Department of Fish and Wildlife
Office of Spill Prevention and Response

GUIDANCE DOCUMENT

For use in the preparation of

Contingency Plans

Response Strategies for Protection of Ecological Resources at Risk and Environmentally Sensitive Sites

Title 14, CCR Section 817.04(l)

BACKGROUND

The *Lempert-Keene-Seastrand Oil Spill Prevention & Response Act* [the Act; Gov. C. §8670.1 *et seq.*; significantly amended in 2014 by Senate Bill 861 (SB 861)] requires the Administrator for oil spill response, acting at the direction of the Governor, to ensure the State fully and adequately responds to all oil spills in state waters and to represent the State in any coordinated response efforts with the federal government. The goal and purpose of the Act is for the Administrator to provide for the best achievable protection of waters of the state from oil spills. This includes establishing and periodically revising a California Oil Spill Contingency Plan that provides integrated and effective coordination for state agencies to address the results of major oil spills.

The Administrator must implement activities relating to oil spill response, such as emergency drills for preparedness, oil spill containment and cleanup, and financial responsibility. This also specifically includes adopting and implementing regulations governing the adequacy of oil spill contingency plans that must be prepared and implemented by vessels and facilities that could spill oil into state waters.

The Administrator has the primary authority to direct prevention, removal, abatement, response, containment, and cleanup efforts with regard to all aspects of any oil spill in waters of the state. This includes authority over the use of all response methods, such as *in situ* burning, dispersants, and other oil spill cleanup agents in connection with an oil discharge. The Administrator must cooperate with any federal on-scene coordinator, as specified in the National Contingency Plan.

The Administrator is required to establish a network of rescue and rehabilitation stations for wildlife injured by oil spills in waters of the state, including sea otters and other marine mammals. This network is known as the Oiled Wildlife Care Network (OWCN), and is administered through the Wildlife Health Center at the University of California, Davis. If a plan holder has a spill that injures wildlife, plan holders are encouraged to use a local OWCN facility if there is one in the area.

Owners or operators of facilities that have the potential to spill oil into state waters are required to prepare and submit an oil spill contingency plan (C-plan) to the Office of Spill Prevention and Response (OSPR) for approval. [Ref. CA Government Code §§8670.28, 8670.28.5, 8670.29, 8670.30.5, and 8670.31] Contingency plans are prepared and used for response activities in the event of an oil spill or threatened spill into waters of the state. The Act authorizes the Administrator to require that contingency plans provide for best achievable protection taken and that sufficient response resources are capable of arriving on-scene and equipment deployed within a certain timeframe for effective containment and response.

DISCLAIMER

The purpose of the guidance document is to assist owner/operators in complying with the oil spill contingency plan (C-plan), drills and exercises, financial responsibility and other requirements established by the Office of Spill Prevention and Response. C-plans are mandated for certain vessels and facilities by the *Lempert-Keene-Seastrand Oil Spill Prevention & Response Act* (the Act; Gov. C. §8670.1 *et seq.*), which was significantly amended in 2014 by Senate Bill 861 (SB 861).

This document does not contain specific requirements, nor does it replace any statutory requirements established by the Act, SB 861 amendments, or regulations promulgated to implement the Act and SB 861 amendments. This guidance document helps explain how to comply with the Act and the implementing regulations. However, all applicable laws and regulations should be read before using this guidance document for the preparation of C-plans.

All guidance documents can be obtained by visiting our website at http://www.wildlife.ca.gov/OSPR/Preparedness/Inland-Facilities-Contingency-Plan. Guidance documents may be updated periodically without notice, as necessary, to reflect any changes in applicable laws or regulations. Comments or questions regarding a guidance document should be addressed to the OSPR Branch listed on the specific guidance document.

Regulation
Title 14, CCR Section 817.04(l) Risk and Hazard, and Oil Spill Consequences Analyses

Purpose

The goal of contingency planning is to provide information and resources necessary for a quick and efficient response to oil spills. A comprehensive contingency plan will identify and map ecologically sensitive areas, which could be adversely affected by an oil spill and identify protective strategies to protect those resources. This section is intended to support compliance with the requirements for identification of response strategies for ecological resources at risk.

