maritime Organization, London, 2005 **(Approved by IMO);**
- IMO. *Manual on Oil Pollution, Section V – Administrative Aspects of Oil Pollution Response*, 2009 Edition, International Maritime Organization, London, 2009 **(Approved by IMO)** ;
- IMO. *Manual on Oil Spill Risk Evaluation and Assessment of Response Preparedness,* 2010 Edition, International Maritime Organization, London, 2010 **(Approved by IMO);**
- CEDRE. *Local Authorities' Guide – What to do in the event of a Spill,* 2012 (For an extract please visit: wwz.cedre.fr/en/content/download/1769/131926/file/extract-local-authorities.pdf please send an email to documentation@cedre.fr to request full version);
- IPIECA/IOGP. Oil Spill Risk Assessment and Response Planning for Offshore Instillations, 2013 (http://www.ipieca.org/resources/awareness-briefing/oil-spill-risk-assessment-and-response-planning-for-offshore-installations/);
- IPIECA/IOGP. Oil Spill Exercises - Good Practice Guide Series, 2014 (http://www.ipieca.org/resources/good-practice/oil-spill-exercises/);
- IPIECA/IOGP. Oil Spill Training – Good Practice Guide Series, 2014 (http://www.ipieca.org/resources/good-practice/oil-spill-training/);

- ITOPF. TIP 15 – *Preparation and Submission of Claims from Oil Pollution,* 2012 (www.itopf.com/fileadmin/data/Documents/TIPS%20TAPS/TIP15PreparationandSubmissionofClaimsfromOilPollution.pdf); and
- ITOPF. TIP 16 – *Contingency Planning for Marine Oil Spills*, 2011 (www.itopf.com/fileadmin/data/Documents/TIPS%20TAPS/TIP16ContingencyPlanningforMarineOilSpills.pdf).

PARTICIPANT PRESENTATIONS

Objective:

The objective of this lesson is to enable participants to describe their National Oil Spill Contingency Plan (NOSCP) and the incident command system currently in use in their respective country. This will be used as a benchmark and revisited later in the course when participants will be asked to consider what, if any, improvements need to be made to their incident command system and how these might be achieved.

At the end of this lesson, participants will have:

- consolidated the lessons they have learned from this module; and
- described how your NOSCP and incident command system works.

LESSON 2.4: PRINCIPLES OF INCIDENT MANAGEMENT

Objective:

The objective of this lesson is for participants to understand that a properly implemented and coordinated management system will improve the efficiency and effectiveness of emergency response operations, regardless of the nature of the incident. In addition, it will provide strategic guidance on the development and implementation of a management system that meets your needs.

At the end of this lesson, participants will understand:

- the requirements for an incident management system; and
- how you may develop and implement such a system to meet your needs.

Lesson summary:

It is important that participants understand that a properly implemented and coordinated management system will improve the efficiency and effectiveness of emergency response operations, regardless of the nature of the incident. In addition, participants will be able to consider how the current system addresses the needs and consider what improvements, if any, may be required.

The early stages of any response incident are often confusing and stressful, with competing priorities, few resources and little information. Effective incident management requires turning this opening "crisis" phase into a structured response in the shortest possible time. This can best be achieved by utilizing an IMS that is best suited for your needs, understood by you and exercised.

There are a range of response systems employed worldwide. In this lesson we will consider the principles of an IMS that can be applied to a range of response situations and organizational structures. Participants will consider which system best meets their needs.

Authoritative command is carried out by those who have been given authority over others for a specific operation or incident. Incident commanders should:

- make decisions;
- give clear directions; and
- ensure these directions are carried out.

This promotes cohesion and provides direction to deliver the response strategy. In the response to an incident our response objectives are established at the strategic level (Figure 1). At the tactical level, we turn these objectives into an incident (action) response plan. An IMS ensures a structured and flexible response organization to develop and manage our response plan.

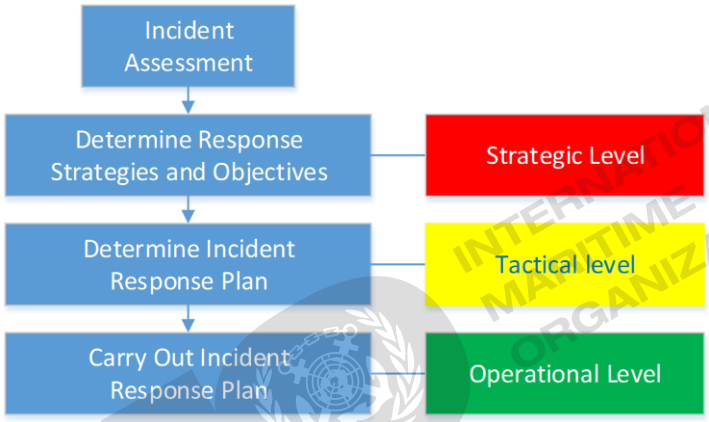

Figure 1. Development of Response Objectives

The identification and consideration of tactical options will help deliver a tactical plan that contains the most suitable options to deliver the strategy. The options chosen must consider the following factors:

- Net Environmental Benefit Analysis (NEBA)*;
- technical reasonableness;
- capacity; and
- capability.

This can be summarized as:

- Is it technically feasible?
- Does it meet our NEBA criteria and considerations?
- Is it allowed under our regulations?
- Do we have the resources?
- Can we monitor the effectiveness of the chosen option?

* For information, the concept of Spill Impact Mitigation Assessment (SIMA) is currently under development by the oil and gas industry and is a further development of the NEBA concept. Note that at the time of publishing this Model Course, SIMA has not been considered or reviewed by IMO.

An effective response requires the implementation of a series of actions to meet the overall objectives:

- Objectives are a statement of intent for the incident response and should clearly describe the intended outcome for the response;
- Response actions should be measured against the incident objectives; and
- Incident objectives should be achievable, measurable, include an intent, a time parameter (when) and a space parameter (where).

The different IMS systems described in this lesson can be expanded or contracted to meet the management needs of any type or size of incident. The Command Function is the only mandatory position, while other functions need to be delegated through expansion. Response frameworks vary from country to country. In addition, industry, especially major multi-national presence industry, may have their own in-house systems. These must be adapted to align with the host country's approach.

Due to time constraints we can only give an introduction to these topics and would urge you to read the papers produced by IMO, ITOPF and IPIECA on this subject.

Further reading:

- IMO. *Manual on Oil Pollution, Section V – Administrative Aspects of Oil Pollution Response,* 2009 Edition, International Maritime Organization, London, 2009 **(Approved by IMO);**
- IMO. *Guidance Document on the Implementation of an Incident Management System (IMS)*, International Maritime Organization, London, 2012 **(Approved by IMO);**
- CEDRE. *Local Authorities' Guide – What to do in the Event of a Spill,* 2012 (For an extract please visit: wwz.cedre.fr/en/content/download/1769/131926/file/extract-local-authorities.pdf please send an email to documentation@cedre.fr to request full version);
- IPIECA/IOGP Incident Management System for the Oil and Gas Industry – Good Practice Guide Series 2016 (http://www.ipieca.org/resources/good-practice/incident-management-system-ims/);
- ITOPF. TIP 10 – *Leadership, Command & Management of Marine Oil Spills*, 2012 (www.itopf.com/knowledge-resources/documents-guides/document/tip-10-leadership-command-management-of-oil-spills/); and
- POSOW. *Oil Spill Volunteer Management Manual*, 2013, (www.posow.org/documentation/manual/volunteersmanual.pdf).

EXERCISE 2.1: INCIDENT MANAGEMENT SYSTEMS (IMS)

Objective:

The objective of this exercise is to consolidate the lessons from the Principles of Incident Management module, allowing participants to become familiar with the current IMS structure within their country and use the knowledge gained to decide whether that structure is robust enough to cope with a multi-agency response to a major pollution incident.

By the end of this exercise, participants will:

- understand the incident management system structure within their country at Tier 2 and Tier 3 levels;
- have considered the challenges of a multi country response; and

- have considered how these challenges may be overcome.

LESSON 2.5: RESPONSE TOOLS

Objective:

The objective of this lesson is for participants to understand the tools that enhance spill response activities, consider how to utilize such tools and identify the tools their country currently has available. This will, in turn, help participants identify any gaps in both planning and response activities. This is an area in which many new and innovative tools are being developed. This lesson covers the "standard" tools currently available but further tools will become available over time.

At the end of this lesson, participants will:

- understand the tools that could enhance spill response activities;
- have considered how you may use such tools; and
- have identified any gaps in planning and response preparedness.

Lesson summary:

It is important that participants understand that there are a number of tools and models available to assist during your spill response. Once participants understand the tools that are available and required, they can identify those they have access to and, thus, any gaps in preparedness.

There are a number of tools and models available to assist in the response to an incident. It is anticipated that the number and sophistication of tools will grow. Currently the tools can be categorized into:

- Tracking
- Weather and tidal/current data
- Oil spill forecasting models
- Information resources
- Data handling

These tools assist us by facilitating our decision-making, speeding up complex calculations and visually portraying the areas affected or under threat. The reliability and accuracy of these tools needs to be understood and, in some cases, require expertise in their interpretation and use.

