# MARINE OIL SPILL RESPONSE GUIDE

## FOR INDIGENOUS NATIONS AND COASTAL COMMUNITIES

If you see or suspect an oil spill,
immediately call the **Canadian Coast Guard** at:

**1-800-889-8852**

To activate **WCMRC,** call:

**1-855-294-9116**

WCMRC
Western Canada Marine Response Corporation

**Photo:**
San Josef Bay, Cape Scott,
Northern Vancouver Island, British Columbia

WCMRC
Western Canada Marine Response Corporation

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# OVERVIEW

Coastal Indigenous Nations and local communities are the first to be impacted by a marine oil spill and play a vital role in spill response operations in coastal British Columbia. Community preparedness is a key factor in spill response on the West Coast and strong relationships between local partners is vital to mitigating the impacts should a spill occur in our waters. By sharing information and preparing together, we ensure our readiness to respond.

This guide is intended as a resource for community members to deepen their spill response knowledge and learn more about how to get involved both before and after a spill occurs. Detailed information on joining a response and the typical roles community members might be asked to fill is included to support those participating in the operational response to a spill. The guide also provides an overview of the Canadian spill response regime and the many factors that contribute to spill response management in British Columbia. Topics covered include wildlife rehabilitation, liability and insurance, response tactics, strategies, equipment, information on the types of product transiting coastal waters, and more.

# ABOUT WCMRC

WCMRC is prepared to respond to spills along all 27,000 km of B.C.'s coastline.

## WHO WE ARE

Founded as Burrard Clean Operations in 1976, WCMRC was originally formed as an industry cooperative with a mandate to maintain response readiness in the Burrard Inlet and respond to local marine spills caused by the co-op's members.

In 1995, following significant spills in Alaska (Exxon Valdez, 1989) and Washington state (Nestucca, 1988), the Canadian government undertook a regulatory review of marine safety and prevention as well as spill response in Canada. The Canada Shipping Act was subsequently amended to include new regulations aimed at protecting navigable waters, and to enable industry to respond to its own spills through a polluter-pays model. When these changes came into effect, WCMRC was formed to respond to marine spills along the entire coastline of British Columbia. Burrard Clean was incorporated as a division of WCMRC, which subsequently became the first certified marine spill response organization in the country.

WCMRC's mandate is to ensure there is a state of preparedness in place to respond quickly when a marine spill occurs and to mitigate the impacts on B.C.'s coast. This includes the protection of wildlife, economic and environmental sensitivities, and the safety of both responders and the public. On average, we respond to 20 spills each year.

## WHAT WE DO

At WCMRC, we work to ensure we are always in a ready state to respond to marine-based oil spills. From an operational perspective, that means our staff and contractors conduct training operations as well as equipment and technology testing on an ongoing basis, including training in advanced recovery techniques, commissioning purpose-built vessels, and field-testing new technologies up and down the coast. This also includes the development and management of localized environmental protection strategies as a key tool in mitigating the impacts if a spill does occur. Our team also maintains response infrastructure, equipment, bases, personnel and management resources along the coast.

## WHO WE WORK WITH

While WCMRC is the only Transport Canada-certified response organization on Canada's West Coast, we typically work with multiple government agencies and local stakeholders when responding to an oil spill. This can include the polluter, Transport Canada, Fisheries and Oceans Canada/Canadian Coast Guard, Environment and Climate Change Canada (ECCC), the British Columbia Ministry of Environment and Climate Change Strategy (BCMOE), Indigenous Nations, local government (municipalities and regional districts) and volunteers.

## WHERE WE RESPOND

WCMRC's area of response constitutes the entire British Columbia coastline. However, Canada's response time Planning Standards are not the same for the entire coastline. For example, the Port of Vancouver is considered a 'designated port' under the spill response regime. This means that within the Port of Vancouver, WCMRC must have equipment deployed on-scene within six hours for a spill of up to 150 tonnes, and within 12 hours for a spill of up to 1,000 tonnes. In the last decade, WCMRC's average response time within the Port of Vancouver has been approximately 60 minutes.

WCMRC's Primary Area of Response is from the Port of Vancouver through the Salish Sea to near Victoria. Within this area, WCMRC is mandated to be deployed on-scene within 18 hours for spills of under 2,500 tonnes and within 72 hours for spills of over 2,500 tonnes.

The Enhanced Area of Response includes the area from near Victoria to the Strait of Juan de Fuca and requires response times of 18 hours or less for spills of up to 2,500 tonnes and 72 hours or less for a spill over 2,500 tonnes. Anywhere else on the B.C. coast requires a response to be deployed on-scene within 18 to 72 hours plus travel time.

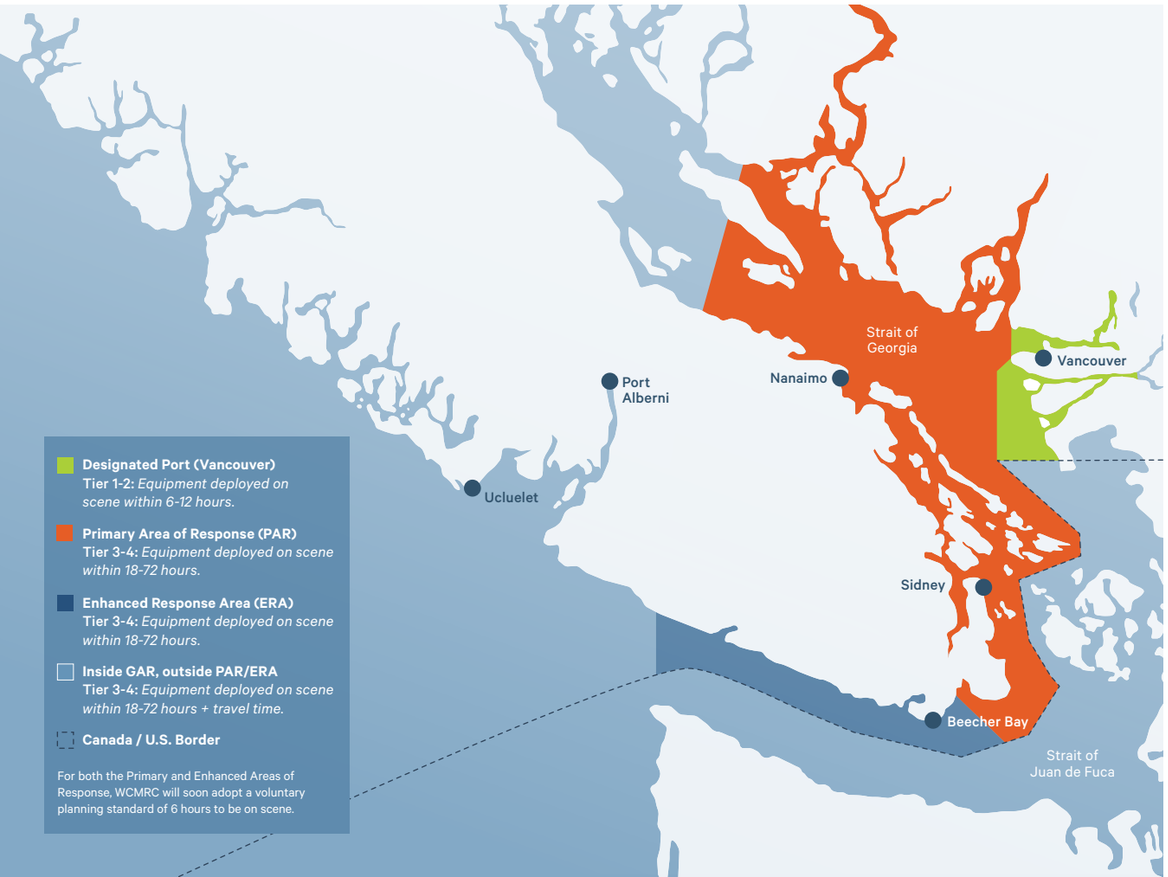
## HOW WE PREPARE

WCMRC maintains the infrastructure, equipment, bases, personnel and management resources to ensure a safe and effective response to a marine spill in local waters.

### Planning

WCMRC manages an ongoing strategic planning process aimed at protecting wildlife, economic and environmental sensitivities, as well as the health and safety of responders and the public. The plans developed through this process provide detailed operational-level information to all involved parties regarding roles and responsibilities should a spill occur. We engage coastal Indigenous Nations, governments and other local stakeholders in developing these strategies and in testing them through exercises and drills on an ongoing basis to ensure compliance with the requirements of the Canada Shipping Act, the legislation which governs our work. Plans developed include our Marine Oil Spill Response Plan as well as plans and guidelines for different response needs, such as wildlife management, submerged and sunken oil, and joint information sharing. For more information on our planning process and to view our Marine Oil Spill Response Plan, visit **wcmrc.com/preparedness/strategies**.

**Figure 1:** Geographic Area of Response (GAR)




### Coastal Mapping and Geographic Response Strategies

Geographic Response Strategies (GRS) are site-specific response plans that are tailored to protect sensitive areas threatened by an oil spill. GRS are globally recognized as an integral element of response planning and are a fundamental part of WCMRC's preparedness regimen. Our GRS's are operational documents that detail the location of vulnerable shoreline areas and describe how to protect them.

Sensitive areas can be protected with boom secured to the shoreline or by on-water tactics that work to prevent or limit oil from reaching the shore. GRS's protect elements of larger and smaller microhabitats rather than individual species. They are an emergency response tool created to safeguard archaeological and cultural sites, critical habitats and infrastructure, public beaches and parks, sensitive shorelines, and water-dependent commercial users.

Indigenous Nations and coastal communities have played an important role in assisting WCMRC with the identification of shoreline sensitivities. We always welcome the opportunity to collaborate with interested parties who may be able to enhance our knowledge of sensitive areas along the coast. For more information on how GRS work, or to support WCMRC in creating a GRS for your area, visit **coastalresponse.ca/coastal-mapping**.

### Bases

WCMRC maintains response bases strategically located along the coast in order to ensure efficient and rapid deployment during an incident. Response bases serve as operational centres where staff and equipment are maintained in a state of readiness. The bases act as warehouses, storing a variety of response equipment including boom, skimmers, sorbent pads and Personal Protective Equipment (PPE). For more information on our bases, visit **wcmrc.com/preparedness/bases.**

GRSs are a globally recognized element of response planning.

### Vessels

WCMRC has over 60 vessels dedicated to spill response, including high-speed skimming vessels, deck and tank barges, landing craft, skiffs, workboats and purpose-built vessels designed to handle spills in B.C.'s unique marine environment. WCMRC also maintains a wide variety of spill response equipment in order to respond to any type of fuel spill. For more information on our vessels, visit **wcmrc.com/preparedness/vessels**.

### Ongoing Training

WCMRC's team continuously researches, tests, and implements new equipment and technologies. This includes training in advance recovery techniques, commissioning purpose-built vessels and field-testing new technologies.