General Strategy for Addressing Oil Spills

A Contingency Plan spill response strategy should address steps from point of release through release into water body and final extent, based upon worst case trajectory. Typically, the following concerns must be addressed, in priority order:

- SAFETY AND PUBLIC HEALTH
    - Ensure the safety of responders as well as maximize the protection of public health and safety.
- SOURCE CONTROL
    - Ensure actions are underway to control the source and minimize the total volume released. Respond as close to the source as possible.
- ENVIRONMENTAL PROTECTION
    - Use all appropriate tools to keep oil out of water and ensure all necessary actions have been taken to protect environmentally sensitive areas and minimize wildlife impacts.
- CONTAINMENT AND RECOVERY
    - If oil enters the water body, use key strategies of collection, diversion or exclusion booming to contain and recover the oil and ensure effective cleanup, recovery, and disposal of spilled product.

Reasonable Worst Case Spill Trajectory Planning

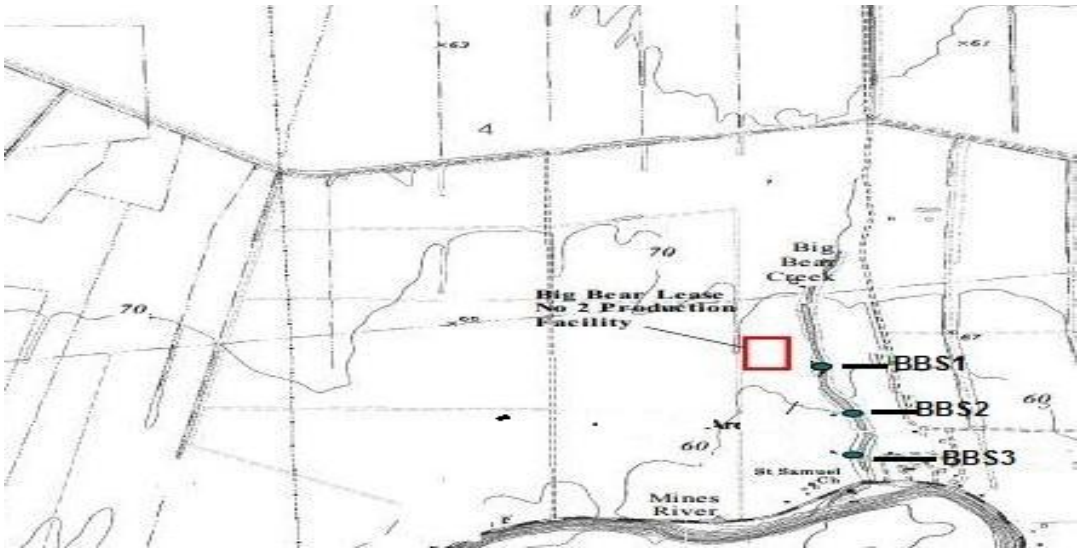
- Calculate the distance that discharged oil could travel from your facility before it is contained.
    - If oil can impact a water body, knowing the water flow will allow prediction of how far downstream oil will flow under given time and flow condition.

- Determine locations of sensitive resources and strategic points to divert, collect and/or recover oil within the potentially effected waterway. These may include bridge and culvert crossings.

- Provide a map indicating waterways, sensitive areas and specific locations of booming strategies. These maps are designed to help the responder visualize response strategies. Details of each booming strategy should be listed in corresponding matrix tables. Each table should indicate the exact location, intent and implementation of the strategy indicated on the map.