MODULE 2.2: OIL SPILL RESPONSE TECHNIQUES

MODULE OBJECTIVE

The overall objective of this module is to enable participants to understand in detail the existing oil spill response techniques. This will allow participants to turn the incident response strategy into tactical instructions and exercise command and control over the response. It will also give participants an understanding of the advantages and disadvantages of each oil spill response technique in order to facilitate the selection of the appropriate response tactics.

This module is composed of nine lessons, four videos and two exercises:

- L.2.6: Fate and Behaviour of Oil in Marine and Shoreline Environments
- V.2.2: Environmental Impacts
- L.2.7: Observation
- V.2.3: Aerial Surveillance
- Ex.2.2 Exercise: Aerial Observation exercise
- L.2.8: Containment, Recovery and Salvage Considerations
- L.2.9: Use of Dispersants
- L.2.10: In Situ Burning (optional)
- V.2.4: At-sea Response
- Ex.2.3: Exercise: Implementing Response Strategy (At-sea)
- L.2.11: Shoreline Assessment and Clean-up
- V.2.5: Shoreline Clean-up
- L.2.12: Oil Spill Response in Fast Water
- L.2.13: Oil Spill Response in Ice (Optional)

The objectives for each lesson are described below.

LESSON 2.6: FATE AND BEHAVIOUR OF OIL IN THE MARINE AND SHORELINE ENVIRONMENT

Objective:

The objective of this lesson is for participants to understand the main processes affecting oil spilled in the marine environment and to be able to recognize the impacts of these processes on response techniques.

At the end of this lesson, participants will understand:

- the principal oil weathering processes for surface and sub-surface oil spills;
- the shoreline interactions for various shoreline types; and
- the impacts of these processes on response.

Lesson summary:

When oil is spilled into the marine environment, it becomes exposed to environmental conditions such as winds, waves and varying temperatures, which will change oil properties over time. This process is referred to as “oil weathering”. The principal weathering processes are as follows:

- **Spreading:** As soon as oil is spilled at sea, it starts spreading out in a thin layer on the sea surface. Low viscosity oil will tend to spread faster than high viscosity oil. The colour of

the oil will change depending on its thickness. Thick oil will remain black or brown while thin oil will change to rainbow colour and silvery sheen.

- **Fragmentation:** As oil spreads, the oil slicks fragment into smaller slicks and patches under the action of winds, waves and currents.
- **Evaporation:** The lighter components of oil evaporate over time. High temperature, rough seas and high winds influence this process. Evaporation generally results in higher oil density and viscosity, which affects response strategies. Significant amounts of oil can be eliminated from the environment through this process.
- **Dispersion:** Oil droplets of various sizes mix into the water column under the actions of breaking waves. This process is principally observed with low viscosity oil. While small oil droplets may remain in the water column and dilute, larger oil droplets rise back to the sea surface to form new oil slicks.
- **Emulsification:** With the action of waves, some oil takes up water droplets, which become incorporated into the oil matrix, forming an emulsion. Oils with an asphaltene concentration above 0.5% or with a nickel/vanadium concentration above 15ppm are likely to form an emulsion. Emulsification increases the volume of pollutant up to five times and significantly increases oil viscosity, complicating clean-up and altering other weathering processes.
- **Sedimentation:** Dispersed oil droplets can interact with sediment particles or organic matter suspended in the water column which will increase their density and result in the sinking of these oil-sediment particles. This is usually observed in shallow coastal areas or estuaries.
- **Stranding or shoreline interaction:** In almost all cases, oil eventually reaches the shoreline where it becomes stranded. The persistence of oil on shoreline will depend on shoreline type and exposure to sea energy.
- **Biodegradation:** Many micro-organisms living in seawater are able to use oil compounds as an energy source. This eventually leads to the successful degradation of oil and its removal from the environment. The speed at which this process takes place is highly dependent on the availability of oxygen and nutrients, as well as oil type and temperature. Processes increasing surface area such as dispersion will also improve biodegradation rates.

As mentioned above, these processes can significantly affect the effectiveness of response strategies. It is therefore important that responders take into consideration changes in oil characteristics and readjust response strategies accordingly.

Further Reading:

- IMO. *Field Guide for Oil Spill Response in Tropical Waters*, 1997 Edition, International Maritime Organization, London, 1997 **(Approved by IMO);**
- IMO. *Manual on Oil Pollution, Section IV – Combating Oil Spills,* 2005 Edition, International Maritime Organization, London, 2005 **(Approved by IMO);**
- IMO. *IMO/UNEP Guidance Manual on the Assessment and Restoration of Environmental Damage Following Marine Oil Spills,* 2009 Edition, IMO, London, 2009 **(Approved by IMO);**
- CEDRE. *Local Authorities' Guide – What to do in the Event of a Spill,* 2012 (For an extract please visit: wwz.cedre.fr/en/content/download/1769/131926/file/extract-local-authorities.pdf please send an email to documentation@cedre.fr to request full version);
- ITOPF. TIP 2 *Fate of Marine Oil Spills*, 2011 (www.itopf.com/knowledge-resources/documents-guides/document/tip-2-fate-of-marine-oil-spills/);

- ITOPF. TIP 11 *Effects of Oil Pollution on Fisheries and Mariculture*, 2011 (www.itopf.com/knowledge-resources/documents-guides/document/tip-11-effects-of-oil-pollution-on-fisheries-and-mariculture/);
- ITOPF. TIP 12 *Effects of Oil Pollution on Social and Economic Activities*, 2011 (www.itopf.com/knowledge-resources/documents-guides/document/tip-12-effects-of-oil-pollution-on-social-and-economic-activities/); and
- ITOPF. TIP 13 *Effects of Oil Pollution on the Marine Environment*, 2011 (www.itopf.com/knowledge-resources/documents-guides/document/tip-13-effects-of-oil-pollution-on-the-marine-environment/).

VIDEO 2.2: ENVIRONMENTAL IMPACTS

Objective:

The objective of this video is for participants to learn more about the potential impacts on various habitats and species following an oil spill.

At the end of this lesson, participants will have:

- a better appreciation of the potential impacts from an oil spill.

Lesson summary:

It is important that participants have a good appreciation of the potential impacts of an oil spill on habitats, species and human activities. By better understanding the factors determining the potential severity of impacts, participants will be in a better position to identify response strategies in order to minimize these impacts.

Further reading:

- IMO. *Guideline for Oil Spill Response in Fast Currents*, 2013 Edition, International Maritime Organization, London, 2013 **(Approved by IMO);**
- IMO. *Manual on Oil Pollution, Section IV – Combating Oil Spills,* 2005 Edition, International Maritime Organization, London, 2005 **(Approved by IMO);**
- IMO. IMO/UNEP Guidance Manual on the Assessment and Restoration of Environmental Damage Following Marine Oil Spills, 2009 Edition, International Maritime Organization, London, 2009 **(Approved by IMO);**
- IMO. IMO/FAO Guidance on Managing Seafood Safety during and after Oil Spills, 2002 Editions, International Maritime Organization, London, 2002 **(Approved by IMO);**
- CEDRE. Ecological Monitoring of Accidental Water Pollution, 2007 (wwz.cedre.fr/en/Our-resources/Documentation/Operational-guides/Ecological-Monitoring please send an email to documentation@cedre.fr to request full version);
- ITOPF. TIP 11 Effects of Oil Pollution on Fisheries and Mariculture, 2011 (www.itopf.com/knowledge-resources/documents-guides/document/tip-11-effects-of-oil-pollution-on-fisheries-and-mariculture/);
- ITOPF. TIP 12 *Effects of Oil Pollution on Social and Economic Activities*, 2011 (www.itopf.com/knowledge-resources/documents-guides/document/tip-12-effects-of-oil-pollution-on-social-and-economic-activities/); and
- ITOPF. TIP 13 *Effects of Oil Pollution on the Marine Environment*, 2011 (www.itopf.com/knowledge-resources/documents-guides/document/tip-13-effects-of-oil-pollution-on-the-marine-environment/).

Lesson 2.7: Observation

Objective:

The objective of this lesson is to enable participants to understand why observation is an essential element of spill response, recognize what platforms may be available, understand the requirements for flight planning, how to carry out visual observations and how to quantify oil observation reports.

At the end of this lesson, participants will be able to:

- understand why observation is an integral and essential element of oil spill response:
- recognize what observation platforms may be available;
- understand the requirements for flight planning;
- understand how to carry out visual observations; and
- quantify oil observation reports.

Lesson summary:

The ability to observe and quantify oil spills is an essential element of an oil spill response. This module will help participants to understand the importance of aerial observation, the need for flight planning and the best method of carrying out visual observations. It will conclude with a short exercise on quantification.

Observation is a key element of an effective response. It enables us to confirm and assess the location and extent of the pollution, verify predictions of the movement and fate of oil at sea, interpret information to facilitate the deployment and control of operations at sea and identify threatened shorelines, enabling the protection of sites and the preparation of shoreline response.

Therefore, aerial observation should be high priority in the initial stages of a response. To develop a response strategy, it is helpful to have confirmation of the spill source, location and size, to identify, if possible, the oil type and condition, local weather conditions and sea state, to corroborate forecasted spill trajectory and to identify potential areas at risk.