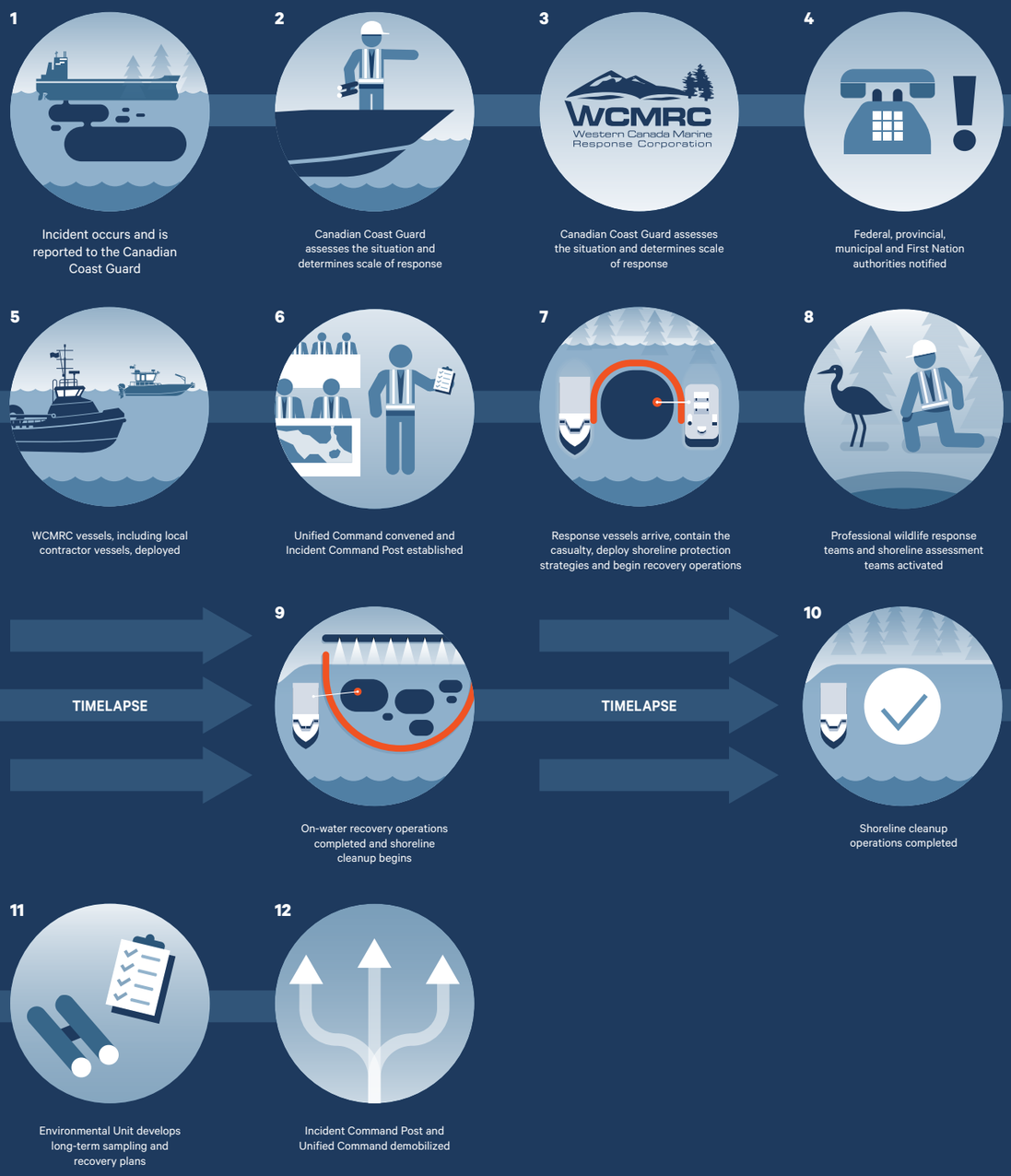
### Partnerships

Through mutual aid agreements and arrangements with Canadian and American response organizations and contractors, WCMRC has access to cascading resources that expand our capabilities beyond the Transport Canada-mandated spill response threshold of 10,000 tonnes.

# WHAT HAPPENS WHEN AN OIL SPILL OCCURS

When an oil spill occurs, a process is set in motion to manage the response operation. This includes notification of first responders, resource mobilization and deployment, and ongoing response management. Representatives from a number of agencies are involved.

**Figure 2:** Timeline of a Spill Response




# IF A SPILL HAPPENS IN YOUR COMMUNITY

When an oil spill occurs in or near your community, it is natural for community members to want to help clean up the spill as quickly and efficiently as possible. Community members play an important role in a spill response by providing local knowledge or expertise related to wildlife, the local marine environment and local resources as well as through participation in response activities. They can also act as a bridge to communities affected by the response and support response awareness within the community.

## WHAT TO DO IF YOU SEE A SPILL

If you see or suspect an oil spill, immediately call the Canadian Coast Guard at **1-800-889-8852**.

## WHAT NOT TO DO IF YOU SEE A SPILL

Do not attempt to cleanup spilled oil in the water or along the shoreline under any circumstances. Without proper training, PPE or coordination with the overall response, individuals could be placing themselves and others—as well as wildlife—at risk if they attempt to cleanup oil on their own or assist wildlife impacted by a spill. As well, they could unknowingly cause increased damage to environment. The best way for community members to get involved is to contact their community leaders to learn more about how to get involved in the response.

# GETTING INVOLVED: INDIGENOUS NATIONS AND COASTAL COMMUNITIES

WCMRC has partnered with many Indigenous Nations and coastal communities to ensure a collaborative approach to spill response planning and operations. There are a range of opportunities for community members to become involved, including helping WCMRC identify local sensitivities, becoming a response contractor, participating in training workshops, storing Coastal Response Packages, or simply learning what to expect if a spill occurs. Indigenous Nations and community members may also participate in the operations center of the response, known as the Incident Command Post, if and when a spill occurs.


COASTAL RESPONSE PROGRAM

## COASTAL RESPONSE PROGRAM: PREPARING FOR A SPILL

Launched in 2017 to share existing strategies and further involve communities in response planning, WCMRC's Coastal Response Program brings together existing WCMRC community initiatives under one umbrella. The objective is to enhance these interrelated initiatives and ensure there is coordinated support to maintain an operational ready state. By building strong relationships with coastal Indigenous Nations and local communities as well as large and small industry, local NGOs and conservancies, and municipal, regional and provincial authorities, WCMRC's capacity is improved and communities are empowered to mitigate the damage should a spill occur. To learn more about the Coastal Response Program, visit **coastalresponse.ca**.

### Vessels of Opportunity

A Vessel of Opportunity (VOO) refers to a vessel whose crew is trained by WCMRC to respond to marine oil spills. A VOO can be a landing craft, tugboat, crew boat, water taxi or work boat with pre-determined towing capacity, lifting ability and/or available deck space. WCMRC's marine contractor network consists of trained VOOs that provide support, valuable insights on local waters, and additional technical skills that enhance WCMRC's response capability.

During a spill response, VOOs can be activated to support operations in a variety of ways: deploying coastal protection strategies, supplementing WCMRC's existing fleet of vessels, or undertaking first responder duties in remote coastal locations. The role a VOO undertakes during a spill depends on the capabilities of the vessel and her crew.

Vessels and crews accepted into the VOO program participate in an orientation session, receive spill response training at least once each year, and are compensated for their time. VOO members may also be asked to take part in spill response exercises.

### Sharing Local Knowledge

Integrating local knowledge of critical resources and coastal sensitivities in spill response planning is a key component of our response readiness regime. By providing invaluable information during the planning and preparedness process, local subject-matter experts and organizations support an efficient and effective response.

The expertise required to support a response operation varies depending on the unique characteristics of the spill. Responders typically work with coastal/marine science experts who have local knowledge of at-risk areas. Responders also collaborate closely with Indigenous Nations and individuals who have knowledge of coastal cultural sensitives or archaeological sites. Organizations with a mandate to protect, conserve and restore the coastal environment or that conduct field work in the area are also important contributors.

### Businesses and Contractors

The specialized skills and services offered by local businesses and contractors are an integral part of spill response in B.C., and WCMRC works with and employs members of Indigenous Nations and coastal communities along the province's entire coastline. Typically, WCMRC works with businesses or contractors in the marine, transportation, communication, aerial surveillance, safety and security, or hospitality industries. However, other service providers may be considered depending on the nature of the spill and the needs of the response operation.

## INCIDENT COMMAND SYSTEM: JOINING THE RESPONSE

Marine spills in Canada are managed using the Incident Command System (ICS), a standardized command and control emergency response system that can be scaled up or down to manage a hazardous incident. In British Columbia, there are often multiple agencies and jurisdictions involved in responding to a marine oil spill. To ensure a cohesive, collaborative response, the ICS structure is typically managed at an Incident Command Post (ICP) through a Unified Command (UC), a decision-making body comprised of key agency, community and jurisdictional representatives. These representatives jointly act as the Incident Commanders of the response, functioning as a team with a common set of incident objectives and strategies to manage the spill and ensure all impacted groups' concerns are considered in the actions taken. The role of Incident Commander is often shared by two or more representatives. See Unified Command on p. 12 for more information on the role of this body within the response.

### Indigenous Nations and Community Representatives in ICS

Indigenous Nations and community members participating in response operations as a member of the Incident Command Post team provide important functions to the overall success of the response. Roles which community members may undertake are varied and could include supporting Unified Command (either as a Unified Commander or Liaison Officer) or as subject-matter experts in the Environmental or Operations Sections. See ICS Roles: Indigenous Nations and Coastal Communities on page 18 for more information about key roles representatives may be asked to fill.

**Figure 3:** Contractor training in shoreline cleanup techniques.

# INCIDENT COMMAND SYSTEM

Originally developed in the 1970s to combat wildfires in California, ICS has evolved as the key organizational tool used to manage multi-agency emergency situations across North America and internationally. British Columbia was the first Canadian province to adopt ICS when, in 1995, the Provincial Emergency Program adopted it and included its principles in the development of the BC Emergency Response Management System. Key benefits of ICS include:

- A flexible and expandable process to deal with any type or size of emergency, enabling a jurisdiction to cope with incidents of any kind or complexity
- A common management structure with common terminology, enabling personnel from a wide variety of agencies to rapidly integrate into a response
- Comprehensive logistical and administrative support for operational staff
- Can be cost effective by avoiding duplication of efforts and continuing overhead
- A unified, centrally authorized emergency organization[1]

The fully interchangeable nature of ICS means anyone with adequate ICS training can integrate into any ICS-managed emergency, regardless of its nature, and fill a number of roles in the Incident Command Post.

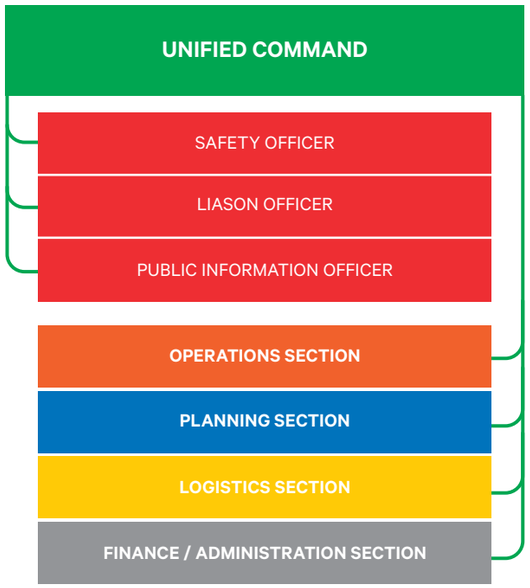



**Figure 4:** ICS Organizational Structure

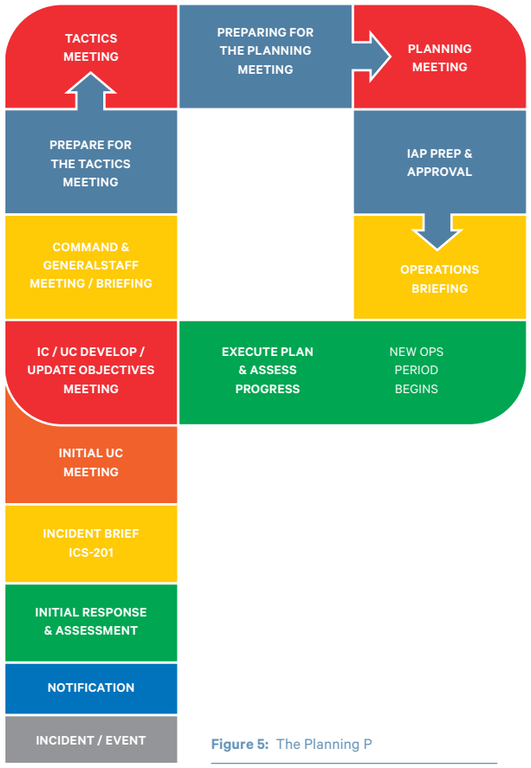



**Figure 5:** The Planning P

## ICS PHASES OF RESPONSE

ICS uses two distinct response phases: the Initial Response Phase and the Planning Cycle.

The Initial Response Phase (the "leg of the P") begins the moment WCMRC is notified about a spill. Over the subsequent four to 72 hours (depending on the size and complexity of the spill), an Incident Management Team is activated. During this phase, the focus is on containing the source of the spill and cleaning up spilled product. If it is a small spill, the response typically begins and ends with the Initial Response Phase. However, if the incident is large or complex and is expected to take several days or longer to manage, the Incident Management Team launches the Planning Cycle to proactively plan for the next stage of the response.

The Planning Cycle (the "head of the P") is implemented every operational period for the duration of the response. An operational period typically lasts for 12 or 24 hours and is set by Unified Command during the Initial Response Phase. The Planning Cycle is a highly structured process focused on the creation of an Incident Action Plan (IAP), which is implemented during the next operational period. The IAP outlines the response objectives set by the Unified Command for that operational period and details the specific actions that will be taken, including which sections and teams are responsible, in order to achieve the objectives.