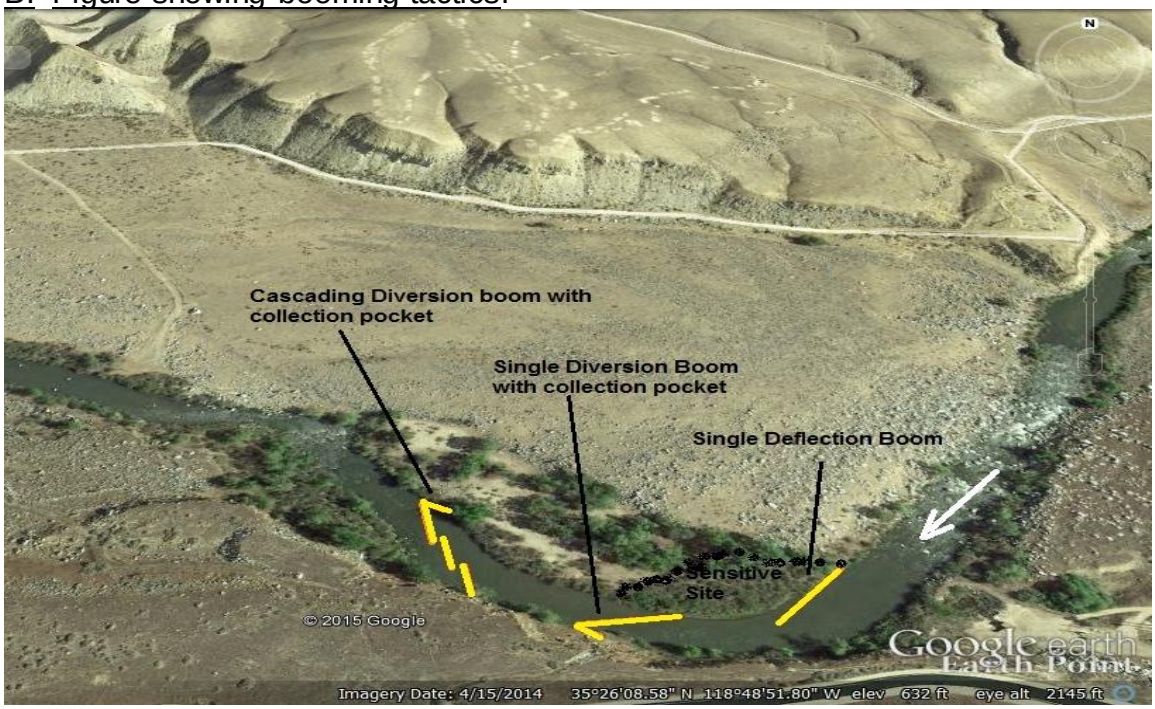
Examples

A. Site Map and Table: Locate response strategies and sensitive areas potentially affected by a spill from the facility, with cross-references to their locations as shown on Site map. Show protection strategy points for a spill into a waterbody from this facility. Insert Response Strategy Table with strategy location coordinates.



Site Name	Strategy	Location
BBS1	**Diversion/Collection. 400' boom**	**36.4655 122.3425**
BBS2	**Deflection/Protection of Wetlands. 600' boom**	**36.4534 122.4982**
BBS3	**Diversion/Collection. 400'boom**	**36.5678 122.4728**

B. Figure showing booming tactics.



C. Response Actions

If the oil has not yet reached water:

Actions
Contain or control oil leak at source. Assess character of oil & its trajectory Contact cleanup contractor(s).
Control oil flow on the ground by constructing physical barriers and/or using sorbent materials (e.g., sandbags, earthen berm, trenches) across the oil flow path.
Deploy berms or barriers downgradient from the oil, to contain and prevent the oil from spreading.
Implement land based response actions (countermeasures) such as digging temporary trenches, containment pits, storage tanks, or curbs to prevent the flow of oil into the waterbody*.
Deploy boom and sorbent materials along the waterbody shoreline to prevent oil from entering waters or leaving immediate area.
* Physical barriers or excavations can cause significant impacts to the environment and may require appropriate permits. If time allows, the facility should consult with the lead Environmental Agency (DFW OSPR) before authorizing the construction of any dike, berm or dam in a waterway.

If the oil has reached water:

Actions
Deploy floating booms immediately downstream from the release point to contain oil at water entry.
Deploy additional floating booms to divert oil to collection pockets for recovery and to prevent further downstream spread of oil.
Deploy additional booms at appropriate diversion and collection points downstream of release point. Access points and staging areas along the shoreline should be identified in the Contingency Plan.
Deploy protective booming measures for downstream receptors that may be impacted by the spill. Sensitive sites/areas designated for protection should be identified in the Contingency Plan. As responders and planners adjust strategies to meet the needs presented by prevailing conditions, they should, as much as possible, do so with the prior advisement of the on-scene DFW Office of Spill Prevention and Response Resources at Risk Technical Specialist and with the approval of the Unified Command.

Mechanical Recovery and Protection Strategies: Waterways

The key strategies are the use of collection, diversion, or exclusion booming to contain and recover the oil, and prevent it from entering areas with sensitive wildlife and fisheries resources. Booming and other recovery and protection options are described in detail in Appendix A. In general, immediate cleanup objectives are to:

- Contain oil and control source as soon as possible, mobilize resources to the spill location, and collect.

- Intercept oil flowing downstream to prevent further contamination, while protecting resources at risk

- Identify strategic locations to collect, divert and/or recover oil within the potentially affected waterway. .