The tools we have available to us depend on local resources and their availability but could include untrained observers, vessels, installations or ports with trained observers, aircraft with trained observers and portable surveillance equipment, dedicated remote sensing aircraft, unmanned surveillance platforms, satellite imagery and sub-sea sensors.

Observers need to document and capture their observations. These reports need to be recorded and distributed quickly to other functions within the command centre. Accurate assessment of oil quantity is not possible due to the difficulties in assessing the thickness and coverage of oil. There is, however, a relationship between the appearance, thickness and volume of floating oil which is described in the Bonn Agreement Oil Appearance Code. This Code can assist observers to estimate a range of observed volumes.

The raw data captured by sensors can result in huge volumes of electronic media. This media needs to be stored, analysed and distributed in a manner that can be used by decision-makers and planners. Linking the imagery with any modelled outputs is very useful but timely analysis and distribution to the end users is critical if the imagery is to be used effectively.

Further reading:

- IMO. *Manual on Oil Pollution, Section IV – Combating Oil Spills,* 2005 Edition, International Maritime Organization, London, 2005 **(Approved by IMO);**
- IMO. *Manual on Oil Pollution, Section VI – Guidelines for Sampling and Identification of Oil Spills,* 1998 Edition, International Maritime Organization, London, 1998 **(Approved by IMO);**
- IPIECA/IMO/IOGP. *Aerial Observation of Oil Spills at Sea – Good Practice Guidelines,* 2015 (www.oilspillresponseproject.org/wp-content/uploads/2016/02/GPG-Aerial-Observation.pdf) **(Approved by IMO);**
- IPIECA/IOGP. Guidelines on oil characterization to inform spill planning and decision making, 2013 (http://www.ipieca.org/resources/awareness-briefing/guidelines-on-oil-characterization-to-inform-spill-response-decisions/);
- ITOPF. TIP 1 – *Aerial Observation of Marine Oil Spills*, 2011 (www.itopf.com/knowledge-resources/documents-guides/document/tip-1-aerial-observation-of-marine-oil-spills/);
- ITOPF. TIP 14 – *Sampling and Monitoring of Marine Oil Spills*, 2012 (www.itopf.com/fileadmin/data/Documents/TIPS%20TAPS/TIP14SamplingandMonitoringofMarineOilSpills.pdf);
- OSRL. *Aerial Surveillance Field Guide*, 2011 (www.wcmrc.com/wp-content/uploads/2012/06/Aerial-Surveillance-Handbook.pdf); and
- POSOW. *Oiled Shoreline Assessment Manual*, 2013 (www.shorelinescat.com/Documents/Manuals/POSOW%20Oiled%20Shoreline%20Assessment%20Manual%20webversion.pdf).

VIDEO 2.3: AERIAL OBSERVATION

Objective:

The objective of this video is for participants to gain an understanding of aerial observation and the platforms, equipment and methodologies employed during surveillance flights.

At the end of this lesson, participants will understand:

- the principles of aerial observation;
- the platforms that can be used for conducting surveillance flights;
- some of the equipment used for conducting surveillance; and
- the methodologies employed during surveillance flights.

Lesson summary:

It is important that participants have an understanding of the benefits of aerial surveillance and how it is conducted. Consider what resources and trained personnel are available in an incident response and how observations will be assimilated into the incident command.

EXERCISE 2.2: AERIAL OBSERVATION

Objective:

The objective of this exercise is for participants to consolidate the lessons from the previous modules on aerial observation and become familiar with using an aerial observer quantification table. This will involve a worked example followed by a series of questions.

At the end of this exercise, participants will:

- be familiar with an aerial observation table;
- have understood a worked example; and
- have worked through a series of calculations based on observed spill reports.

LESSON 2.8: CONTAINMENT, RECOVERY AND SALVAGE CONSIDERATIONS

Objective:

The objective of this lesson is to:

- provide an introduction to containment at sea and how it may be used as an operational tactic;
- provide an introduction to recovery at sea and how it may be used as an operational tactic;
- provide an introduction to salvage operations, some general salvage techniques and information about how salvage operations may be integrated within the incident management system; and
- provide an introduction to Places of Refuge and how these may be utilized in incident response operations.

At the end of this lesson, participants will understand:

- objectives of containment including boom selection, boom types, their limitations and failures and how to consider protection and containment plans;
- objectives of recovery operations, including recovery devices, recovery systems, safety issues and temporary storage;
- general salvage operations and techniques;
- how salvage operations may be integrated within the incident management system; and
- Place of Refuge considerations and how they may be applied within the incident response.

Lesson summary:

When facing an oil spill, responders have to select the most appropriate response options in order to minimize damage from oil on the environment or socio-economic activities. Containment and recovery of the lost pollutants are key tactical considerations. However, no magic option exists and these methodologies all have their operational limitations. Managers must have basic knowledge of the available response options in order to make sound decisions, not only at the time of an incident but also during the contingency planning stage.

Containment can prevent the initial discharge from spreading, if used promptly, the prevention of both continuous and further discharges from spreading, to coral oil for recovery (or burning, if appropriate), to protect sensitive resources and environments, to deflect a spreading slick away from

sensitive resources and habitats and to deflect a spreading slick to areas from which it can be more easily recovered.

Containment generally requires the use of booms. The selection of boom type and size will depend on the planned deployment purpose, the proposed location, whether you are planning to operate in calm water, low current or open water and the deployment platform. The environmental conditions, wind, waves, tide or current and the buoyancy/weight ratio of the selected boom must also be taken into account.

Recovery objectives can include the physical recovery of oil from the water surface, minimizing any further damage to marine resources and the environment, reducing the amount of oil that may impact the shoreline and recovering floating oil from shoreline clean-up operations.

Recovery requires the use of collection and pumping equipment. There is a diverse range of devices currently available. They generally fall into one of four main categories, although some incorporate dual features. These categories are weir devices, adhesion devices, induction devices and devices that use other principles.

There are a number of safety concerns that should be addressed by risk assessment. These include the type of oil and associated hazards, working near water, working on decks covered with oil, weather conditions and movement of the vessel. An operational plan must be provided for each vessel detailing their specific operations, including risk assessments. Temporary storage is critical for ongoing operations. This may consist of vessel tanks, barges, towable or temporary tanks. When using chartered vessels not constructed as tankers, special considerations need to be given to storing and handling recovered oil.

Salvage is a specialist subject but is often associated with the prevention or minimization of pollution from a damaged or grounded vessel. An understanding of salvage operations and some common salvage techniques is essential for operations staff to fully integrate salvage operations within the IMS.

There are a number of ways in which oil can be lost from a vessel or from an offshore installation or pipeline. The Master, as representative of the vessel and cargo owners, or the Offshore Installation Manager (OIM), as representative of the owners of the installation, should take immediate action to ensure the safety of their crew, the preservation of the ship or installation, the preservation of the cargo, if appropriate, and stopping or limiting the cargo/oil loss. The Master, or OIM, may require specialist help for the salvage of the vessel or installation.

Salvage assistance will generally be arranged, on commercial terms, with a professional salvage company. In respect of tankers the salvage company is rewarded for operations, including preventative measures, which prevent or minimize pollution damage.

The salvor's primary aim is the successful and timely completion of the assignment. An Administration, under its national law or under the Intervention Convention, may take powers to intervene if their waters or coastline are at threat from pollution. The salvage operation will be conducted between the owner/operator and the salvor with both parties complying with the requirements of the Administration. It is important that there is full cooperation between all parties.

Within the Command Function, the salvage response should focus on notifying the relevant authorities, establishing the facts and assessing the damage potential of the incident, establishing and maintaining contact with all parties concerned, deciding whether salvage activities being undertaken by the owner are adequate, and what additional steps the Command Function should take to facilitate salvage and prevent pollution, as well as organizing the prompt provision of specialist assistance and salvage materials.

The Command Function may be requested to provide assistance with Customs and Immigration, logistical facilitation, the provision of government equipment, access to government stockpiles or the provision of response assistance. It may also be requested to review and approve, as appropriate, the salvage plan, including the appropriate risk assessments for the proposed operations.

It may also be required to give consideration of an appropriate "Place of Refuge" to facilitate the salvage operations, the imposition and enforcement of Temporary Exclusion Zones and Temporary Danger Areas.

The Command Function must ensure close cooperation between the salvage operation and the Operations and Planning functions. Salvage is a highly technical and complex process which, where possible, should be conducted by professional salvors. These salvors may need further specialist expertise, such as from the offshore industry, to respond to pipeline and offshore installations. Both Search and Rescue (SAR) and salvage operations may be conducted alongside the incident response, and both are critical components of the overall response.