1 Taken from en.wikipedia.org/wiki/Incident_Command_System August 13, 2019

## ICS SECTIONS

### Unified Command

While a single Incident Commander normally handles the command function during small, straightforward incidents, an ICS structure may be expanded into a Unified Command for complex responses that cross jurisdictional boundaries or involve multiple agencies. The UC brings together the Incident Commanders of all major organizations involved in the response to function as a team with a common set of incident objectives and strategies. The Unified Command for marine oil spills in Canada will typically include:

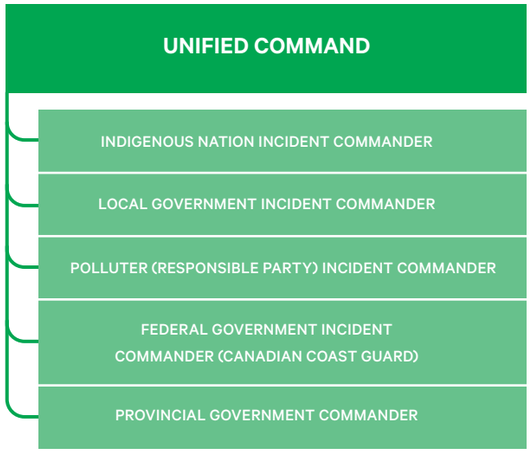



Figure 6: Unified Command Structure

Actual Unified Command for an incident will be determined on a case-by-case basis, taking into account specifics of the incident or decisions reached during the initial meeting of the Unified Command. The makeup of the UC may change as an incident progresses in order to account for changes in the situation.

The UC is responsible for overall management of the incident: directing incident activities, developing and implementing objectives and strategies, and approving resource orders and releases. Each UC member may assign Deputy Incident Commander(s) to assist in carrying out Incident Command responsibilities. UC members may also be assigned legal and administrative support from their own organizations.

As a component of an ICS, the UC facilitates and coordinates the effective involvement of various agencies and responders. It links the organizations responding to the incident and provides a forum for these agencies to make consensus decisions. Under Unified Command, the various jurisdictions and/or agencies, as well as non-government responders, may blend together throughout the ICS to create an integrated response team. Assisting or cooperating agencies that are not part of the UC can also participate through agency representatives working with the Liaison Officer.

**Participation in a Unified Command occurs without any agency giving up its authority, responsibility, or accountability.**

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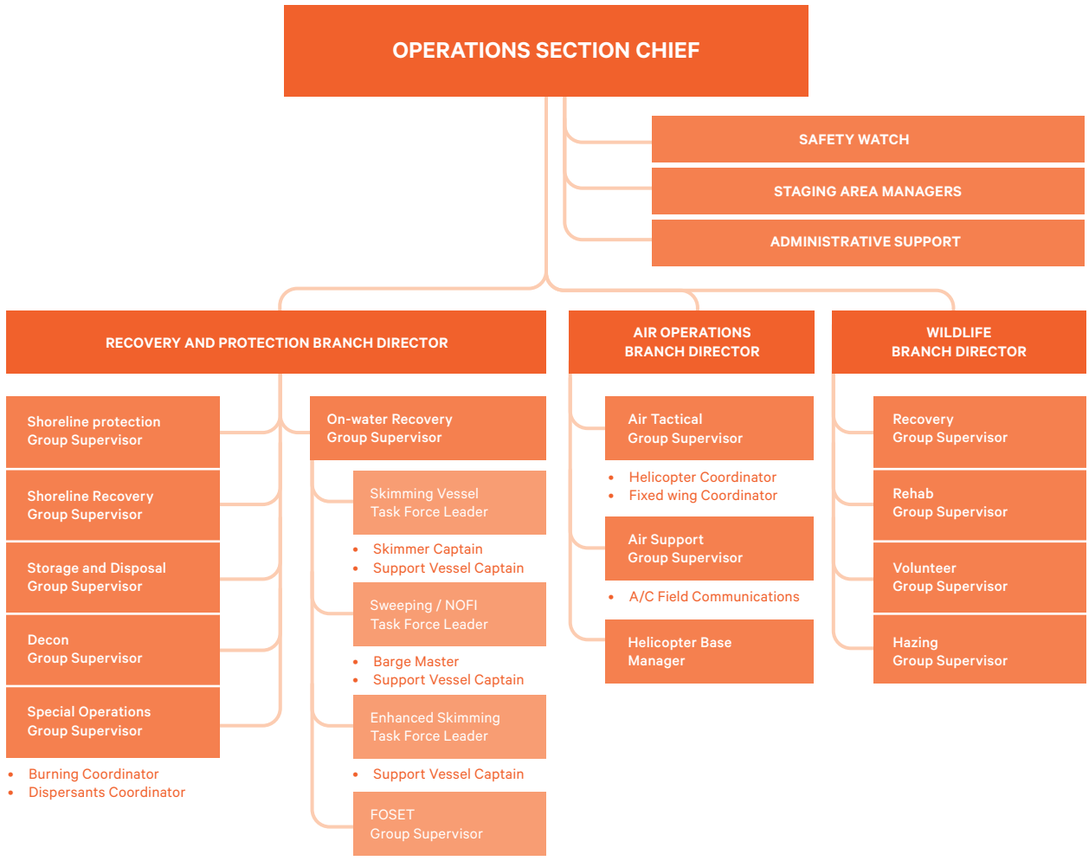



**Figure 7:** Operations Section Structure

### Operations Section

The Operations Section is responsible for all field-operating activities. In the initial phase of a response they will handle their own logistics and planning to facilitate the response quickly. As the planning cycle is established, the Operations Section is responsible for carrying out the response activities described in the Incident Action Plan.

The Operations function includes the responsibility to manage on-water activities, shoreline work, aerial support (surveillance, spotting, etc.) and any special operations they are required to complete. The Operations function organizes and manages all response assignments directed at containing and recovering spilled oil, protecting sensitive resource areas and treating impacted areas.

Operations priorities during the Initial Response Phase include:

- Establishing the Operations Section
- Establishing staging areas
- Mobilizing and directing resources
- Briefing the Incident Commander(s) on operations
- Revising tactics in response to changing incident information

The Operational Phase follows the Initial Response Phase. This phase is characterized by a set operational period and a planned approach to the spill response driven by development of the Incident Action Plan. Many, if not most, of the required Command and general staff positions will have been filled and tasks will begin to become routine over the course of the Operational Phase.



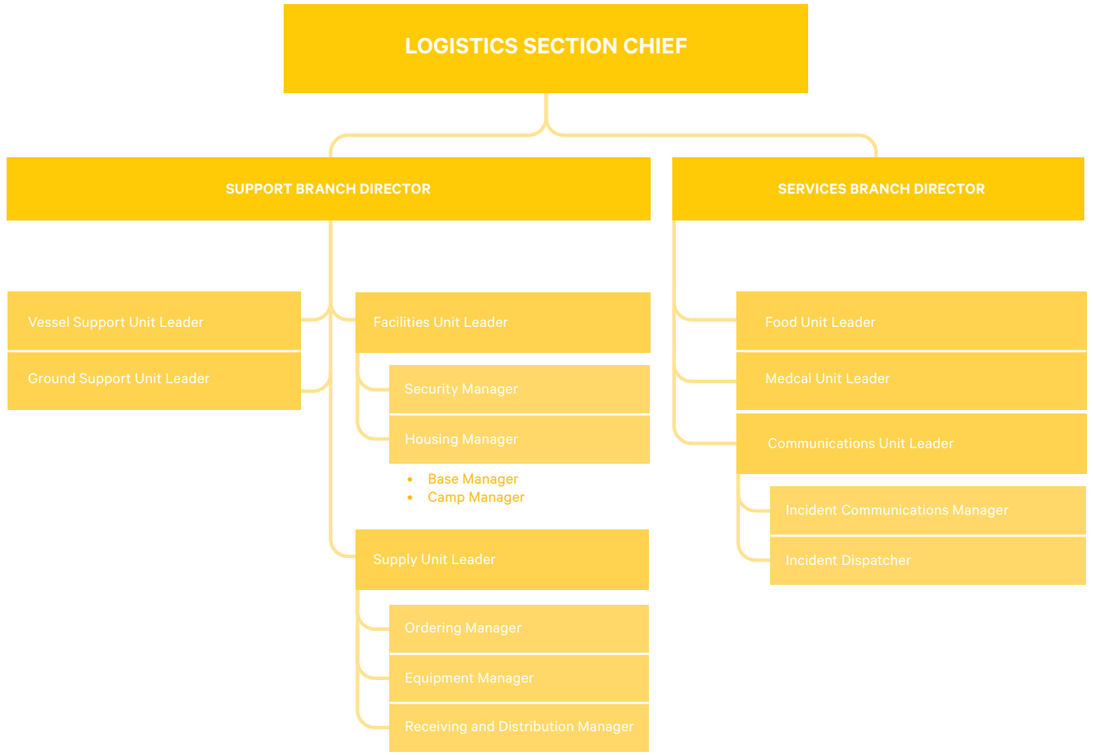



**Figure 8:** Logistics Section Structure

Logistics secures the equipment and personnel that carry out response services.

### Logistics Section

The Logistics Section is responsible for providing all support resources to keep the response operating at peak levels. It provides all support for purchasing, transportation, communications and security. Logistics establishes and maintains the Incident Command Post, staging areas and incident facilities such as bases, camps and housing facilities.

Logistics support assignments may include:

- Acquiring and/or constructing and managing response and staging facilities
- Securing and arranging for the housing, clothing and feeding of response personnel
- Obtaining, inspecting and maintaining equipment
- Providing strategic and tactical air, land, and water transportation resources
- Obtaining communications equipment and setting up and maintaining communications networks
- Ensuring the security of personnel and equipment
- Providing medical services and input to the development of safety plans
- The handling of waste materials
- The organization and management of demobilization efforts

The Logistics Section secures the equipment and personnel needed to carry out response services and keeps the equipment and response personnel operational in the field.

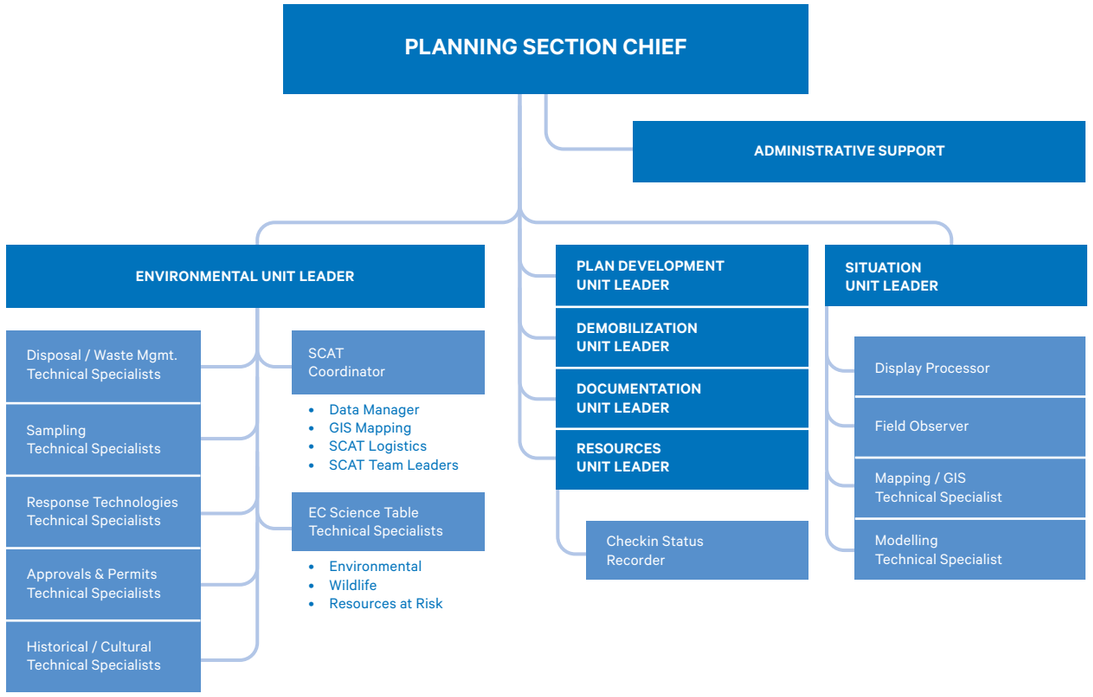



**Figure 9:** Planning Section Structure

### Planning Section

The Planning Section is staffed by the experts and planning resource professionals who are responsible for developing operational plans and providing expert advice and technical information to the response organization. The Planning Section is the link between the Incident Management Team and any government technical groups, such as the Environment and Climate Change Canada Science Table.