Determining the priority or order of ~~Area~~ Contingency Plan or Geographic Response Plan strategies should be based on the location of the spill or area affected. In establishing waterway response priorities, the downstream movement of spilled oil and the time it takes to mobilize and deploy response resources must always be considered. Oil can be rapidly transported by moving water, following the direction of currents, winds and tidally influenced waters. Generally, waterway response plan strategies should first be implemented downstream, well beyond the furthest extent of the spill, and then continued upstream towards the spill source. As response resources become available, implement additional ~~Area~~ Contingency or Geographic Response Plan strategies in order of priority.

Boom is a common type of oil spill response equipment for oil spills to water. Boom is a containment barrier typically comprised of a PVC coated material that encloses a foam tube to float it and a PVC skirt or curtain that extends below to prevent oil from entraining beneath it. Boom serves as a floating, physical barrier placed on the water surface. Boom is used in many ways during an oil spill response, including the following: to contain, exclude, deflect, or divert oil. Boom is used to protect shorelines or sensitive areas such as marshes or other wildlife and fish habitat by acting as a barrier.

Containment boom may work well in water with little or no current and can be placed around a vessel or tank that is leaking oil or trapping oil in a slough or eddy adjacent to fast water until it can be recovered. The boom confines the oil within a small space, minimizing spread, so it can be collected with oil recovery devices such as a skimmer – equipment that efficiently and effectively separates oil from water for recovery.

River booming strategies:

- Diversion booming moves oil from fast flow areas in the center of the river to calm water to enable collection in slower water or pockets along the bank. This approach allows the use of conventional containment and recovery techniques. The boom can be deployed in a single long section as shown in in the example above, or as multiple booms staggered across a river or harbor.

- Deflection booming is used to keep oil away from water intakes and ecologically sensitive areas. Can be used in conjunction with recovery/collection tactics. Fewer booms may be required than those used for containment, but the oil may be directed to another sensitive area.

- Exclusion booming is used to completely boom off an area such as a sensitive site, forming a protective barrier. Conventional oil boom, tidal-seal boom, or a combination of each can be used to exclude spilled oil from a sensitive area. This technique is most effective in no or low current areas.

Small Streams/Arroyos/Washes/Creeks/Culverts:
Shallow streams and other small waterways are susceptible to spills from pipelines, storage facilities, highway accidents and storm drains. Boom is generally ineffective in very shallow water where the draft of the boom is greater than about one-third of the water depth. The restricted flow under the skirt increases the flow, which increases oil entrainment. For very low flow rates or small spills, floating boom, including sorbent types, can be used but care must be taken to minimize entrainment. A rule of thumb for a low flow rate is a flow of less than 10 cubic feet per second (cfs). A flow of one cfs is approximately equal to 450 gallons per minute. Above this flow rate, underflow dams, overflow dams, weir and sorbent barriers can be used. Under very low flow conditions or no flow conditions, a temporary berm or

dam can be built that completely stops the oil and water flow for immediate containment but if there is water, flow will have to be quickly dealt with before the dam is overwhelmed. In measuring the speed of drift or stream flow, an easy rule of thumb to remember is that an object that moves 100ft in 1 minute is traveling at a speed of ~1 knot. Changing weather conditions can drastically alter the flow so caution should be taken during severe weather. In some conditions, a combination of techniques can be used such as deploying a sorbent barrier backed by an underflow dam.

Dams can be built in shallow streams, culverts and inlets using hand tools or heavy equipment, as available. Pipes are used to form an underflow dam to allow water passage through while oil stays behind. Pipes must be inclined, with the elevated end on the downstream side. Make sure that the upstream end of the pipe is submerged and remains below the oil/water interface. This technique is effective for water bodies less than two feet deep where flow volume can be accommodated by pipe flow. This method can also be used in deep, narrow culverts (see "Oil Spill Response in Fast Currents: A Field Guide." U.S. Coast Guard, October 2001).

Facilities in inland areas need to be aware that sometimes the classification of boom for an Oil Spill Response Organization (OSRO) in rivers/canals includes boom sizes up to 18" (overall). This can be far too large for many of the fast moving (over 2 miles an hour) streams and rivers found in California. Besides the velocity of the current, many streams and rivers are often shallow, resulting in the larger boom dragging on the bottom or creating difficulty in placement near to the river bank. Boom that is large requires more people to deploy, the skirt may fill and sink, and smaller angles must be used which requires more boom. Boom that is 10" (overall) or 12" (overall) works better in fast water as well as in smaller, shallow water bodies.

Do not assume 100% efficiency with one boom system.