Further reading:

- IMO. *Manual on Oil Pollution, Section III – Salvage,* 1997 Edition, International Maritime Organization, London, 1997 **(Approved by IMO);**
- IMO. *Manual on Oil Pollution, Section IV – Combating Oil Spills,* 2005 Edition, International Maritime Organization, London, 2005 **(Approved by IMO);**
- IMO. *Field Guide for Oil Spill Response in Tropical Waters*, 1997 Edition, International Maritime Organization, London, 1997 **(Approved by IMO);**
- CEDRE. *Custom Made Spill Response Barriers*, 2012 (www.cedre.fr/en/Our-resources/Documentation/Operational-guides/Custom-Made-Barriers, please send an email to documentation@cedre.fr to request full version);
- CEDRE. *Involvement of Sea Professionals in Spill Response,* 2012 (wwz.cedre.fr/en/Our-resources/Documentation/Operational-guides/Sea-Professionals, please send an email to documentation@cedre.fr to request full version);
- CEDRE. *Response to Small-Scale Pollution in Ports and Harbours*, 2007 (wwz.cedre.fr/en/Our-resources/Documentation/Operational-guides/Pollution-in-Ports please send an email to documentation@cedre.fr to request full version);
- IPIECA/IOGP. *Mutual Aid Indemnification and Liability*, 2016 (http://www.ipieca.org/resources/awareness-briefing/mutual-aid-indemnification-and-liability-including-a-template-emergency-personnel-secondment-agreement/);
- IPIECA/IOGP. *The Use of Decanting during Offshore Oil Spill Recovery Operations*, 2016, (http://www.ipieca.org/resources/awareness-briefing/the-use-of-decanting-during-offshore-oil-spill-recovery-operations/);
- ITOPF. TIP 3 – *Use of Booms in Oil Pollution Response*, 2011 (www.itopf.com/knowledge-resources/documents-guides/document/tip-3-use-of-booms-in-oil-pollution-response/);
- ITOPF. TIP 5 – *Use of Skimmers in Oil Pollution Response*, ITOPF, 2012, (www.itopf.com/knowledge-resources/documents-guides/document/tip-5-use-of-skimmers-in-oil-pollution-response/);
- ITOPF. TIP 8 – *Use of Sorbent Materials in Oil Spill Response*, 2012 (www.itopf.com/knowledge-resources/documents-guides/document/tip-8-use-of-sorbent-materials-in-oil-spill-response/); and
- OSRL. *Containment and Recovery Field Guide*, 2011 (www.wcmrc.com/wp-content/uploads/2012/06/Containment-and-Recovery-Handbook.pdf).

LESSON 2.9: USE OF DISPERSANTS

Objective:

The objective of this lesson is to ensure that participants understand the mechanism of dispersion, the tactical advantages and disadvantages of using dispersants and how dispersants can be used as a tactical response option.

At the end of this lesson, participants will understand:

- the principles of dispersion;
- how dispersants can be applied including the need for monitoring;
- the decision-making process that must be considered prior to using dispersants as tactical response option; and
- the advantages and disadvantages of applying dispersants.

Lesson summary:

When facing an oil spill, responders have to select the most appropriate response options in order to minimize damages from oil on the environment or socio-economic activities. The use of dispersants can, in the appropriate circumstances, help to minimize such damage and, as such, are a key tactical consideration. However, no magic option exists and these methodologies all have operational limitations. Managers must have basic knowledge of the available response options in order to make sound decisions, not only at the time of an incident but also during the contingency planning stage.

The principal aim of dispersant application is to break up an oil slick for subsequent degradation by naturally occurring micro-organisms. Used appropriately, dispersants can be an effective response to an oil spill and can minimize or prevent damage to important sensitive resources. However, like with other response techniques, careful consideration must be given before deciding to use them.

The factors that need to be taken into account include oil characteristics, current state of oil, position of oil, sea and weather conditions, including forecast, environmental sensitivities at risk, any national regulations and type of dispersant and quantities available. In addition, consideration must be given to how you plan to apply dispersants, monitor their application and measure the effectiveness.

In some cases, significant environmental and economic benefits can be achieved by the use of dispersants as a tactical option, particularly when other at-sea response techniques are limited by weather conditions or the availability of resources. Most dispersants are unable to disperse very viscous oils and stable emulsions.

Knowledge of the advantages and disadvantages of dispersant use is important before it can be considered as a response option or considered during the contingency planning phase.

Further reading:

- IMO. *Field Guide for Oil Spill Response in Tropical Waters,* 1997 Edition, International Maritime Organization, London, 1997 **(Approved by IMO);**
- IMO. *Guidelines for the Use of Dispersants for Combating Oil Pollution at Sea* (to be published), IInternational Maritime Organization, London **(Approved by IMO)[*];**

[*] Please note that Part IV of the IMO *Guidelines for the Use of Dispersants for Combating Oil Pollution at Sea* is currently under development

- IMO. *Manual on Oil Pollution, Section IV – Combating Oil Spills,* 2005 Edition, International Maritime Organization, London, 2005 **(Approved by IMO);**
- CEDRE. *Using Dispersant to Treat Oil Slicks at Sea*, 2005 (wwz.cedre.fr/en/content/download/1779/138734/file/extract-using-dispersant.pdf);
- IOGP/IPIECA. *JIP 3 – Dispersant Logistics and Supply Planning*, 2013 (www.oilspillresponseproject.org/wp-content/uploads/2016/02/JIP-3-Dispersant-logistics.pdf);
- ITOPF. TIP 4 – *Use of Dispersants to Treat Oil Spills*, 2011 (www.itopf.com/knowledge-resources/documents-guides/document/tip-4-use-of-dispersants-to-treat-oil-spills/);
- OSRL. *Dispersant Application Field Guide*, 2011 (www.wcmrc.com/wp-content/uploads/2012/06/Vessel-Dispersant-Application-Handbook.pdf);
- OSRL. *Dispersant Application Monitoring Field Guide, Tier I*, 2015 (www.oilspillresponse.com/technical-library/dispersant-application-monitoring-field-guide---tier-i-visual-observation/);
- OSRL. *Dispersant Application Monitoring Field Guide Tier II and III*, 2015 (www.oilspillresponse.com/technical-library/dispersant-application-monitoring-field-guide---tier-ii-and-iii/);and
- OSRL. *Vessel Dispersant Application Field Guide*, 2011 (www.wcmrc.com/wp-content/uploads/2012/06/Vessel-Dispersant-Application-Handbook.pdf).

LESSON 2.10: IN SITU BURNING (OPTIONAL)

Objective:

The objectives of this lesson are to ensure that participants understand the use of In Situ Burning (ISB) as a possible spill response technique, discussing how operations may be effective and which equipment monitoring and tactical considerations may be required. Please note that this is an optional module and if the topic is not appropriate, may be substituted by case histories, group discussion or an exercise.

At the end of this lesson, participants will understand:

- the principles of ISB;
- how ISB should be undertaken, including the need for monitoring;
- the decision-making process that must be considered prior to using ISB as a tactical response option; and
- the advantages and disadvantages of undertaking ISB operations.

Lesson summary:

When facing an oil spill, responders must select the most appropriate response options in order to minimize damages from oil on the environment and socio-economic activities. In the appropriate circumstances, the use of ISB may be a potential technique. In order to consider this, participants need to be aware of how to conduct ISB operations, the potential effectiveness and the tactical considerations. This methodology has operational limitations and managers must have a basic knowledge of the available response option in order to make sound decisions not only at the time of an incident but also during the contingency planning stage.

ISB is a potential response technique where the principle is to combust vapours from slicks on a water or land surface. This converts the hydrocarbon mixture into CO_2 and water with some particulate

(soot), which is then released into the atmosphere, leaving residues in the water column. It has been used on small inland and onshore spills in North America since the late 1950s. ISB operations can be conducted on land, ice and other hard surfaces, or on water. As with any response technique, the effectiveness, efficiency and success rates are dependent on the type and properties of the oil, the amount of weathering that has occurred, the amount of oil and area covered, the response time and equipment availability and the current and forecasted weather and sea state.

All ISB operations require sufficient fuel to generate an ignitable concentration of vapours (the vapour burns rather than the liquid), an ignition source to instigate the burn, sufficient quantities of fuel to sustain a burn (i.e. greater than 1-2 mm), specialist training and a means of monitoring air and water quality.

Further Reading:

- IMO. *In-Situ Burning Guidelines*, 2017 Edition, International Maritime Organization, London, 2017 **(Approved by IMO);**
- IMO. *Manual on Oil Pollution, Section IV – Combating Oil Spills,* 2005 Edition, International Maritime Organization, London, 2005 **(Approved by IMO);**
- Fingas, M., Oil Spill Science and Technology, 2011 ;
- IPIECA/IOGP. *Guidelines for the Selection of In-Situ Burning Equipment*, 2016 (http://www.ipieca.org/resources/awareness-briefing/guidelines-for-the-selection-of-in-situ-burning-equipment/);
- ITOPF. TIP 3 – *Use of Booms in Oil Pollution Response*, 2011 (www.itopf.com/knowledge-resources/documents-guides/document/tip-3-use-of-booms-in-oil-pollution-response/); and
- OSRL. *Offshore In-Situ Burn Operations Field Guide*, 2011 (www.wcmrc.com/wp-content/uploads/2012/06/In-Situ-Burn-Handbook.pdf).

VIDEO 2.4: AT-SEA RESPONSE

Objective:

The objective of this video is to give participants an understanding of at-sea response operations.

At the end of this lesson, participants will:

- understand the principles of at-sea response operations;
- be aware of the advantages and limitations of at-sea response; and
- understand the equipment and methodologies employed during at-sea response operations.

Lesson summary:

When facing an oil spill, responders have to select the most appropriate response options in order to minimize damage from oil on the environment and socio-economic activities. Containment and recovery of lost pollutants is a key tactical consideration. However, no magic option exists and these methodologies all have their operational limitations. Managers must have a basic knowledge of the available response options in order to make sound decisions not only at the time of an incident but also during the contingency planning stage.