The Planning Section is responsible for the collection, evaluation and display of incident information, maintaining status of resources, and preparing the Incident Action Plan and incident-related documentation.

The Planning Section:

- Compiles and prepares status reports
- Facilitates tactical (short-term) planning and strategic (long-term) planning
- Compiles and prepares the necessary Incident Action Plans, the General Plan and supporting documentation for all plans
- Prepares and coordinates strategies for a wide variety of functions, such as storage and disposal of liquid and solid oily and non-oily wastes, conducting shoreline treatment assessment operations, generating maps, and planning demobilization activities
- Interfaces with technical advisors and services supplied by contracted companies or by various governments. This ensures that the Incident Management Team develop strategies and plans based on common and up-to-date information.



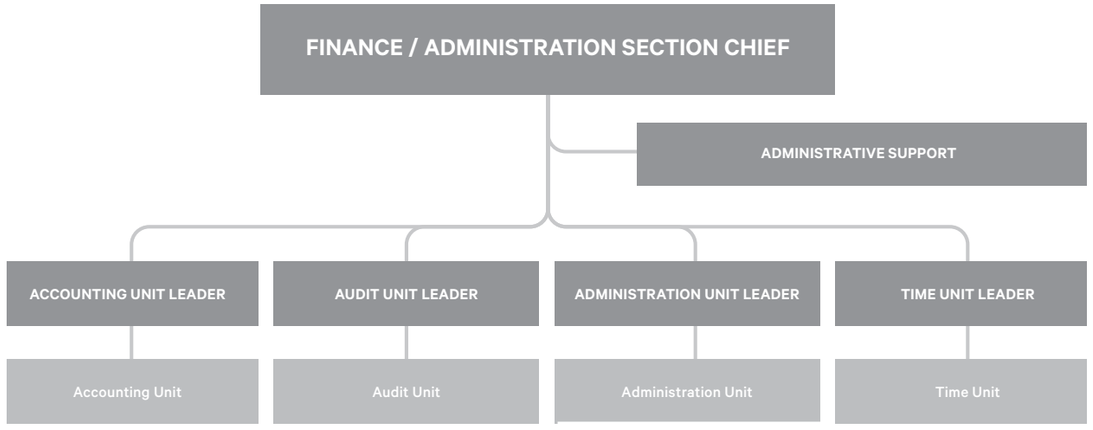



**Figure 10:** Finance / Administration Section Structure

Finance must work closely with all sections to ensure all costs are documented.

### Finance / Administration Section

The Finance/Administration Section monitors all activities with respect to time and billing, as well as ensuring that the response operations are audited. It ensures all expenditures and commitments are subject to strict controls to ensure they are properly documented for asset control and invoicing purposes. This section also processes purchase orders and invoices, tracks receipt and distribution of resources, monitors costs, audits contractor attendance and provides the IC with regular, accurate and up-to-date reports on response expenditures and commitments.

The Finance/Administration Section must work closely with all sections to ensure all costs are documented. They must fiscally manage the incident to include contracting, administrative functions and assisting the Responsible Party's Claim Centre, if requested.

## ICS ROLES: INDIGENOUS NATIONS AND COASTAL COMMUNITIES

The roles Indigenous Nation and coastal community members may be asked to fill during a response vary depending on the complexity of the response and the impact the spill has had on individual communities. If an Indigenous Nation or coastal community has been directly impacted by an oil spill, a representative will often be asked to participate in Unified Command as an Incident Commander. In this scenario, it is also critically important to have Indigenous Nations represented in the Environmental Unit to ensure cultural sensitivities, such as burial sites and current food harvesting areas, are taken into account in the overall response. As well, responders rely on Indigenous Nations' local area knowledge to support operational elements of the response. For example, understanding local currents and tidal actions can help responders understand where oil may move.

Below are a sample of the types of roles Indigenous Nations and coastal community members are often asked to fill in the ICP.

### Liaison Officer

The Liaison Officer (LOFR) serves as the primary contact for all impacted communities that are not represented in the Incident Command Post and can bring forward any of their concerns to the appropriate Incident Management Team members. The LOFR is responsible for ensuring effective coordination with organizations participating in the spill response and impacted communities. The role of the LOFR is critical to any emergency as their role can significantly impact how well communities are kept informed of the response.

### Environment Unit

The Environment Unit is a branch in the Planning Section. The Environment Unit is responsible for all environmental and technical matters associated with the response, including strategic assessments, spill surveillance and supervising technical specialists.

### Shoreline Cleanup Assessment Technique Coordinator

The Shoreline Cleanup Assessment Technique (SCAT) Coordinator is the primary point of contact for all SCAT activities. They are responsible for coordinating the SCAT program and recommending appropriate cleanup methodologies and actions for various types of shoreline.

Field teams (referred to as SCAT Teams) should be initiated as soon as possible after notification of the incident. It is ideal that the SCAT Team's data about shoreline conditions is used in the Incident Action Plan being developed for the next operational period.

In addition to the SCAT Team Leaders, a small team of ICP personnel provide support to the SCAT Coordinator and SCAT Program. These personnel include a SCAT Data Manager, a SCAT GIS/Mapping specialist and a SCAT Logistics specialist.

### Resources at Risk Technical Specialist

The Resources at Risk Technical Specialist is responsible for identifying resources that may be at risk from exposure to the spill, by analyzing known natural, cultural and man-made resources and the projected movement of the spilled product. The Resources at Risk Technical Specialist weighs the relative importance of the potentially impacted resources and helps to develop a priority list. This position also represents the practical integration of Environment and Climate Change Canada Science Table into the Environment Unit.

### Historical/Cultural Resources Technical Specialist

The Historical/Cultural Resources Technical Specialist is responsible for identifying and resolving issues related to any historic or cultural sites that may be threatened or impacted by the incident. It is ideal that this person have knowledge of local communities, cultures and histories, and be able to capture and address local concerns. The Specialist may have a team made up of many local experts, including Indigenous representatives from the impacted area.

# CANADIAN SPILL RESPONSE REGIME

## LEGISLATION AND REGULATIONS

The federal government is responsible for transportation and shipping in Canadian waters. The primary piece of legislation that regulates shipping and navigation is the Canada Shipping Act, 2001. Under this law, any vessel larger than 400 tonnes calling on a B.C. port or any vessel more than 150 tonnes carrying fuel for delivery is required to have a membership with a Transport Canada-certified response organization (RO), such as WCMRC. As well, anyone moving oil across a dock must remit a Bulk Oil Cargo Fee to the RO. Currently, WCMRC has agreements with over 2,300 members.

Regulations under the Canada Shipping Act, 2001, set out how an organization can become a certified RO. These regulations establish tiered response capabilities that ROs must meet within their defined area of response in order to be certified. Response capabilities are planning standards that specify the time within which a RO must respond to a spill of a specified quantity as well as the number of days in which on-water recovery operations must be completed. The standards also set out how much shoreline must be treated each day during a response, The RO must show how it can meet these standards and response times over a three-year certification period, with the understanding that other factors may impact the response during a spill. The current planning standards require ROs to have sufficient capacity to complete the on-water recovery operations within 10 days.

WCMRC is certified as a Tier 4 Response Organization by Transport Canada. Tier 4 requirements involve having the capacity to clean-up a 10,000-tonne spill in 10 days. WCMRC will soon have the equipment, personnel and expertise to clean-up a spill of up to 20,000 tonnes in 10 days.

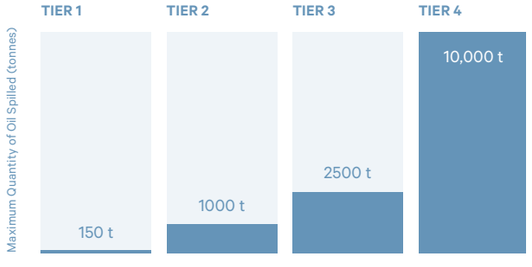



**Figure 11:** Response Capabilities

## WHO PAYS FOR A MARINE SPILL RESPONSE?

Under the *Canada Shipping Act*, the polluter is always required to pay the costs of an oil spill, including costs for cleanup, monitoring, preventative measures, reinstatement measures, third-party damages and government costs. Annual membership fees plus BOCF remitted to certified ROs cover the response organization's day-to-day operating expenses, ensuring its ability to maintain a state of readiness. In the event of an oil spill, however, the polluter is required to pay 100% of the cleanup costs and to have insurance to cover those costs.

The *Marine Liability Act* requires vessels entering a Canadian port to have mandatory liability insurance. The amount of insurance will depend on the size of the ship and the source of the oil (cargo or fuel). If the costs to cleanup a spill exceed the insurance, there are additional sources funded by industry, such as the International Oil Pollution Compensation Funds and Canada's Ship Source Oil Pollution Fund. These funds are financed by levies collected from oil cargo companies.

## ROLES AND RESPONSIBILITIES

While WCMRC is currently the only Transport Canada-certified RO on Canada's West Coast, we work with multiple agencies when responding to an oil spill. Key partners include the polluter, Transport Canada, Fisheries and Oceans Canada/Canadian Coast Guard, Environment and Climate Change Canada, British Columbia Ministry of Environment and Climate Change Strategy, Indigenous Nations, Local Government (municipalities and regional districts) and community volunteers

### Polluter

Under Canadian law, the polluter is responsible for paying for the cleanup costs. Often this will involve hiring ROs, such as WCMRC, to ensure the spill is cleaned up appropriately. The polluter is legally required to ensure the spill is cleaned up and is responsible for all costs associated with an oil pollution incident, including any government costs associated with the response. If the polluter is unwilling or unable to manage the response the Canadian Coast Guard will take charge of the incident and hire WCMRC (RO) directly. They will in turn pursue payment from the polluter after the fact.

### Indigenous Nations and Coastal Communities

If an Indigenous Nation or local community has been directly impacted by an oil spill, a representative will often be asked to participate in Unified Command as an Incident Commander. The roles and responsibilities these representatives may be asked to undertake are discussed in detail in *ICS Roles: Indigenous Nations and Coastal Communities* on page 18.

### Local Government (Municipalities and Regional Districts)

Local governments impacted by a spill are often involved as Incident Commanders on a spill response. Local governments may have staff with detailed knowledge of the local area and services



The polluter is responsible for all cleanup costs.

that may help in the spill response. Local government personnel may also be able to provide information and resources that can aid in the spill response.

### British Columbia Ministry of Environment and Climate Change Strategy

During a spill response, the BC Ministry of Environment and Climate Change Strategy acts as the Provincial Incident Commander. They often provide expertise in the Environment Unit and have technical specialists involved in waste management, SCAT and water/tissue sampling. BCMOE staff are also responsible for ensuring any provincial permits are in place to address waste management.

### Transport Canada

Transport Canada is the lead regulatory agency responsible for the overall spill response regime. In other words, they are responsible for the development of regulations and overall governance of the regime. Some of Transport Canada's activities include regime management, RO certification, development of regulations and standards, conducting risk assessments, monitoring spills through the National Aerial Surveillance Program, and leading ship incident investigations.

Some of the guiding principles for the regime are:

- Effective and responsive legislation founded on a partnership between government and industry
- Potential polluters pay for preparedness
- Polluter pays for reasonable response costs
- Comprehensive contingency plans
- Mutual aid agreements with neighbours.[2]

### Fisheries and Oceans Canada/Canadian Coast Guard

The Canadian Coast Guard is the lead operational federal agency for all ship-source oil spills in Canadian waters. The Coast Guard provides national preparedness capacity and maintains personnel and equipment located strategically in each region on Canada. The Coast Guard is leading the development of regional response plans, such as the Greater Vancouver Integrated Response Plan (GVIRP).

If you spill a pollutant into the marine environment or you see an oil slick, immediately call the Canadian Coast Guard. **In British Columbia, the 24-hour line to report marine pollution incidents is 1-800-889-8852**.