Position collection areas where there are natural collection points, or where water movement is slowest, such as the inside of the river bend, or where access allows. Deploy booms to deflect oil from the fast side to the slow side of the river and into the collection areas.

Currents are highest in the deep channels of the river and diminish as depth decreases near shore, due to bottom friction effects. Oil will generally follow the higher current flow downriver. It will be distributed much like river debris in areas where slow current, eddies and alternate watercourses exist.

Controlling and recovering oil spills in fast moving water above one knot is difficult to accomplish because oil entrains under booms and skimmers in swift currents. Fast water accelerates many spill processes, necessitating quicker and more efficient responses compared to stagnant water or slow-moving current conditions.

The angle of the boom to the current flow is of critical importance. Correct boom deployment is a key factor in on-water oil control and containment. The maximum

deflection angle as possible from the current must be maintained to prevent oil entrainment.

For inland waterways with current, it is better to limit the boom draft for diversion/ deflection applications. Boom with draft greater than six inches is not recommended for currents above 1.5 knots. For currents of three knots and greater, boom with only a short chain pocket and no more than three inches draft is recommended to maintain a shallow deflection angle to the current. The requirements for anchoring will depend upon the situation. Details about anchoring methods are contained in Oil Spill Response in Fast Currents: A Field Guide." U.S. Coast Guard, October 2001, Chapter 8.

Geographic Response Plans (GRPs)

In some geographic areas, Geographic Response Plans (GRPs) have been developed and are available for consideration (see https://www.wildlife.ca.gov/OSPR).

GRPs are geographic-specific response plans for oil spills to particular waterbodies or areas. They include response strategies tailored to a specific beach, shore, or waterway and are meant to minimize impacts on sensitive resources threatened by the spill. GRPs include map-based strategies that can save time during the critical first few hours of an oil spill response. They indicate where sensitive areas are located and where to place oil spill protection resources. Each GRP has two main priorities:

- To identify sensitive natural, cultural or significant economic resources.
- To describe and prioritize response strategies in an effort to minimize injury to sensitive natural, cultural, and certain economic resources at risk from oil spills.

Each plan covers a specific geographic area and contains information meant to aid the response community in managing the incident through, and as necessary beyond, the initial phase of the response. Information contained in the plans include: site descriptions, reference maps, recommended response strategies, shoreline information, resources at risk details, and logistical information. These plans can be useful to reference in Contingency Plans, however GRP coverage is currently limited in California.

References

Alaska Department of Environmental Conservation. 2002. “Alaska Incident Management System Guide for Oil and Hazardous Substance Response, Revision 1.” http://www.akrrt.org/aim/aim_toc.shtml

ExxonMobil Research and Engineering Company. 2002. “Oil Spill Response Field Manual.”

Hansen, Kurt and Thomas J. Coe. October 2001. “Oil Spill Response in Fast Currents – A Field Guide.” U.S.Coast Guard, Research and Development Center, 1082 Shennescossett Road, Groton, CT 06340-6096. http://www.epa.gov/oilspill/pdfs/hansenpaper.pd

Michel, Jacqueline; Christopherson, Sharon; Whipple, Frank. 1994. “Mechanical Protection Guidelines.” National Oceanic & Atmospheric Administration, Hazardous Materials Response & Assessment Division. http://response.restoration.noaa.gov/oilaids/Mechanical.pdf

Appendix A
Mechanical Protection and Recovery Techniques

Protection Techniques	Description	Primary Logistical Requirements	Limitations
LAND			
Berms	A berm is a low barrier constructed of available material (earth, gravel, sandbags etc.) to contain, stop or divert the flow of oil.	• Bulldozer/Road grader • Personnel – equipment operator & worker(s) • Misc. - plastic or geotextile sheeting to prevent penetration of oil thru berm.	• Accessibility • Implementation time • Environmental damage inflicted by berm material excavation or deposition
Interception trench	Excavated trenches are used to intercept or divert surface or subsurface flows of oil.	• Bulldozer/Road grader/ Excavator • Personnel - equipment operator & 1 worker	• Impenetrable subsurface • High water table • Accessibility • Implementation time • Environmental damage caused by excavation
Culvert blocks	Boards, sandbags, sheetmetal used to block flow from entering culverts and contain oil flow..	• Available material to block flow • Accessibility	• Strong flowing water • Culvert size
Dams (over flow, underflow or no flow)	A dam is constructed across a low flow or no flow ditch, streambed or dry drainage course. Contain oil and stop spread.	• Bulldozer/ Frontend loader/ Excavator • Personnel - equipment operator & 1 worker or several workers w/shovels	• Inadequate storage capacity behind dam • Too much water flow exceeding outflow capacity
Sorbent pads, booms	Adsorbents are used to recover small amounts of oil through absorption and adsorption	• Logistics of applying and retrieving sorbents on wide-spread slicks	• Labor-intensive nature of the operation • Relative high cost Relative low recovery rates • Large amount of solid waste generated