Further Reading:

- IMO. *Field Guide for Oil Spill Response in Tropical Waters*, 1997 Edition, International Maritime Organization, London, 1997 **(Approved by IMO);**
- IMO. *Manual on Oil Pollution, Section IV – Combating Oil Spills,* 2005 Edition, International Maritime Organization, London, 2005 **(Approved by IMO);**
- CEDRE. *Involvement of Sea Professionals in Spill Response,* 2012 (wwz.cedre.fr/en/Our-resources/Documentation/Operational-guides/Sea-Professionals, please send an email to documentation@cedre.fr to request full version);
- CEDRE. *Manufactured Spill Response Booms,* 2012 (wwz.cedre.fr/en/Our-resources/Documentation/Operational-guides/Manufactured-Booms, please send an email to documentation@cedre.fr to request full version); and
- CEDRE. *Response to Small-Scale Pollution in Ports and Harbours*, 2007 (wwz.cedre.fr/en/Our-resources/Documentation/Operational-guides/Pollution-in-Ports).

EXERCISE 2.3: IMPLEMENTING RESPONSE STRATEGY (AT-SEA)

Objective:

The objective of this exercise is for participants to consolidate the lessons from the previous modules on operational response at sea, including aerial observation, salvage operations, at-sea recovery, dispersant operations and ISB operations, if appropriate. During the exercise, participants will be presented with various scenarios and asked to answer specific questions as the Incident Commander and his or her operational response team.

At the end of this exercise, participants will:

- have consolidated the lessons from the previous operational modules;
- understand the thought processes within the Incident Command; and
- understand what may be required in order to implement the chosen response strategies.

LESSON 2.11: SHORELINE ASSESSMENT AND CLEAN-UP

Objective:

The objective of this lesson is to ensure that participants understand the importance of shoreline assessment and the various clean-up techniques in order to reduce environmental damages.

At the end of this lesson, participants will understand:

- the phases and principles of shoreline assessment;
- the steps to be taken to conduct shoreline assessment;
- the phases in shoreline clean-up;
- the various shoreline treatment options; and
- the basis of shoreline treatment recommendations.

Lesson summary:

Shoreline assessments can either be carried out in the pre-spill phase, in order to collect data for response preparedness or during the reactive response phase, to help guide decisions regarding shoreline treatment and response operations. This lesson outlines the principles of shoreline assessment, which provides incident management with real-time data on oiling conditions, as well as the steps to be taken to conduct a shoreline assessment including systematic aerial/ground surveys, shoreline segmentation, oiling condition descriptions, the use of interagency survey teams and managerial and operational support through to completion.

Once the shoreline assessment has been completed, the shoreline assessment team or SCAT (Shoreline Assessment Clean-up Technique) team makes shoreline treatment recommendations based on a variety of factors such as shoreline type, oil type and behaviour, end-point criteria and net environmental benefit. The objectives of shoreline clean-ups are to remove the bulk oil, accelerate natural recovery and avoid clean-up activities from causing more damage to the environment. They are conducted in phases, including the initial clean-up, final clean-up and restoration phase.

The shoreline clean-up methods that may be recommended are also reviewed in this lesson, including:

- Natural recovery;
- Physical methods, including:
    - Washing
    - Removal and disposal
    - In situ treatment; and
- Chemical and biological methods.

Shoreline assessment teams or SCAT teams are the "eyes" of incident management, providing real-time data on oiling conditions. Shoreline treatment recommendations are made considering the net environmental benefit as well as shoreline type and logistical, operational and safety constraints.

Further reading:

- IMO. *Manual on Oil Pollution –Section IV – Combating Oil Spills,* 2005 Edition, International Maritime Organization, London, 2005 **(Approved by IMO);**
- IMO. *Bioremediation in Marine Oil Spills*, 2004 Edition, International Maritime Organization, London, 2004 **(Approved by IMO);**
- CEDRE. *Local Authorities' Guide – What to do in the Event of a Spill,* 2012 (For an extract please visit: wwz.cedre.fr/en/content/download/1769/131926/file/extract-local-authorities.pdf please send an email to documentation@cedre.fr to request full version);
- CEDRE. *Response to Small-Scale Pollution in Ports and Harbours*, 2007 (wwz.cedre.fr/en/Our-resources/Documentation/Operational-guides/Pollution-in-Ports);
- CEDRE. *Surveying Sites Polluted by Oil*, 2006 (wwz.cedre.fr/en/Our-resources/Documentation/Operational-guides/Surveying-Sites – please send an email to documentation@cedre.fr to request);
- IPIECA/IOGP. *A Guide to Oil Shoreline Assessment (SCAT) Surveys – Good Practice Guide Series*, 2014 (http://www.ipieca.org/resources/good-practice/a-guide-to-oiled-shoreline-assessment-scat-surveys/);
- IPIECA/IOGP. *Mutual Aid Indemnification and Liability Oil Spill Response*, 2016 (http://www.ipieca.org/resources/awareness-briefing/mutual-aid-indemnification-and-liability-including-a-template-emergency-personnel-secondment-agreement/);
- ITOPF. TIP 3 – *Use of Booms in Oil Pollution Response*, 2011 (www.itopf.com/knowledge-resources/documents-guides/document/tip-3-use-of-booms-in-oil-pollution-response/);

- ITOPF. TIP 5 – *Use of Skimmers in Oil Pollution Response*, 2012 (www.itopf.com/knowledge-resources/documents-guides/document/tip-5-use-of-skimmers-in-oil-pollution-response/);
- ITOPF. TIP 6 – *Recognition of Oil on Shorelines*, 2011 (http://www.itopf.com/knowledge-resources/documents-guides/document/tip-6-recognition-of-oil-on-shorelines);
- ITOPF. TIP 7 – *Clean-up of Oil from Shorelines*, 2011 (www.itopf.com/knowledge-resources/documents-guides/document/tip-7-clean-up-of-oil-from-shorelines/);
- ITOPF. TIP 8 – *Use of Sorbent Materials in Oil Spill Response*, 2012, (www.itopf.com/knowledge-resources/documents-guides/document/tip-8-use-of-sorbent-materials-in-oil-spill-response/);
- ITOPF. TIP 14 – *Sampling and Monitoring of Marine Oil Spills,* 2012, (www.itopf.com/fileadmin/data/Documents/TIPS%20TAPS/TIP14SamplingandMonitoringofMarineOilSpills.pdf);
- OSRL. *Containment and Recovery Field Guide*, 2011 (www.wcmrc.com/wp-content/uploads/2012/06/Containment-and-Recovery-Handbook.pdf);
- OSRL. *Shoreline Operations Field Guide*, 2011 (www.wcmrc.com/wp-content/uploads/2012/06/Shoreline-Operations-Handbook.pdf);
- POSOW. *Oiled Shoreline Assessment Manual*, 2013 (www.shorelinescat.com/Documents/Manuals/POSOW%20Oiled%20Shoreline%20Assessment%20Manual%20webversion.pdf) ; and
- POSOW. *Oiled Shoreline Clean-Up Manual*, 2013, (www.posow.org/documentation/manual/cleanupmanual.pdf).

VIDEO 2.5: SHORELINE CLEAN-UP

Objective:

The objective of this video is to illustrate issues related to shoreline clean-up such as planning, shoreline assessment and clean-up techniques.

By the end of this lesson, participants will understand:

- the importance of contingency planning with respect to shoreline clean-up;
- the importance and techniques for shoreline assessment; and
- the methods for shoreline clean-up and some of the associated issues.

Lesson summary:

This lesson highlights the necessity of contingency planning which includes pre-spill data such as shoreline type and sensitivity maps. During a spill these tools assist incident management with prioritization and planning.

The management of shoreline clean-up resources is critical for an efficient and effective response. The phases of clean-up include the removal of bulk oil during the initial stages of the response, the final clean-up when risk of additional spill has been eliminated and the restoration phase. There are a variety of issues related to shoreline treatment methods that must be considered before they are employed, including safety, effectiveness in a particular situation and net environmental benefit.

LESSON 2.12: OIL SPILL RESPONSE IN FAST WATER

Objective:

The objective of this lesson is to ensure that participants understand the basics of fast current response, and are able to develop fast water response strategies, consider how these strategies may be applied within the incident command system and are aware of the specific safety issues when working near fast water.

At the end of this lesson, particpants will:

- understand the basics of fast current response;
- be able to develop fast water response strategies for both open water and fast water;
- understand the decision-making process that must be considered prior to responding in fast water and how these strategies may be applied within the incident command system; and
- be aware of the specific safety issues when working near fast water.

Lesson summary:

When facing an oil spill, responders must select the most appropriate response options in order to minimize damages from oil on the environment and socio-economic activities. At-sea or near-shore containment and recovery may be our preferred response option, but it could mean working in fast water.

In order to do this successfully, participants need to be aware of the basics of fast current response, how to develop these response strategies and the specific safety issues that need to be addressed. This methodology has operational limitations and managers must have a basic knowledge of the response option in order to make sound decisions, not only at the time of an incident but also during the contingency planning stage.