In the event of a spill where the polluter is unknown (a 'mystery spill'), the Coast Guard takes responsibility to ensure an appropriate cleanup while the polluter ultimately pays the cleanup costs. In a spill where the polluter is known, the Coast Guard is responsible for monitoring the polluter's cleanup efforts to ensure an appropriate response. The Coast Guard acts as the Federal Incident Commander under the Incident Command System. The Department of Fisheries and Oceans also provides scientific expertise and information during a spill response.

### Environment and Climate Change Canada

Environment and Climate Change Canada provides scientific, technical, environmental and wildlife expertise during spill response. ECCC is responsible for chairing the Science Table which brings together experts in the field of environmental protection to help identify environmental priorities. The Science Table provides scientific advice on appropriate methods and procedures during spill cleanup.

Staff from ECCC will act as the Environment Unit Leader. ECCC staff will also act as technical specialists within the Environment Unit for oil spill trajectory modeling, and site-specific weather and water/tissue sampling. ECCC is also responsible for developing plans to treat birds and other wildlife if they are impacted by the spill, and lead shoreline clean-up assessment technique (SCAT) teams.

### Volunteers

The safety risks associated with spill response operations prohibits the use of volunteers in all operational response activities. However, it is important for the response to find safe response-related activities for volunteers and/or ensure there is adequate security to protect the public from danger. In addition to concerns for the health and safety of the public and responders, other considerations when determining whether to incorporate volunteers into a response include the required resources for volunteer supervision and training, as well as liability and insurance considerations.

Unified Command determines whether it is too dangerous to integrate volunteers into the response. If volunteers are incorporated, their positions will typically be converted into paid temporary worker positions due to safety and security as well as liability issues. The use of such temporary workers will be scaled according to the needs of the incident. Temporary workers are typically provided training at the time of the spill (i.e. just-in-time training). In Canada, the polluter is liable for all costs associated with volunteer/temporary worker management, including associated insurance and liability expenses.

Temporary workers will not be placed into roles that would put themselves or others at risk. However, a spill response involves a variety of tasks and roles and some positions are far safer for temporary workers to fill. Such roles may include but are not limited to administrative support, facility and site safety and maintenance, IT support, community notification, shoreline patrol and surveillance, wildlife surveillance and transportation.

2 Taken from tc.gc.ca/eng/marinesafety/oep-ers-regime-menu-1780.htm 8 March 2019.

# SPILL RESPONSE TACTICS

Once oil is spilled, it will naturally spread, fragment and disperse under the influence of wind, waves and currents. As cleanup operations unfold, different tactics may be used to reduce the impacts of the spill on the surrounding environment. These could include mechanical recovery, shoreline protection, dispersants and in-situ burning.

## BIODEGRADATION

Natural biodegradation and evaporation of oil can greatly impact the amount of oil that is recovered by response crews. Petroleum hydrocarbons naturally occur in all marine environments and oil-degrading microorganisms have evolved to consume them. The rate of biodegradation depends on many factors, including type of product spilled, environmental conditions and the size of the spill.

**Figure 12:** Boom deployed in a U-Sweep to collect oil for recovery.

## MECHANICAL RECOVERY

The primary method for responding to marine oil spills in Canada is mechanical recovery. Skimmers will skim oil off the surface of the water and be pumped into temporary storage vessels, such as barges. Booms are used to limit the spread of oil, deflect it away from sensitive areas and collect it for recovery. For smaller amounts of oil, sorbent pads are often used. Sorbents refer to materials used to recover oil through absorption. These materials are designed to absorb oil but not water.

**Figure 13:** Disc skimmer being set up to skim diesel.

## SHORELINE PROTECTION

Shoreline protection aims to prevent or minimize contact between oil and the shore zone. Typically, a combination of strategies, techniques and equipment are integrated into long-term operations to reduce the environmental consequences to at-risk shorelines. Strategies include removing shoreline debris before the oil washes ashore, deflecting oil away from the shore with the use of booms or other physical barriers, and trapping or collecting oil at the shoreline or on the seabed.

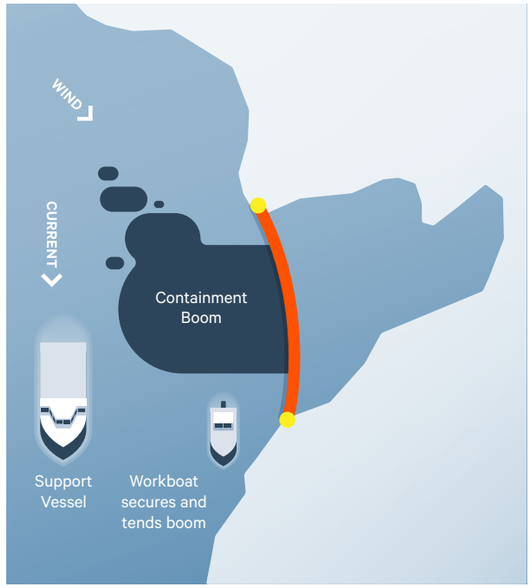



**Figure 14:** Protective strategy to prevent oil from entering a bay.

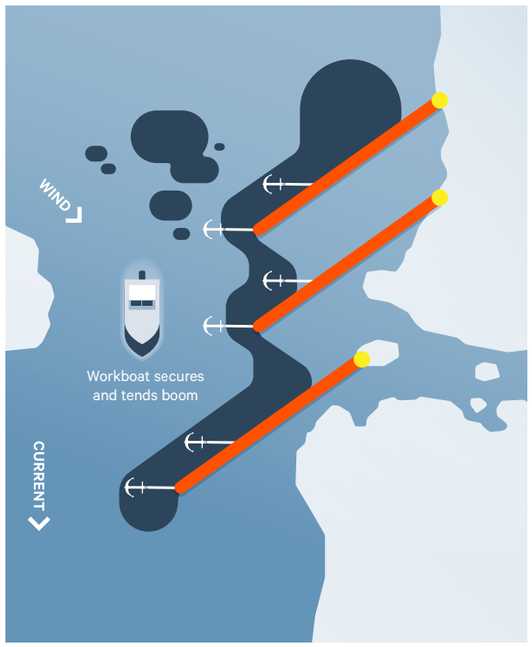



**Figure 15:** Protective strategy to deflect oil away from the shore.



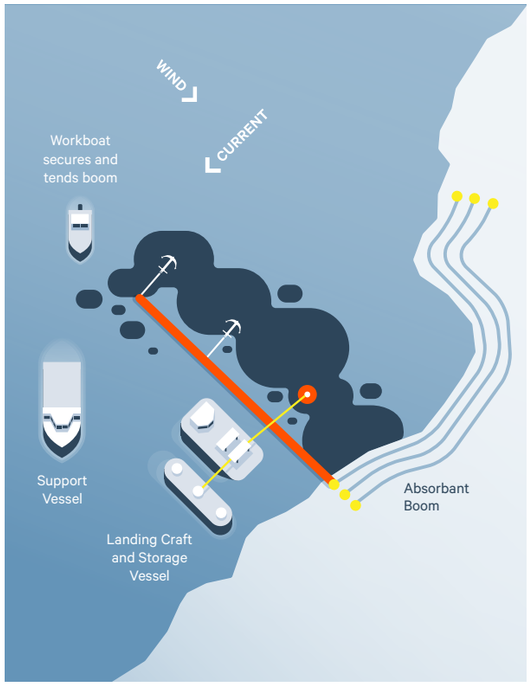



**Figure 16:** Booming to entrap oil for recovery.

## SHORELINE FLUSHING

If oil reaches the shore, shoreline flushing is used to remove the product. Before flushing begins, a shoreline boom is deployed in the water to contain and collect oil as it is flushed from the shore back into the water. Water is then pumped from the ocean through a large sprinkler system set up along the foreshore. High volumes of low-pressure water flood the shore, raising the water table. As oil rises to the surface, natural wave, and tidal action flush it from the shore and into the water, where it is contained by the booms. Skimmers then recover the oil from the water's surface, pumping it into storage vessels.

## SUBMERGED/SUNKEN OIL RECOVERY

Weathering, sediment interaction and other processes can cause oil to sink or submerge during a response. After as much oil as possible is removed from the water's surface, several different processes can be employed to detect and recover submerged or sunken oil, including the use of sonar systems, underwater cameras, diver observations and vacuuming, sorbents, dredging and remobilization.

## ALTERNATIVE RESPONSE MEASURES

Alternative response measures include techniques like burning the oil on water (in-situ burning). This requires the oil to be concentrated before it is lit on fire. This technique is used early in a response and can remove large amounts of oil from the sea surface.

Another alternative response measure is dispersants. Dispersants quickly transfer large quantities of oil into the water column, accelerating natural dispersion and biodegradation.

**Figure 17:** Contractors training in shoreline flushing.

Dispersants are used early in a response, when other response techniques are limited by weather or resource availability, and before weathering renders dispersants ineffective.

WCMRC maintains fire boom and has equipment to deploy dispersants, but these techniques are rarely used in Canada. In-situ burning and use of dispersants requires the approval of Environment and Climate Change Canada.

## NET ENVIRONMENTAL BENEFIT ANALYSIS

In instances when it is unclear which type of response tool will result in the most effective cleanup, spill responders often use a process called Net Environmental Benefit Analysis (NEBA) to evaluate the risks and benefits of certain cleanup strategies. For example, responders would need to consider what the environmental impacts are of bringing heavy equipment on to a sensitive shoreline to conduct remediation. The NEBA process will evaluate the probable outcomes of using specific cleanup methods versus the probable outcomes of leaving the area to natural attenuation. Environmental considerations are not necessarily the only considerations when conducting a NEBA process—social and economic considerations may also be factored in.

**Figure 18:** In-situ burning. Image from ITOPF.org

# SPILL RESPONSE EQUIPMENT

Please note this section includes a sample of the key equipment in WCMRC's inventory and is not a full and complete list of WCMRC's response equipment.

## BRUSH SKIMMERS

Brush skimmers are floating oil skimmers that use rotating brushes for high volume recovery. These types of skimmers have proven to be very effective with heavier products such as crude oil, dilbit and bunker C.

## DISK SKIMMERS

Disk skimmers use rotating discs covered with a fuzzy material that collects oil as the disc passes through the water. Wiper blades will scrape the oil off the material and into a collection tank. This type of skimmer is typically deployed for lighter oils such as diesel.

**Figure 19:** Aquaguard Brush Skimmer


**Figure 20:** Disc Skimmer

**Figure 21:** NOFI Current Buster Sweep System

## SWEEP SYSTEMS

Sweep systems are regarded as one of the most efficient systems available. They have a unique ability to collect and concentrate oil in waters exposed to current as well as when towing the system at higher speeds in open water.

## BOOM

Boom comes in a range of sizes and styles. It is used to wrap the spill source to contain spilled oil, to collect oil that has been spilled, or to protect key areas along the coast from getting oiled. General-purpose boom is available in a wide range of sizes for use in all water conditions. Boom is known for its simplicity of use and rugged design.

WCMRC maintains over 30,000 metres of general-purpose boom and over 6,000 metres of offshore boom. Offshore boom is well suited to the harsh conditions faced in open ocean spills. We also maintain a small amount of fire boom, which is made from fire resistant material and is used to collect oil before it is ignited, a process known as in-situ burning (see Alternative Response Measures on page 22).

WCMRC also maintains over 7,000 metres of shore-seal boom. This type of boom is used to protect beaches and low tidal land areas. It is also used for shoreline flushing operations to contain the flushed oil for skimming. Water-filled chambers 'seal' the boom to the shoreline and air-inflated chambers provide buoyancy. (See Shoreline Flushing on page 22).

**Figure 22:** General-purpose boom being deployed during a training exercise

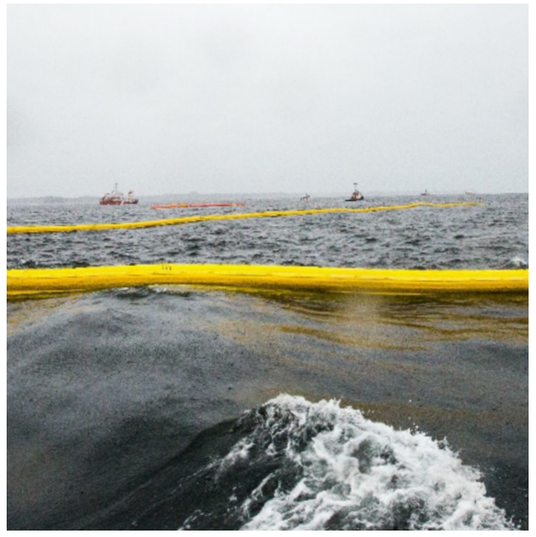


**Figure 23:** Offshore boom being deployed during a spill response

**Figure 24:** Shore-seal boom being deployed during a training exercise

WCMRC maintains over 30,000 metres of general-purpose boom, and 6,000 metres of offshore boom.