Protection Techniques	Description	Primary Logistical Requirements	Limitations
LAND, CONT.			
Sorbent barriers, filter fences	A barrier is constructed by installing two parallel lines of stakes across a channel, fastening wire mesh to the stakes & filling the space between with sorbents.	• Per 30 meters of barrier • Wire mesh - 70 m x 2 m • Stakes - 20 • Sorbents – Synthetic (polypropylene rolls, sheets snare, Organic (straw bales etc.) • Personnel - 2 • Misc. - fasteners, support, lines, additional stakes, etc.	• Waves > 25 cm • Currents > 0.5 m/s • Tidal range > 1 m
Inlet Dams	A dam is constructed across the channel using local soil or beach sediments to exclude oil from entering channel.	• Loader - 1 • Personnel - equipment operator & 1 worker or several workers w/shovels	• If sufficient underflow cannot be maintained, or if excessive overflow occurs, additional dams downstream may be required.
WATER			
Boom Rivers/Streams/Lakes (Depth is greater than boom skirt depth)	Single Diversion Boom	• Currents less than 2 knots, Adequate angle of deflection necessary to prevent entrainment • Currents greater than 2 knots, entrainment can occur if angle too steep	• Current < 2 knots use boom skirt > 10 inches • Current > 2 knots use boom skirt 6 inches or less
Boom Rivers/Streams/Lakes (Depth is greater than boom skirt depth	Cascading Diversion Boom	• Currents over 2 knots • Use short skirts, shorts boom lengths and sufficient overlap. Requires anchors and boats to deploy them or ropes and pulleys	• Use of multiple anchors or ropes is difficult in fast currents over 2 knots so planning and training are required.
Boom Rivers/Streams/Lakes (Depth is greater than boom skirt depth	Currents less than 2 knots and river is wide	• Single Diversion Boom • Exclusion Boom for Sensitive Areas • Encircle & Divert to Collection Area	• Breaking waves

Protection Techniques	Description	Primary Logistical Requirements	Limitations
Containment booming	Boom is deployed in a "U" shape in front of the oncoming slick. The oil is contained within the "U" & prevented from reaching the shore.	• For 150 meters Slick: • Boom - 280 m • Boats - 2 • Personnel - boat crews & 4 boom tenders • Misc. - tow lines, drogues, connectors, etc.	• Boom is used in little or no current to isolate a spill, to control spreading, to concentrate the oil, and to facilitate its recovery by skimmers
Exclusion booming	Boom is deployed across or around sensitive areas & anchored in place. Approaching oil is deflected or contained by boom.	• Per 300 meters of Boom • Boats - 1 • Personnel - boat crew & 3boom tenders • Misc.- 6 anchors, anchor line, buoys, etc.	• Currents > 0.5 m/s • Breaking waves > 50 cm • Water depth > 20 m
Deflection booming	Boom is deployed at an angle from the shoreline away from the approaching slick to deflect oil from sensitive shoreline or to a collection point.	• Single Boom, 0.75m/s <1knot/current • Boom - 100 m • Boats - 1 • Personnel - boat crew + 3 • Misc. - 5 anchors, line, buoys, recovery unit	• Currents > 1.0 m/s • Breaking waves > 50 cm
Diversion booming	Boom is deployed from the shoreline at an angle towards the approaching slick & anchored or held in place with blocks and tackle. Oil is diverted towards the shoreline for recovery.	• Single Boom, 0.75 m/s <1knot current • Boom – per 60 m • boats - 1 • Personnel - boat crew + 3 • Misc. - 3 anchors, line, buoys, recovery unit	• Currents > 1.0 m/s • Breaking waves > 50 cm
Skimming	Portable skimmers are placed within containment booms in the area of heaviest oil concentration. or used in conjunction with diversion/deflection collection booming	• Portable • Hoses • Oil storage • Self-propelled • Towed • Boom • Boats • Personnel - boat crews & boom tenders	• High winds • Swells > 2 m • Breaking waves > 50 cm • Currents > 1.0 m/s