Fast water refers to any situation where river, harbour or estuary surface current velocities are expected to exceed 1 (one) knot as defined in the IMO Guideline for Oil Spill Response in Fast Currents.

This module will consider both Fast Water and Open Water response where surface currents exceed 1 (one) knot. This level considers fast water response from the Incident Command perspective; operational fast water procedures are covered in Level 1.

We have already seen how booms may fail operationally in five main modes. In respect of Open Water, we will focus on two of the failure modes: entrainment and draining.

We can reduce the likelihood of these failure types by reducing the boom speed through the water to less than 0.7 knots. This can be achieved by skilful handling of the vessels involved and reducing the relative velocity between the boom and tide/current. This requires a high level of seamanship, especially when manoeuvring multiple vessels and altering or reversing course with boom deployed.

An understanding of current and tidal patterns relating to open water can be gained by referring to local charts and publications, however, local knowledge is invaluable for the understanding of local current patterns, tidal flow, etc. This local knowledge can be accessed through the employment of local fishermen and other water users. This local knowledge is equally important when considering fast water containment in rivers, river mouths, estuaries and harbour mouths.

Our objectives is to select a containment area where a lower current exists. These can be identified through the employment of local fishermen, port and water users. Natural collection sites should be identified and categorized during the contingency planning process. These typically occur where there is a stagnation zone in the river flow. Identification will require a survey and testing, and these can be validated during the shoreline survey phase in case of seasonal variances or recent developments with access, etc.

Areas where debris tends to collect indicate natural collection points, as do local names. Viable sites should have good access, sufficient depth for boom and vessel operations and good mooring for booms and anchors. Natural collection points attract debris which will impede recovery operations, and cleaning the site prior to the arrival of oil is strongly recommended.

Accurate determination of current direction and velocity is important for selecting the proper tactic and for correct equipment deployment. Current meters and the timing of floating debris over a measured distance can calculate the current velocity. It can also be estimated by observing the incline of buoys, floating debris and the turbulence around buoys and pilings. Local knowledge is critical, especially in tidal conditions where the current direction and velocity can be very variable.

Further reading:

- IMO. *Guideline for Oil Spill Response in Fast Currents*, 2013 Edition, IMO, London, 2013 **(Approved by IMO);**
- CEDRE. *Custom Made Spill Response Barriers*, 2012 (www.cedre.fr/en/Our-resources/Documentation/Operational-guides/Custom-Made-Barriers);
- CEDRE. *Manufactured Spill Response Booms*, 2012 (www.cedre.fr/en/Our-resources/Documentation/Operational-guides/Manufactured-Booms, please send an email to documentation@cedre.fr to request full version); and
- ITOPF. TIP 3 – *Use of Booms in Oil Pollution Response*, 2011 (www.itopf.com/knowledge-resources/documents-guides/document/tip-3-use-of-booms-in-oil-pollution-response/).

LESSON 2.13: OIL SPILL RESPONSE IN ICE (OPTIONAL)

Objective:

The objective of this lesson is to give participants a detailed understanding of the unique aspects of oil spill response in ice so as to enable you to turn the incident response strategy into tactical instructions, command and control. It will also highlight the advantages and disadvantages of each oil spill response technique in order to facilitate the selection of appropriate response tactics at the time of an oil spill in ice conditions. Please note that this is an optional module and, if the topic is not appropriate, can be substituted by case histories, group discussion or an exercise.

At the end of this lesson, participants will:

- understand the considerations for response activities in ice;
- have reviewed response strategies for responding to an oil spill in ice; and
- understand the limitations of response strategies in ice conditions.

Lesson summary:

When facing an oil spill, responders must select the most appropriate response options in order to minimize damages from oil on the environment or socio-economic activities. Oil in ice requires some unique considerations, including:

- safety;
- environment;
- ice conditions;
- location of oil in ice;
- oil behaviour in ice;
- effectiveness of response equipment in ice;
- logistics for remote areas.

Response strategies must be adapted to the situation. The oil containment and recovery methods to be used depend on whether the oil is above or below solid ice, in broken ice or along a shoreline with ice. Additionally, certain response techniques such as dispersants and burning have specific considerations in ice. Dispersants are rarely effective due to lack of open water. Burning can be effective only if the oil is fresh and can be concentrated to the appropriate thickness.

Safety is the first priority and special consideration must be given to personnel exposed to cold temperatures and working on/adjacent to ice-infested waters. Conventional spill response equipment may be less effective due to the cold and presence of ice.

Further reading:

- IMO. Guide on oil spill response in ice and snow conditions, 2017 Edition, International Maritime Organization, London, 2013 **(Approved by IMO);**
- CEDRE. *Manufactured Spill Response Booms*, 2012 (www.cedre.fr/en/Our-resources/Documentation/Operational-guides/Manufactured-Booms, please send an email to documentation@cedre.fr to request full version); and
- ITOPF. TIP 3 – *Use of Booms in Oil Pollution Response*, 2011 (www.itopf.com/knowledge-resources/documents-guides/document/tip-3-use-of-booms-in-oil-pollution-response/).

MODULE 2.3: RESPONSE ISSUES

MODULE OBJECTIVE

The overall objective of this module is to enable participants to understand the issues that need to be addressed during an oil spill. It focuses very much on overall considerations, such as health and safety, logistics, decontamination, waste management and disposal. These are critical issues, regardless of the response methods being considered.

This module is composed of six lessons, one video and one exercise:

- L.2.14: Oiled wildlife management
- L.2.15: Archaeological and cultural resources
- L.2.16: Health and Safety considerations
- L.2.17: Logistical and decontamination issues
- Ex.2.4: Implementing Response Strategy (Shoreline)
- L.2.18: Waste management and disposal
- V.2.6: Waste management
- L.2.19: Communications and Media

The objectives for each lesson are described below.

LESSON 2.14: OILED WILDLIFE MANAGEMENT

Objective:

The objective of this lesson is to provide participants with an understanding of wildlife management techniques and wildlife response related issues during an oil spill.

At the end of this lesson, participants will understand:

- the various elements involved in wildlife management from planning through to wildlife response activities;
- the importance of human health and safety; and
- the issues related to the use of volunteers in a wildlife response, wildlife waste management, cross border wildlife response, and media and public expectations.

Lesson summary:

Wildlife response includes activities that are undertaken to deal with wild animals that are/may be affected by an oil spill incident. This includes both proactive measures taken to minimize or prevent impact to wildlife and wildlife habitat, as well as measures taken to mitigate the effects on oiled animals. Ensuring human health and safety in wildlife response is always the first priority, and must encompass the shoreline operations, on-water operations and operations within wildlife rehabilitation facilities.

Planning is a critical component to effective wildlife management, and includes assessing resources at risk, as well as identifying available expertise and response resources. During an incident, an Environmental Impact Assessment (EIA) is conducted to determine the scope of the impact to wildlife, which in turn becomes a part of the incident assessment and assists with the decisions made with respect to wildlife response. The wildlife response may consist of:

- Search and Collection
- Transportation
- Reception
- Triage
- Treatment/washing
- Post wash treatment
- Release/disposal

Other issues to be managed during wildlife response include wildlife waste management, including the storage and disposal of carcasses, cross border response and volunteers. Wildlife impacted by oil spills typically gain large amounts of attention from both the media and the public and will attract volunteers eager to assist.

Further reading:

- IMO. *Field Guide for Oil Spill Response in Tropical Waters*, 1997 Edition, International Maritime Organization, London, 1997 **(Approved by IMO);**
- IMO. *Manual on Oil Pollution, Section IV – Combating Oil Spills,* 2005 Edition, International Maritime Organization, London, 2005 **(Approved by IMO);**
- CEDRE. *Management of Volunteers in Coastal Pollution Response*, 2012 (www.cedre.fr/en/Our-resources/Documentation/Operational-guides/Volunteers, please send an email to documentation@cedre.fr to request full version); and
- POSOW. *Oiled Wildlife Response Manual*, 2013 (www.oiledwildlife.eu/sites/default/files/POSOW%20oiled%20wildlife%20manual.pdf).

LESSON 2.15: ARCHAEOLOGICAL AND CULTURAL RESOURCES

Objective:

The objective of this lesson is to ensure that participants understand the importance of adapting oil spill response techniques when in the presence of archeological and cultural resources.

At the end of this lesson, participants will understand:

- what may constitute archeological and cultural resources;
- the requirement for resource specialists;
- how oil can impact archaeological and cultural resources; and
- the importance of minimizing impact during clean-up operations.

Lesson summary:

Archaeological and cultural resources can be of major historical and cultural significance, so it is extremely important that incident management receives accurate and timely information regarding such resources in order to protect them where practicable. Clean-up activities may have to be modified or restricted to ensure resources are not adversely affected, and NEBA must be conducted. This includes engaging operations in any policies and procedures with respect to protecting these resources.

Further reading:

- IMO. *Manual on Oil Pollution, Section IV – Combating Oil Spills,* 2005 Edition, International Maritime Organization, London, 2005 **(Approved by IMO).**

LESSON 2.16: HEALTH AND SAFETY CONSIDERATIONS

Objective:

The objective of this lesson is for participants to understand the hazards associated with oil spill responses and the importance of related health and safety considerations during response operations.

At the end of this lesson, participants will understand:

- the hazards associated with oil spill responses;
- the key elements of a safety plan; and
- how to implement essential safety requirements.