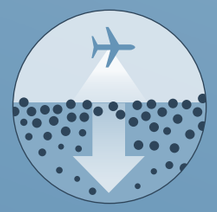
## OTHER EQUIPMENT

WCMRC maintains a wide variety of equipment to support a fast and efficient response. This includes infrared cameras to spot oil at night as well as drones, communications equipment, ICS equipment, staging area equipment and specialized software to support digital mapping and oil spill trajectory modeling. WCMRC is available 24 hours a day, seven days a week to respond to oil spills. When we are not responding to a spill, our spill technicians regularly conduct training and maintenance operations to ensure we are in a ready state to respond.

# SPILL RESPONSE 101

## PROTECTION AND RECOVERY

Once oil is spilled at sea, it will naturally spread and disperse under the influence of wind, waves and currents, changing its composition and environmental impact. As a clean-up operation unfolds, different techniques may be employed to limit the impacts of the spill on the marine environment.



### DISPERSANTS

Dispersants quickly transfer large quantities of oil into the water column, accelerating the natural dispersion and biodegradation from microorganisms that break down the oil. To be effective, dispersants must be used early in a response. The use of dispersants requires the approval of Environment and Climate Change Canada.

### IN-SITU BURNING

Burning floating oil at sea is called in-situ burning. It requires the oil to be concentrated and can quickly remove large amounts of oil from the sea surface. In-situ burning requires the approval of Environment and Climate Change Canada.

### BIODEGRADATION

Natural biodegradation and evaporation of oil can greatly impact the amount of oil that is recovered by response teams. Petroleum hydrocarbons occur naturally in all marine environments and oil-degrading microorganisms have evolved to consume them. The rate of biodegradation depends on the type of oil spilled, environmental conditions and the size of the spill.

### SHORELINE PROTECTION

Shoreline protection aims to prevent or minimize contact between oil and the shore zone. Strategies include deflecting oil away from the shore with the use of booms and trapping or collecting oil.

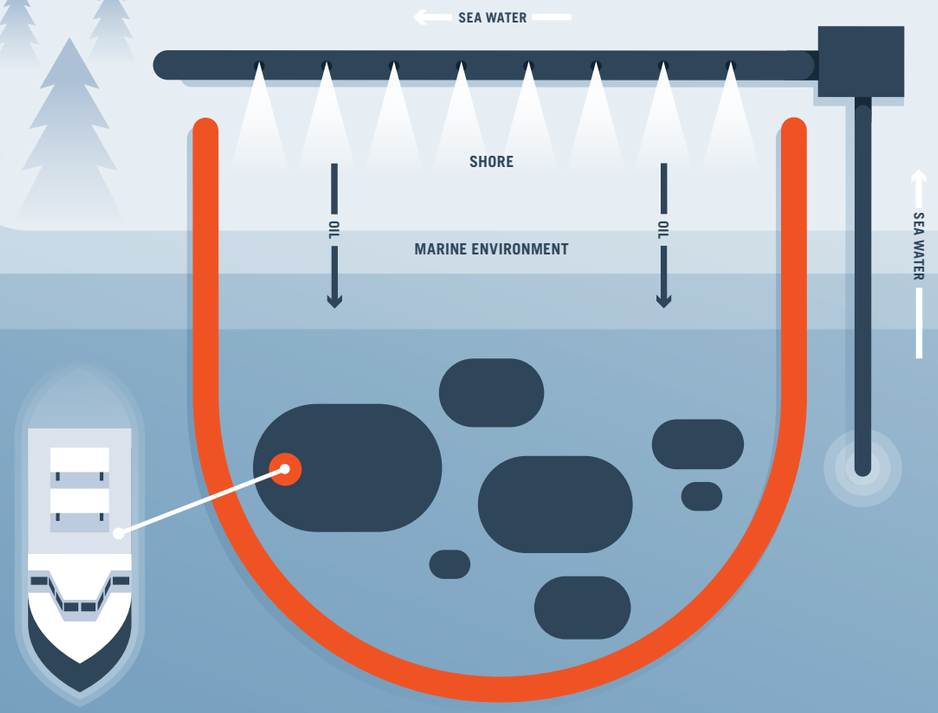

### MECHANICAL RECOVERY

The primary equipment used to recover oil during a marine response includes:

1 **Response vessels** perform a variety of functions, from deploying boom to transporting personnel and equipment.
2 **Booms** limit the spread of oil, deflect oil away from sensitive areas and contain the oil for recovery.
3 **Mechanical skimmers** recover spilled oil from the water's surface, and pump it into a storage vessel, such as a barge.
4 **Sorbents** are materials used to recover oil through absorption.

## SHORELINE CLEAN-UP

During a spill, oil may drift toward the shore where it can become stranded due to the action of currents, waves and tides. To clean-up oil on the shoreline or seabed several strategies may be employed.




### RECOVERY OF SUNKEN AND SUBMERGED OIL

A combination of weathering, sediment and wave action can cause oil to sink. Once oil is removed from the water's surface, several different processes can be employed to detect and recover sunken and submerged oil, including the use of sonar systems, underwater visualization systems, diver observations and vacuuming, sorbents, dredging and remobilization.

### SHORELINE FLUSHING

Shoreline flushing causes minimal ecological damage and removes oil quickly. Shoreline boom is first deployed into the water contain the oil. Water is then pumped onto the shore from the sea through a large sprinkler system. As the oil rises to the surface, natural wave and tidal action flush into the water from the shore. Skimmers then recover the oil from the water's surface.

### SHORELINE CLEAN-UP ASSESSMENT TECHNIQUE

SCAT teams gather crucial field data on the location, degree and type of shoreline contamination. The data is then used to create a shoreline clean-up plan that maximizes recovery and minimizes the risk of further damage. SCAT begins once the threat of shoreline contamination is identified and continues throughout the response, ensuring the clean-up is based on up-to-date information.

### WILDLIFE REHABILITATION

The first 48 hours after a spill are critical for wildlife rehabilitation. Professional wildlife teams are quickly activated to locate and begin treatment of oiled wildlife and ensure appropriate, safe and high-quality care. Untrained persons should never attempt to capture, wash or treat a wild animal impacted by oil.


# APPENDIX A: ACRONYMS

These are the acronyms typically used in the day-to-day operations of an ICP.

| ABBREVIATION | DESCRIPTION |
|---|---|
| BCERMS | British Columbia Emergency Management System |
| CANUSDIX | Canada - U.S. Dixon Entrance (Contingency Plan) |
| CANUSPAC | Canada - U.S. Pacific (Contingency Plan) |
| CCG | Canadian Coast Guard |
| CHS | Canadian Hydrographic Services |
| COSBC | Chamber of Shipping B.C. |
| CSA, 2001 | Canada Shipping Act, 2001 |
| CWS | Canadian Wildlife Service |
| DFO | Department of Fisheries and Oceans (Canada) |
| ECCC | Environment and Climate Change Canada |
| EEST | Environmental Emergencies Science Table |
| ECRC | Eastern Canada Response Corporation |
| EMBC | Emergency Management BC |
| ERA | Enhanced Response Area |
| FOG | Field Operations Guide |
| GAR | Geographic Area of Response |
| GRP | Geographic Response Plan |
| GRS | Geographic Response Strategy |
| HAZMAT | Hazardous Materials |
| IAP | Incident Action Plan |
| IC | Incident Commander |
| ICP | Incident Command Post |
| ICS | Incident Command System |
| IMO | International Maritime Organization |
| IMT | Incident Management Team |
| IOPC | International Oil Pollution Compensation Fund (International) |
| MCTS | Marine Communications and Traffic Services (CCG) |
| NEEC | National Environmental Emergencies Centre (ECCC) |
| OHF | Oil-handling Facility |
| OPEP | Oil Pollution Emergency Plan |
| OSC | On-scene Commander |
| OSRP | Oil Spill Response Plan |
| OSRO | Oil Spill Response Organization (U.S.) |
| OWSBC | Oiled Wildlife Society of B.C. |
| P&I Clubs | Protection and Indemnification Insurance |
| PAR | Primary Area of Response |
| PPE | Personal Protective Equipment |
| RO | Response Organization |
| RP | Responsible Party (Polluter) |
| SCAT | Shoreline Cleanup Assessment Technique |
| SDS | Safety Data Sheet |
| SRM | Spill Response Manager (WCMRC) |
| TC | Transport Canada |
| UC | Unified Command |
| VOO | Vessel of Opportunity |
| WCB | WorkSafeBC |
| WCMRC | Western Canada Marine Response Corporation |
| WHIMIS | Workplace Hazardous Material Information System |
| WRA | Wildlife Rescue Association |

# APPENDIX B: FACT SHEETS

## TYPES OF OIL: DIESEL

Diesel is a light petroleum product that is derived from crude oil during the refining process. It can be used as fuel or shipped as cargo. Many recreational and deep-sea cargo vessels on Canada's West Coast use diesel to fuel their engines.

### WHAT TYPE OF OIL IS DIESEL?

Diesel is a non-persistent, distillate fuel classified as a light oil. It's exact physical-chemical properties are determined by the deposit of crude oil from which it originated, combined with the production year and blending ratio of the final fuel.

### WHAT TYPES OF VESSELS USE DIESEL?

Diesel can be used by all types and sizes of vessel, but is typically used by smaller vessels such as tugs, work boats, fishing boats, yachts and other recreational boats.

### WHAT HAPPENS WHEN DIESEL SPILLS IN SEA WATER?

Once released into the sea, diesel will typically spread quickly and be visible as a rainbow or silvery sheen on the water's surface. Because it is much lighter than water, diesel will not sink and accumulate on the seafloor in open marine environments.

Typically, diesel evaporates and disperses naturally within a couple of days, even in cold water. In rough open seas, it can take up to five days to evaporate and disperse. Adverse weather conditions will disperse the sheen into smaller slicks, creating a greater surface area for evaporation. Due to its very low viscosity, diesel can be dispersed into the water column by breaking waves, or when winds reach 5-7 knots. If this occurs, it can form droplets that are small

enough to be kept in suspension and moved by currents. Oil dispersed in the water column can adhere to fine-grained suspended sediments which then settle out and deposit on the seafloor. This process is more likely to occur near river mouths where fine-grained sediments are carried in by the river.

### HOW DOES SPILLED DIESEL AFFECT MARINE FLORA AND FAUNA?

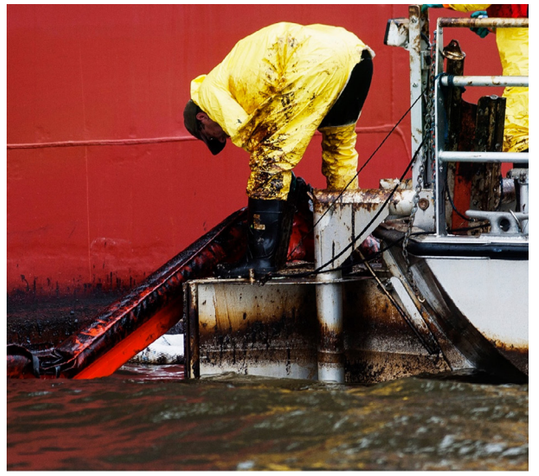
The aquatic toxicity of diesel to water-column organisms is high. Fish, invertebrates and seaweed that come into direct contact with diesel may die. Surface-dwelling wildlife or wildlife that frequently surfaces, including aquatic and semi-aquatic mammals, seabirds, waterfowl, turtles and aquatic insects, can also be affected by diesel spills. These species are vulnerable to acute mortality due to hypothermia from loss of insulation, oil ingestion or inhalation of toxic fumes. In shallow, nearshore areas crabs and shellfish can be at risk from diesel spills. These organisms bioaccumulate the diesel but will also filter it out, usually over a period of several weeks following exposure.

If diesel becomes stranded in shoreline areas, it tends to penetrate porous sediments quickly but is also washed off quickly by waves and tidal flushing. In addition, diesel oil is readily and completely degraded by naturally occurring microbes within a period of one to two months. As a result, shoreline clean-up is not typically required. Stranded diesel can also evaporate.