Lesson summary:

Ensuring the health and safety of both the public and response personnel should be the utmost priority during an oil spill response. It is essential that management and field personnel are able to identify potential hazards and implement associated corrective actions to ensure everyone's safety. Responders can potentially be exposed to a wide range of hazards during an oil spill, including:

- physical hazards such as tripping and falling;
- chemical hazards due to the toxic nature of some oil components;
- environmental hazards from weather conditions, causing conditions such as heat stress; and
- wildlife hazards from potential wildlife encounters during clean-up operations.

To ensure a safe working environment for all response workers, it is essential to develop an adapted safety plan. The adapted safety plan will take into consideration all response activities (at-sea, aerial and ground activities) as well as specific work site considerations. This plan will identify hazards, requirements for safety training, equipment such as personal protection equipment and site control measures. It will also include incident or near-miss reporting protocols to ensure that the plan is updated according to newly identified risks and/or potential incidents. Although the implementation of the safety plan is ultimately the responsibility of the incident manager, all responders should also take responsibility to ensure their own safety and the safety of those working around them.

Protection of the general public is also an important consideration during an oil spill response. The public can be affected by hydrocarbon vapours or by direct contact with oil, and can be protected by implementing preventive evacuations of areas potentially exposed to vapours and by enforcing strict access control to contaminated areas.

Further reading:

- IMO. *Field Guide for Oil Spill Response in Tropical Waters*, 1997 Edition, International Maritime Organization, London, 1997 **(Approved by IMO);**
- IMO. *Manual on Oil Pollution, Section IV – Combating Oil Spills,* 2005 Edition, International Maritime Organization, London, 2005 **(Approved by IMO);**

- CEDRE. *Management of Volunteers in Coastal Pollution Response*, 2012 (www.cedre.fr/en/Our-resources/Documentation/Operational-guides/Volunteers, please send an email to documentation@cedre.fr to request full version);
- IPIECA/IOGP. *Oil Spill Responder Health & Safety – Good Practice Guide Series,* 2013 (http://www.ipieca.org/resources/good-practice/oil-spill-responder-health-safety/); and
- IPIECA/IOGP. *Mutual Aid Indemnification and Liability*, 2016 (http://www.ipieca.org/resources/awareness-briefing/mutual-aid-indemnification-and-liability-including-a-template-emergency-personnel-secondment-agreement/).

LESSON 2.17: LOGISTICAL AND DECONTAMINATION ISSUES

Objective:

The objective of this lesson is to ensure that participants understand the importance of the logistics supply chain, equipment staging and decontamination.

At the end of this lesson, participants will understand:

- the components of the logistics supply chain;
- the importance of this supply chain;
- the significance of an equipment staging area; and
- the importance and requirements of a decontamination area.

Lesson summary:

Logistics are critical to the response effort and it is important to maintain the supply chain in order to avoid "bottlenecks" in response operations; even small breakdowns in the supply chain can cause delays. It is important to establish staging and decontamination facilities early in the response and in a timely manner, since proper decontamination is required to enable personnel to safely leave the spill site for breaks, meals and shift changes.

Further reading:

- IMO. *Manual on Oil Pollution, Section IV – Combating Oil Spills,* 2005 Edition, International Maritime Organization, London, 2005 **(Approved by IMO);**
- IPIECA/IOGP. *The Use of Decanting during Offshore Oil Spill Recovery Operations*, 2016, (http://www.ipieca.org/resources/awareness-briefing/the-use-of-decanting-during-offshore-oil-spill-recovery-operations/);
- IPIECA/IOGP. *Dispersant Logistics and Supply Planning*, 2013 (http://www.ipieca.org/resources/good-practice/dispersant-logistics-and-supply-planning/);
- ITOPF. TIP 8 – *Use of Sorbent Materials in Oil Spill Response*, 2012 (www.itopf.com/knowledge-resources/documents-guides/document/tip-8-use-of-sorbent-materials-in-oil-spill-response/); and
- ITOPF. TIP 9 – *Disposal of Oil and Debris*, 2011 (www.itopf.com/fileadmin/data/Documents/TIPS%20TAPS/TIP9DisposalofOilandDebris.pdf).

EXERCISE 2.4: IMPLEMENTING RESPONSE STRATEGY (SHORELINE)

Objective:

The objective of this exercise is for participants to consolidate the lessons from the previous module on shoreline assessment and clean-up. During the exercise, participants will be presented with various oil spill response information and asked to develop appropriate response strategies.

At the end of this exercise, participants will:

- have consolidated the lessons from the previous operational modules;
- understand the thought processes within the Incident Command; and
- understand what may be required to implement the chosen response strategies.

Lesson summary:

The class will be divided in small groups and each group will nominate a representative for a plenary discussion following the exercise. Participants will be presented with a number of oil spill scenarios and each group will have to analyse the information and develop appropriate response strategies. Participants will then have to present their results to the other groups during a plenary session.

LESSON 2.18: WASTE MANAGEMENT AND DISPOSAL

Objective:

The objective of this lesson is for participants to understand the importance of waste management during an oil spill response and identify best practices in order to minimize the amount of waste generated during an oil spill.

By the end of this lesson, participants will understand:

- the importance of planning for waste management prior to an oil spill;
- the types of waste generated during oil spill response;
- the importance of establishing an efficient waste stream; and
- the options for final disposal of waste.

Lesson summary:

Waste management is a key aspect of an oil spill response. If not managed properly, waste generation can halt recovery operations and jeopardize the entire response. Many types of waste can be generated following an oil spill. Liquid waste includes oil, oily water and emulsion, while solid waste mainly consists of oil mixed with shoreline material, debris or absorbents. Large amounts of waste can be generated during an oil spill, with up to 30,000 m^3 of waste resulting from a spill of 1,000 m^3. Waste management planning must therefore be carried out pre-spill and integrated into the contingency plan. This will ensure that every effort is taken to reduce, reuse, recycle or recover wastes, while respecting local environmental regulations.

A waste management plan should include the following aspects:

- measures to ensure waste minimization and segregation;
- process to obtain permits and approvals as per local regulations;

- evaluation of available resources for waste management;
- determination of temporary storage sites and transportation methods;
- measures to minimize contamination of new sites; and
- determination of final disposal method and sites.

Pre-planning for waste management will ensure a smooth and coordinated waste stream (storage-transfer-transport) that will contribute to an effective response. Trying to establish a waste management plan during an incident with no prior preparation will likely result in significant problems for the response.

Further reading:

- IMO. Manual on Oil Pollution, Section IV – Combating Oil Spills, 2005 Edition, International Maritime Organization, London, 2005 **(Approved by IMO);**
- IMO. Oil spill waste management decision support tool, 2010. http://www.imo.org/en/OurWork/Environment/PollutionResponse/Documents/Oil%20spill%20waste%20management%20decision%20support%20tool.pdf **(Approved by IMO);**
- CEDRE. Guidance on Waste Management during a Shoreline Pollution Incident, 2011 (wwz.cedre.fr/en/content/download/1780/138739/file/extract-waste-management.pdf, please send an email to documentation@cedre.fr to request full version);
- CEDRE. *Oil Spill Waste Management*, 2004 (www.wcmrc.com/wp-content/uploads/2012/06/Waste-Management-at-Oil-Spills.pdf);
- IPIECA/IOGP. Oil Spill Responder Health & Safety – Good Practice Guide series, 2013 (http://www.ipieca.org/resources/good-practice/oil-spill-responder-health-safety/);
- ITOPF. TIP 9 – Disposal of Oil and Debris, 2011 (www.itopf.com/fileadmin/data/Documents/TIPS%20TAPS/TIP9DisposalofOilandDebris.pdf);
- OSRL. *Shoreline Operations Field Guide*, 2011 (www.wcmrc.com/wp-content/uploads/2012/06/Shoreline-Operations-Handbook.pdf); and
- OSRL. *Waste Management Field Guide*, 2011 (www.wcmrc.com/wp-content/uploads/2012/06/Waste-Management-Handbook.pdf).

VIDEO 2.6: WASTE MANAGEMENT

Objective:

The objective of this video is for participants to gain a better understanding of the type of wastes generated during an oil spill and the importance of pre-planning for waste management.

At the end of this lesson, participants will understand:

- the different types of wastes; and
- the importance of waste management to ensure a smooth response.

Lesson summary:

Waste management is a key aspect of an oil spill response. It is important for participants to be fully aware of the types of waste that can be generated and how to manage these efficiently. Pre-planning is very important in order to minimize waste generation, ensure an efficient waste stream, as well as

an environmentally sound solution for final disposal. This video will provide a great visual summary of the important considerations related to waste management.

LESSON 2.19: COMMUNICATIONS AND MEDIA

Objective:

The objective of this lesson is to ensure that participants understand the need for a communications plan and a media response plan to gather and disseminate information during an incident. In addition, participants will receive some basic guidance on how to conduct themselves during a media interview and will be asked to consider the contents of a press release.

At the end of this lesson, participants will:

- understand the need for a communication plan;
- understand the need for a media response plan;
- have received some basic guidance on being interviewed; and
- have considered the contents of a press release.

Lesson summary:

Communications, both internal and external, are common challenges during an oil spill response, but are also vital for an effective response. Considering these and understanding the need for an effective communications plan can allow many of these challenges to be addressed prior to an incident. This can be facilitated by developing a communications plan and a media response plan.

There are different types of media that you may have to deal with during the response to an incident, namely newspapers, radio, television and social media. It is important to remember that these days much of what appears in the media will also appear on the internet, probably within a few minutes of actual events. We live in a global village and the media serves our appetites through 24-hour news programmes and forums.

The media can be a very effective way of ensuring that the public are informed about an incident and its effects. Therefore, careful handling of the media is very important. It is vital that the authorities provide members of the media with the information they need to do their job and tell the story.

There are many factors that can influence the size of the media contingent. In some cases the media will only be interested in the identity of the polluter, however threats to local population, wildlife, coastline, etc. will attract more interest. Briefings should be held once or twice a day and updates posted as required. Be aware of media deadlines and make sure that the response authorities and their technical experts are available. Media releases should be provided regularly during the incident response. Tools to supplement media releases include background information, fact sheets and media kits. These are especially important when trying to explain technical issues with which the public are not conversant. These can be prepared ahead of the incident, as part of your preparedness and planning.

Media facilities should be provided where possible. This should include establishing a media centre with backgrounds, picture charts and updates, telephones, fax machines and outlets for laptops and a workspace. Parking facilities for specialized communication vehicles should also be considered. It might be beneficial to provide the media with tours, escorting them through response areas, avoiding

unrestricted access to response sites and personnel. Ensure that you provide them with adequate briefings so that all safety precautions and standards are observed.

There are seven key elements to a successful interview, namely:

- Preparation
- Positioning statement
- Negotiate the interview
- Use of quotes and sound bites
- On the record and off the record
- Handling difficult questions
- Look and act the part

Remember that journalists often work to the 4WH programme (who, what, when, where and how).

Further reading:

- IMO. *Manual on Oil Pollution, Section IV – Combating Oil Spills,* 2005 Edition, International Maritime Organization, London, 2005 (**Approved by IMO**).

MODULE 2.4: INCIDENT TERMINATION

MODULE OBJECTIVE:

The overall objective of this module is to enable participants to understand the termination process of a response and consider the post-incident operations and administrative issues that need to be addressed. This module will also include a short reference to oil spill compensation which, whilst mainly covered in the Level 3 course, is also of importance to the incident command.

This module is composed of three lessons, one video and one exercise:

- L.2.20: Response Termination Criteria
- L.2.21: Post-incident Operations
- L.2.22: Post-incident Administrative Issues
- V.2.7: Video: Oil Spill Compensation
- Ex.2.5: Implementing Response Strategy (Ongoing and Post-incident Operations)

The objectives for each lesson are described below.

LESSON 2.20: RESPONSE TERMINATION CRITERIA

Objective:

The objective of this lesson is to ensure that participants understand the difficulties and challenges associated with the termination of a response. Participants will understand the issues related to response termination, as well as the selection and definition of appropriate termination criteria.

At the end of this lesson, participants will:

- understand the difficulties and issues associated with termination of response;
- understand termination consideration for at sea response and shoreline clean-up; and
- be able to define termination criteria.

Lesson summary:

Termination of response is one of the most delicate stages of an oil spill response. As operations are winding down and remaining quantities of oil diminishing, without termination criteria agreed on at the beginning of the spill, it can be challenging to end the response. A number of competing interests will be present during a spill response, which will lead to difficulties in deciding when a response should be terminated. Environmental, technical, economic and political interests are all at play during a spill and describing which one should be prioritized can prove difficult. Government, ship owners, landowners and other stakeholders should all agree on these objectives, as response activities will end when they are reached.

Termination criteria should be simple and easy for responders to evaluate. They should also provide guidance to answer the “how clean is clean?” question. Effective termination criteria will be based on natural processes and consider the effectiveness of clean-up methods and associated environmental benefits (NEBA) as well as the perception of the public and the media. A response should never be allowed to continue when response methods are likely to cause more environmental damage than the oil itself. The decision to terminate a response should be established through a consensus decision-making approach involving the main stakeholders.

Further reading:

- IMO. *Manual on Oil Pollution Section II – Contingency Planning*, 2018 Edition, International Maritime Organization, London, 2018 **(Approved by IMO).**

LESSON 2.21: POST-INCIDENT OPERATIONS

Objective:

The objective of this lesson is for participants to understand the post-incident operations required after an oil spill as well as the importance of post-spill monitoring or studies.

At the end of this lesson, participants will understand:

- the tasks that must be completed at the end of a spill; and
- the steps involved in the development of post-spill studies.

Lesson summary:

Once the active clean-up is terminated a number of tasks must be accomplished to complete the response. Generally, operational as well as administrative tasks have to be completed. Operational tasks mainly involve clean-up, maintenance of response equipment, and restocking of equipment stockpiles. These tasks ensure that the same level of readiness is in place were another spill to happen. Administrative tasks involve the finalization of payments or contracts, compiling response costs, preparing an incident report and preparing claims for compensation. It is important to realize that these tasks will continue over a significant period of time and should be considered as a project rather than simply a series of isolated tasks.

Typically, post-spill studies initiated during a response will continue after the end of clean-up operations. These studies should be implemented to answer specific questions and should have well defined objectives and scope. They should also be established in collaboration between governments and polluters in order to minimize sampling efforts and avoid differences in the interpretation of results.

Further reading:

- IMO. *Manual on Oil Pollution, Section V – Administrative Aspects of Oil Pollution Response,* 2009 Edition, International Maritime Organization, London, 2009 **(Approved by IMO);**
- ITOPF. TIP 15 – *Preparation and Submission of Claims from Oil Pollution,* 2012 (www.itopf.com/fileadmin/data/Documents/TIPS%20TAPS/TIP15PreparationandSubmissionofClaimsfromOilPollution.pdf); and
- Premiam. *Post-Incident Monitoring Guidelines*, 2018. (https://www.cefas.co.uk/premiam/guidelines/).

LESSON 2.22: POST-INCIDENT ADMINISTRATIVE ISSUES

Objective:

The objective of this lesson is for participants to understand the various administrative tasks that should take place following the response to an oil spill.

At the end of this lesson, participants will:

- understand the administrative tasks that should be undertaken following an oil spill;
- understand the importance of incident documentation and debriefing; and
- have an overview of the claim and compensation system.

Lesson summary:

Administrative tasks such as documenting an incident and conducting a debriefing session are important elements of the process that should be completed at the end of a spill response. The incident should be documented primarily through the compiling of incident logs and preparing of incident reports. These are essential activities to preserve information about the response, especially in terms of the various decisions that were taken while responding. Conducting debriefing sessions with all the responders involved in the effort will contribute to identifying elements of the contingency plan that need improvement, as well as those that are effective. Following an oil spill, some response costs as well as economic losses can be compensated for by the international compensation system in place, mainly in case of an oil spill originating from a tanker. Claims should provide a factual record of the event and the decisions made, providing a narrative and invoices that support every cost item. This highlights the importance of maintaining proper documentation of facts and decisions throughout the response.

Further reading:

- IMO. *Manual on Oil Pollution, Section V – Administrative Aspects of Oil Pollution Response,* 2009 Edition, International Maritime Organization, London, 2009 **(Approved by IMO)**; and
- ITOPF. TIP 15 – *Preparation and Submission of Claims from Oil Pollution,* 2012 (www.itopf.com/fileadmin/data/Documents/TIPS%20TAPS/TIP15PreparationandSubmissionofClaimsfromOilPollution.pdf).

VIDEO 2.7: OIL SPILL COMPENSATION

The objective of this video is for participants to gain an understanding of the claims and compensation system in place at the international level. It will also give you a better understanding on the information that needs to be submitted in order to get compensation.

At the end of this lesson, you will:

- be aware of the international system for claims and compensation from oil pollution; and
- understand the types of claims and the information needed to get compensation.

Lesson summary:

A claims and compensation system is in place at the international level to provide compensation for costs incurred by victims of an oil spill. Compensation can be received for a variety of claims, ranging from response costs to economic loss. This video provides a good overview of the different types of claims, as well as the process to follow in order to receive compensation.

Further reading:

- ITOPF. TIP 15 – *Preparation and Submission of Claims from Oil Pollution,* 2012 (www.itopf.com/fileadmin/data/Documents/TIPS%20TAPS/TIP15PreparationandSubmissionofClaimsfromOilPollution.pdf); and
- IOPC Funds – Claims information pack. (http://www.iopcfunds.org/publications/).
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EXERCISE 2.5: IMPLEMENTING RESPONSE STRATEGY (ONGOING AND POST-INCIDENT OPERATIONS)

Objective:

The objective of this exercise is for participants to consolidate the lessons from the previous modules on waste management, termination of response and administration issues.

At the end of this exercise, participants will:

- have consolidated the lessons from the previous operational modules;
- understand the thought processes within the Incident Command; and
- understand what may be required to implement the chosen response strategies.

Lesson summary:

The class will be divided in small groups and each group will nominate a representative for a plenary discussion following the exercise. Participants will be presented with a number of oil spill scenarios and each group will have to analyse the information and develop appropriate response strategies. Participants will then have to present their results to the other groups during a plenary session.