### HOW IS DIESEL CLEANED UP?

Due to the high evaporation rate of diesel, on-water recovery is generally not required. However, if the product is thick enough and persists on the surface, responders can use booms and skimmers to attempt recovery. Fuzzy disc skimmers can be effective in these situations. Sorbent pads and sorbent boom can also be used to absorb diesel on the surface.





## TYPES OF OIL: BUNKER C

After gasoline, diesel and other light hydrocarbons are extracted from crude oil during the refining process, a heavy residual oil known as Bunker Fuel remains.

Bunker is graded as either A, B or C, with C being the thickest and most viscous. When mixed with a lighter petroleum product, bunker C becomes a cheap fuel for use in shipping. Most of the larger shipping vessels traversing Western Canada's waters use bunker C as fuel.

### WHAT HAPPENS WHEN BUNKER C SPILLS IN SEA WATER?

Depending on the specific gravity of the bunker C, and the water density in which it is spilled, the oil could float, suspend in the water column or sink. Biodegredation of bunker C is very slow, with just five to 10 per cent expected to evaporate in the first hours following a spill.

Bunker C typically spreads into thick, dark-coloured slicks, which can contain large amounts of oil. If floating oil weathers and mixes with sediment it could sink, causing subsurface tarballs (small, compact masses of heavily weathered oil) or tar mats (slabs of oil residue mixed with sediment and water).

After a period of days, floating bunker C can occasionally form an emulsion. Very little of this viscous oil is likely to disperse into the water column.

### WHAT TYPE OF OIL IS BUNKER C?

Bunker C is classified as a persistent, heavy oil. The exact physical-chemical properties of bunker C are determined by the deposit of crude oil from which it originated, combined with the production year and the blending ratio of the final fuel.

### WHAT TYPES OF VESSELS USE BUNKER C?

Bunker C is widely used as fuel oil for deep-sea cargo vessels.

### HOW DOES SPILLED BUNKER C AFFECT MARINE FLORA AND FAUNA?

The aquatic toxicity of bunker C is relatively low because it contains only small quantities of water-soluble compounds. However, floating bunker C can adversely affect surface-dwelling wildlife or wildlife that frequently surfaces, including aquatic and semi-aquatic mammals, seabirds, waterfowl, turtles and aquatic insects. These species are vulnerable to acute mortality due to hypothermia from loss of insulation, oil ingestion or inhalation of toxic fumes.

In shoreline areas, light accumulations of oil can form a ring at the high-tide line of the shore, while heavier accumulations can pool on the beach. Due to its high viscosity, beached bunker C tends to remain on the surface rather than penetrate sediments. Shorebirds and fur-bearing mammals that feed in heavily oiled intertidal habitats can suffer from contaminated or reduced populations of prey. Many shoreline plants can survive partial oiling, and roots often survive unless the substrate is heavily oiled. As biodegradation of bunker C is very slow, the product could persist on the shoreline for months or even years.

### HOW IS BUNKER C CLEANED UP?

Oil recovery by brush skimmers and vacuum pumps can be very effective when used early in a bunker C spill response. Sorbent booms and sorbent pads are also effective in cleaning-up this product. Shoreline clean-up of bunker C can be very effective before the oil weathers and becomes very sticky and viscous.


# TYPES OF OIL: CRUDE

Often referred to as black oil, crude oil is pumped directly from the ground in various locations around the world, including the Middle East, West Africa, the Americas and Asia.

Crude oil is comprised of a highly variable mixture of hydrocarbons that need to be separated through a refining process to turn them into usable products. Products derived from crude include diesel fuel, residual fuel oil, jet fuel, kerosene, home heating oil, liquid petroleum gases naphtha and gasoline. Crude oil is not usable in unrefined form. The different types of crude oil transported on Canada's West Coast include medium-grade Alaskan North Slope (ANS) and light crudes from Western Canada. This fact sheet will focus on ANS crude.

## WHAT TYPE OF OIL IS CRUDE?

Crude oil is a persistent oil made up of a wide variety of hydrocarbons, ranging from very volatile, light materials such as propane and benzene, to more complex heavy compounds like bitumens, asphaltenes, resins and waxes. The exact physical-chemical properties of crude are determined by the geographic source of the original oil—each deposit of crude oil has its own composition and properties. For this reason, there is no universal boiler or engine capable of running on all crude oils, and refining is necessary to create the products demanded by global markets and consumers.

## WHAT TYPES OF VESSELS TRANSPORT CRUDE?

Crude oil is transported by crude tanker.

## WHAT HAPPENS WHEN CRUDE SPILLS IN SEA WATER?

Because crude oils vary so widely in their physical and chemical properties, their fate and behaviour in the marine environment can differ significantly. However, crude oils spilled at sea are all affected by the same processes of weathering, which causes spreading, evaporation, dispersion, emulsification and dissolution in the early phases of a spill. Dispersion and emulsification are competing processes, with dispersion removing oil from the sea surface and emulsification causing the volume of product to increase and persist. The factors that determine whether the oil will disperse or emulsify include how much oil was spilled, its physical and chemical properties, and the sea temperature, currents, wind and sea state.

When ANS is released into the sea, approximately 15 to 20 per cent will evaporate in the first 24 hours, with very little oil dispersed into the water column. ANS tends to emulsify quickly, forming a stable emulsion (or mousse) that contains up to 75 per cent water. As the water content increases, weathering processes such as dissolution and evaporation tend to slow down. The water content can increase the volume of pollutant by a factor of up to five times.

The viscosity of the mouse typically increases rapidly, with the colour changing from a dark brown or black to light browns and rust colours. The mousse has a sticky rather than fluid texture, and can stretch and tear into smaller bits as it weathers and is exposed to increased wave action. This can result in a field of streamers, streaks, small patches and eventually tar balls (small, compact masses of heavily weathered oil), if no clean-up occurs.

## HOW DOES SPILLED CRUDE AFFECT MARINE FLORA AND FAUNA?

Floating crude can endanger surface-dwelling wildlife or wildlife that frequently surfaces, including aquatic and semi-aquatic mammals, seabirds, waterfowl, turtles and aquatic insects. These species are vulnerable to acute mortality due to hypothermia from loss of insulation, oil ingestion or inhalation of toxic fumes.

While organisms are not at high risk from crude oil dispersing into the water column, stranded crude can smother shoreline organisms. When stranded on the shoreline, the degree of adhesion will vary depending on the type of substrate. A mouse of ANS crude, for example, will not penetrate deeply into finer sediments.

## HOW IS CRUDE CLEANED UP?

Brush skimmers, sorbent booms and sorbent pads are very effective in removing crude oil from the surface of the sea. If crude strands on the shoreline, clean-up tactics could include shoreline flushing, manual collection or the use of heavy equipment, among other techniques.


# TYPES OF OIL: DILBIT

Alberta's Athabasca oil sands contain a naturally-occurring petroleum called crude bitumen, which can be upgraded into a synthetic crude oil and ultimately refined into a full range of petroleum products.

Due to the cold climate, Canada's bitumen deposits exist in a semi-solid or solid state and will not flow unless heated or diluted with lighter hydrocarbons. When a diluent is added to the bitumen, it produces a homogeneous blend with considerably lower density and viscosity, allowing the product to be transported via pipeline. This product is known as diluted bitumen, or dilbit.

In Western Canada, dilbit is currently transported to tidewater via the Trans Mountain Pipeline, which originates in Edmonton, Alberta, and extends west across British Columbia to Burnaby's Westridge Marine Terminal. The dilbit is then loaded onto vessels and traverses the Southern Shipping Lane en route to overseas ports. When the Trans Mountain Expansion Pipeline becomes operational in 2022, the volume of oil transported is expected to nearly triple.

## WHAT TYPE OF OIL IS DILBIT?

Dilbit is an extra-heavy, extremely viscous petroleum product. Diluents used to thin the bitumen include lighter crude oils, synthetic crude oils or natural gas condensates. Categorized as a persistent oil, most dilbits are composed of 70 to 80 per cent bitumen and 20 to 30 per cent condensate.

The exact physical-chemical properties of a dilbit are determined by the source of the original deposit from which the bitumen was extracted, combined with the production year and the blending ratio of the final product.

## WHAT TYPES OF VESSELS USE DILBIT?

Dilbit is primarily transported by crude tanker or tank barge.

## WHAT HAPPENS WHEN DILBIT SPILLS IN SEA WATER?

Diluted bitumen's density is lighter than the density of sea water, similar to most other medium to heavy crude oils. This means diluted bitumen floats when spilled in the ocean. This was WCMRC's experience during the 2007 Inlet Drive spill and has also been confirmed in numerous tests, including a 2016 Natural Resources Canada study which concluded diluted bitumen would float in sea water for up to three or four weeks, even in rough conditions.

## HOW DOES SPILLED DILBIT AFFECT MARINE FLORA AND FAUNA?

Floating dilbit can endanger surface-dwelling wildlife or wildlife that frequently surfaces, such as aquatic and semi-aquatic mammals, seabirds, waterfowl, turtles and aquatic insects. These species are vulnerable to acute mortality due to hypothermia from loss of insulation, oil ingestion or inhalation of toxic fumes.

## HOW IS DILBIT CLEANED UP?

Similar to most medium to heavy crude oils released into the sea, diluted bitumen can be recovered using a variety of skimmer systems, such as those employed by WCMRC. As tides, currents, turbulence, temperature and wave action weather the oil, the viscosity of the product increases. However, skimmers designed for more viscous oils—such as brush, belt and mechanical systems—as well as sorbent booms and sorbent pads, continue to effectively recover weathered oil in these conditions.

# SPILL RESPONSE MANAGEMENT: SHORELINE CLEANUP ASSESSMENT TECHNIQUE

Shoreline Clean-up Assessment Technique (SCAT) is a systematic and comprehensive approach to surveying, collecting and documenting realtime data on shore oiling conditions during a spill response.

The SCAT process begins as soon as the threat of shoreline oiling is identified, with shoreline assessment data collected quickly and clean-up endpoints established early.

## WHEN DID SCAT START?

SCAT is an integral component of the response organization and is fully integrated into the Incident Command System during a spill response. Each component of the SCAT process is fully scalable to meet the needs of an incident.

SCAT became an integral component of spill response after the Exxon Valdez spill in 1989, which was the first spill where standard approaches for documentation, terminology and decision making were applied. Many organizations have since developed SCAT programs, manuals, field forms, job-aids and training courses, including Environment and Climate Change Canada and the BC Ministry of Environment.

## GETTING INVOLVED IN SHORELINE CLEAN-UP

Oiled shorelines contain hazardous materials and are not a safe environment for untrained people. Assessing and cleaning up oil and oily waste from shoreline areas is conducted by specialized professionals using proper equipment. If a spill was of a size that required public involvement in shoreline clean-up, volunteers would be given real-time training and be integrated into the paid response workforce. Anyone interested in volunteering should immediately contact the response—under no circumstances should volunteers organize themselves.

## WHEN IS SCAT USED?

A SCAT program can be applied to any type of response, including oil, chemical or marine debris, and in any type of habitat, such as shorelines, wetlands, lakes, rivers, streams or uplands.

## WHAT TYPE OF DATA DOES SCAT COLLECT?

SCAT provides crucial field data on the location, degree and character of shoreline oiling, including shoreline habitats, oil type, degree of shoreline contamination, spill-specific physical processes, and ecological and cultural resource issues.

## HOW IS THE DATA USED?

Data is used by decision makers to set strategies and objectives for a shoreline clean-up plan that maximizes the recovery of oiled habitats and resources, while minimizing the risk of further ecological injury from clean-up efforts.

When determining the shoreline clean-up plan, the following is also considered:

- Venture capitalist networks, angel investors, debt financiers, e.g., Chrysalix Energy Venture Capital, Cornerstone Capital Group
- Financial institutions, e.g., RBC, TD Bank, BMO, pension funds, international banks
- Companies looking to invest in or purchase solutions from cleantech suppliers, e.g., GE, BASF, Enbridge
- Federal trade commissioners
- Business Development Canada, Export Development Canada and key federal departments
- Funding agencies, e.g., SDTC, NRC, Foresight, provincial funders
- Municipal economic development agencies from across Canada

## HOW DOES SCAT WORK?

During a spill response, SCAT teams are deployed to:

- Continuously assess the nature and extent of shoreline oiling and the logistical requirements for deploying field teams
- Determine the best treatment options by compiling maps and spatial data on sensitive resources and shorelines
- Develop initial clean-up guidelines and endpoints
- Apply clean-up constraints to reduce further harm
- Organize and train teams, conduct shoreline surveys, provide data to decision makers
- Obtain stakeholder/agency agreement for when a shore is considered clean
- Manage and present field data to planners and decision makers to ensure the appropriate methods and treatments are selected

## WHO IS ON A SCAT TEAM?

SCAT teams are typically small and can include representatives from provincial and federal agencies, the Responsible Party, municipalities and First Nations.

## WHAT TYPES OF TACTICS ARE RECOMMENDED?

Tactics suggested by SCAT teams during a spill response could include natural recovery, manual/mechanical oil removal, closures of oiled shoreline areas and shoreline flushing.

# SPILL RESPONSE MANAGEMENT: PROPERTY DAMAGE

The Canadian Compensation Regime for ship-source oil pollution damage is based on the "polluter pays" principle and is supported by international conventions.

Under these terms, the polluter is always liable for paying the costs of an oil pollution incident, including costs for cleanup, monitoring, preventative measures, reinstatement measures and third-party damages. In a ship-source oil spill, liability and compensation for property and other damage are governed by the Canada Shipping Act and the Marine Liability Act.

## HOW CAN I FILE A CLAIM?

Canada's Ship Source Oil Pollution Fund (SOPF) is the primary source of compensation for Canadians who have suffered quantifiable economic loss or property damage because of an oil spill in Canadian waters.

Claims for pollution damage resulting from an incident can be submitted directly to the SOPF, following the process outlined on their website in the "Filing a Claim" section. You can also contact the SOPF directly at **info@sopf-cidphn.gc.ca** or **1-613-991-1726**.

If you anticipate making a claim, good record keeping is crucial to the successful recovery of costs and expenses. The claim documentation should clearly set out what was done and why, where and when it was done, by whom, with what resources and for how much.

## WHERE DOES THE MONEY COME FROM?

In the event of a tanker spill, the liability and compensation for pollution damages is governed by a multi-tier international regime—regardless of if the oil was carried as cargo or fuel. Any individual, business, municipal or provincial authority in Canada that has experienced ship-source oil pollution damage can claim compensation from the regime. This includes damage to personal or business property, or economic losses suffered by businesses, such as fishing, aquaculture or tourism.

## TIER 1: SHIP OWNERS' LIABILITY

In the case of a spill of crude oil (as cargo), fuel oil, or bunker oil (which is used as fuel for ships' engines) from tankers, the *International Convention on Civil Liability for Oil Pollution Damage (1992 CLC)* and the *International Convention on Civility Liability for Bunker Oil Pollution Damage (2008)* make the ship owner liable. Both conventions are governed under the auspices of the International Maritime Organization. Under both conventions, the limit of liability depends on the size of the ship and is backed by compulsory insurance. If the amount of damages exceeds the ship owner's liability, international and domestic funds provide additional compensation.

Under this tier, claims are made against the ship owner's insurer. When an incident occurs, the responsible party will contact their insurer and information on the compensation and claims process will be made available to the public.

## TIER 2: THE INTERNATIONAL OIL POLLUTION COMPENSATION (IOPC) FUNDS

Canada is a member of the IOPC Funds, which administers two international compensation funds for oil pollution damages caused by persistent oil spilled from tankers. The principal role of IOPC Funds is to pay compensation to those who have suffered oil pollution damage in a member IOPC Funds country, and who cannot obtain full compensation for the pollution damage from the ship owner's insurer.

The first IOPC fund is the 1992 Fund Convention and the second is the Supplementary Fund Protocol, which was adopted in 2003. Both funds are financed by the oil industry and managed by government, and each is structured as an intergovernmental organization. Both funds hold levies collected from entities that receive certain types of oil in the sea ports of a member country. Contributions are based on the amount of oil received in the relevant calendar year, and cover expected claims as well as the costs of administering the IOPC Funds.



The governing bodies of the IOPC Funds are comprised of member states and meet twice each year to make decisions on compensation payments, policy and budgetary matters, including the amounts to levy in contributions.

### Who can make a claim with IOPC Funds?

Under this tier, claims can be made by individuals, partnerships, companies, private organizations or public bodies, including provinces or local authorities. For more information on filing a claim and compensation, visit the IOPC Funds website.

### What is covered under IOPC Funds?

Oil pollution incidents typically give rise to several different types of pollution damage claims, including property damage, costs of on-water and on-shore clean-up operations, economic losses caused by disruption to business, and costs for reinstatement of the environment.

To be entitled to compensation, the pollution damage must result in an actual and quantifiable economic loss that can be verified with detailed accounting records and other relevant supporting documentation and evidence, including the damaged property itself.

### How does the IOPC Funds process work?

Claims are assessed according to criteria established by the governments of IOPC Funds member states. In most cases, claims can be sent directly to the offices of the IOPC Funds. They can be reached through their website contact form or at **+44-20-7592-7100**.

Claimants should submit their claims as soon as possible after the damage has occurred. If a formal claim cannot be made in the immediate aftermath of an incident, claimants should notify the Funds as soon as possible of their intention to present a claim at a later stage. According to the 1992 CLC, claims must be made within three years of the date when the damage occurred. Claimants should also notify the IOPC Funds as soon as they suffer losses as the Funds may be able to assist in mitigating against future losses.

The Funds, normally in co-operation with the ship owner's insurer, usually appoint experts to monitor clean-up operations, investigate the technical merits of claims and to make independent assessments of the losses.

## TIER 3: THE SHIP-SOURCE OIL POLLUTION FUND (SOPF)

Canada created the SOPF in the early 1970s from levies it collects from oil cargo companies. SOPF covers claims for oil spills of any type of oil, from any type of ship, anywhere in Canada or Canadian waters. As Canada's national fund, SOPF was established to serve claimants and is not limited to seagoing tankers. It covers spills of persistent oil, petroleum, fuel oil, sludge, oil refuse and oily waste.

Any person or business may file a claim with SOPF respecting oil pollution loss, damages, costs or expenses regardless of if they have first tried to file a claim with the ship owner's insurer or with IOPF Funds. The SOPF also provides compensation in the event compensation from the ship owner and IOPF Funds is insufficient to meet all established claims.

### Who can make a claim with SOPF?

Any person or business in Canada that has sustained quantifiable economic loss or damage to property, or incurred costs and expenses, as a result of an oil pollution incident may file a claim.

More information regarding eligibility, the claims process, information requirements, and claims presentation and settlement can be found on the SOPF website. You can also contact the SOPF directly at **info@sopf-cidphn.gc.ca** or **+1-613-991-1726**.

### What is covered under SOPF?

If your property has been damaged in a ship-source oil spill, compensation is payable for reasonable costs of cleaning, repairing or replacing property that has been contaminated by oil.

This includes any reasonable preventative measures taken to prevent or minimize pollution damage in the aftermath of a spill.

To be entitled to compensation, the damage must result from actual or anticipated oil pollution and have caused a quantifiable economic loss. The claimant must be able to show the amount of his loss or damage by producing accounting records or other appropriate evidence.

### How does the SOPF process work?

Claims for pollution damage resulting from an incident or anticipated incident can be submitted directly to the SOPF. If damage has occurred, a claim must be made within two years after the day on which the oil pollution damage occurred. If no oil pollution damage occurred, but preventative measures were taken in anticipation of oil spill damage to private property, a claim must be made within five years after the day on which the incident occurred or was expected to occur.

# SPILL RESPONSE MANAGEMENT: WILDLIFE REHABILITATION

Successful rehabilitation of oiled wildlife requires significant funding, coordinated response plans, sophisticated logistical planning, dedicated facilities and highly-trained personnel, as well as the need to be constantly up-to-date on practices and supplies.

## IF YOU DISCOVER OILED WILDLIFE

Wildlife rehabilitation is a painstaking, stressful and slow process, and should be exclusively managed by wildlife professionals and highly-trained staff. The BCSPA warns untrained persons to never approach, touch or treat a wild animal impacted by oil. Oiled wildlife are under extreme stress and could be very defensive. This could result in bodily harm to a person who attempts to handle an animal as well as further stress and injury to the struggling animal.

The BCSPCA asks members of the public to immediately contact the professional wildlife rehabilitators that are involved in the spill response to report animals in distress. Important information to include is location, species (if known), condition and behaviour.

If you are interested in learning to care for oiled wildlife, first responder training courses are offered by the Oiled Wildlife Society of BC. In the event of a large spill, if support from the public is required, those with current wildlife rehabilitation experience can be recruited into the response.

## WHAT DO WILDLIFE REHABILITATORS DO?

Wildlife rehabilitation is a developing discipline that draws on a growing body of knowledge from veterinary medicine, wildlife biology, conservation, ecology, wildlife nutrition and physiology, animal welfare, anthropology, geography and epidemiology.

Wildlife professionals provide expert species-specific care and oversight to oiled and injured animals, performing diagnostic tests, creating treatment plans and performing basic medical care with the goal of returning the animal to full physiological and behavioral functionality for release back into the wild. These first responders are quickly activated in a spill response to locate and begin treatment of oiled wildlife as quickly as possible, and to ensure appropriate, safe and high-quality care.

## THE STAGES OF WILDLIFE RECOVERY

The length of time it takes to rehabilitate oiled wildlife varies depending on the species and the condition the animal is in. For example, birds are typically in care for two weeks before being released back into their natural habitats. There are six stages of recovering and rehabilitating oiled wildlife.

### Stage 1: Initial Impact Assessment

Determine wildlife response needs based on:

- Quantity, type, fate and behaviour of spilled product
- Oil infiltration of area
- Habitat type and usage
- Location, species & density of wildlife in the affected area
- Accessibility to wildlife and access points to oiled areas
- Hazards and controls
- Communication ability of search and rescue personnel

### Stage 2: Search and Collection

Capture oiled wildlife. Methods could include spot lighting, noose traps, mist nets, cannon nets and boat operations. Properly distribute personnel for most effective search and rescue efforts.

### Stage 3: Deterrence

Implement techniques to prevent impact on wildlife.
Techniques can include:

- Dispersing wildlife into appropriate clean habitat
- Dispersing the entire area of concern as continuously
- as possible
- Utilizing a variety of devices to avoid habituation
- Removing all vegetation, sources of cover, possible nesting
- areas, food sources and other attractants

### Stage 4: Field Stabilization

Address life threatening medical conditions by:

- Providing thermoregulatory support
- Removing gross contaminants
- Providing fluid therapy if transport time exceeds two hours
- Placing in appropriate transport container

### Stage 5: Transport

Relocate wildlife to primary care facility, ensuring appropriate container and transport conditions are met (size, ventilation, minimal stressors, temperature, ability to consistently monitor).

### Stage 6: Rehabilitation and Recovery

This stage in the process is focused on animal care operations, which include:

- Processing of evidence
- Intake of wildlife: medical assessment, blood sampling, thermoregulatory assistance, developing treatment plan or triage
- Stabilization: wash evaluation, nutrition and fluid administration, vitamin therapy, medical treatment to begin reversal effects of oil
- Cleaning: washing, rinsing, drying
- Conditioning: pre-release rehabilitation, including acclimatizing, regaining waterproofing (birds), rebuilding fitness/endurance, nutritional and medical support
- Release: determined based on several criteria, including weight, lung condition, physical evaluation, behaviour, waterproofing (birds), blood values

## A NOTE ON WASHING

An oiled animal is already highly stressed and thus is not washed immediately. The specialized process of removing contaminants involves procedures that amplify this stress for an animal. It is important to carefully assess the animal's condition and be certain they are medically prepared to undergo this process without suffering additional harm. This stage could include rehydration, normalization of temperature and the monitoring of other physical indicators including weight, behaviour, temperament and blood values. If the animal does not meet certain minimum medical criteria, it may not be washed.

### SOURCES


Alaska Department of Environmental Conservation | **dec.alaska.gov**
Environment and Climate Change Canada | **ec.gc.ca**
International Tanker Owners Pollution Federation | **itopf.com**
NOAA Office of Response and Restoration | **response.restoration.noaa.gov**
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IOPC Funds | **iopcfunds.org**
SOPF | **sopf.gc.ca**
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BC Marine Oil Spill Prevention and Preparedness Strategy | **gov.bc.ca**
U.S. National Oceanic and Atmospheric Administration | **noaa.gov**