

ROCKS and INFRASTRUCTURES
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PHASE 1: INITIAL CLEAN-UP (1/2)

<i>Techniques / objectives / procedures</i>	<i>Equipment needed</i>	<i>Factors to be considered</i>
1. Pumping at the water's edge ► Datasheet n°02 <i>Aim: to recover large accumulations of pollutant by promoting its concentration and improving selectivity and yield</i>		
(a) Develop the storage site (liquid to slightly viscous pollutants) <ul style="list-style-type: none"> - to facilitate sorting - to reduce volumes for evacuation - to restrict the spreading of the pollution 	<i>(should be adapted to suit the pollutant and the site)</i> <ul style="list-style-type: none"> - areas, trenches, bunds, skips, (watertight) tanks - drainage (rainwater overflow) - screening, sorting - earthmoving equipment (digging) - protective membranes and geotextile 	<ul style="list-style-type: none"> - ecological sensitivity - accessibility of site - transfer of the pollution (watertight storage, decontamination of trucks) - traffic (should be channelled)
(b) Concentrate slicks <ul style="list-style-type: none"> - where possible, block the pollutant trapped in creeks (retention boom) 	<ul style="list-style-type: none"> - floating booms - shore-sealing booms 	<ul style="list-style-type: none"> - dangerousness of site (height, rock fall, slipping, exposure to waves etc.) - personal health and safety (protective clothing, life jackets, masks)
(c) Contain and reconstitute the slick by the pumping/skimming means: <ul style="list-style-type: none"> - by trawling (worksite boom, sorbent boom) - by scraping (planks, scrapers, brushes) - by hosing 	<ul style="list-style-type: none"> - worksite booms - conditioned sorbents - planks, scrapers, hoses - small boat 	<ul style="list-style-type: none"> - accessibility of the coast - agitation of the water body (currents, swell, wind) - tidal range
(d) Pump <ul style="list-style-type: none"> - stop obstruction of the pumps: anticipate screening or another way of retaining diverse debris 	<ul style="list-style-type: none"> - skimming/pumping equipment (skimmer, pump, vacuum truck or other transfer system) - grating, filter baskets - storage capacities and transfer means 	<ul style="list-style-type: none"> - nature (emulsion, viscosity) and evolution of the pollutant according to the temperature - presence of solid debris - draught of skimmers and compatibility with depth of water
(e) Separate <ul style="list-style-type: none"> - promote the separation of water and oil: emulsion breaking, settling - evacuate the products recovered 	<ul style="list-style-type: none"> - settling tanks/separator - transfer pumps - demulsifier - trucks suited to the pollutant 	<ul style="list-style-type: none"> - recovery of liquids from settling traffic lanes


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PHASE 1: INITIAL CLEAN-UP (2/2)

<i>Techniques / objectives / procedures</i>	<i>Equipment needed</i>	<i>Factors to be considered</i>
<p>2. Manual recovery ➤ Datasheet n°09</p> <p><i>Aim: to remove mobilisable clusters of pollutant and heavily polluted diverse materials (sediments, seaweed, floating debris)</i></p> <ul style="list-style-type: none"> - direct collection (use mechanical support wherever possible: vehicles, cranes etc.) - scraping - concentration (containment) - absorption - disposal 	<ul style="list-style-type: none"> - shovels, forks, scrapers, brushes - brushes, brooms, trowels etc. - worksite booms, sorbents - bins, bags 	<ul style="list-style-type: none"> - dangerousness of site (height, rock fall, slipping, exposure to waves etc.) - personal safety: permanent supervision and protective equipment - sites which are rarely workable for mechanical equipment - organisation of teams
<p>3. Flushing ➤ Datasheet n°12</p> <p><i>Aim: to dislodge layers of oil deposited on rocks or trapped in crevices (cracks, boulders etc.) and move the pollutant towards a collection area</i></p>	<ul style="list-style-type: none"> - pump unit (3 to 8 bar individual pump, 25 to 30 m³/h) - fire or impact hose - hoses, connectors 	<ul style="list-style-type: none"> - dangerousness of site (height, rock fall, slipping, exposure to waves etc.) - personal safety: permanent supervision and protective equipment - organisation of teams
<p><i>Systematic complementary operation:</i></p> <ul style="list-style-type: none"> • Effluent recovery <p><i>Aim: to stop the pollution from spreading by installing a recovery system</i></p> <ul style="list-style-type: none"> - prepare a collection area, channel the effluents - on the water ➤ Datasheet n°14 - on the foreshore ➤ Datasheet n°15 	<p><i>(should be adapted to suit the pollutant and the site)</i></p> <ul style="list-style-type: none"> - containment equipment: floating or shore-sealing booms, bunds, pits etc. - recovery and evacuation means: pump, sorbents etc. - settling and storage tanks 	<ul style="list-style-type: none"> - tide - agitation of the water body

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PHASE 2: FINAL CLEAN-UP (1/1)		
<i>Techniques / objectives / procedures</i>	<i>Equipment needed</i>	<i>Factors to be considered</i>
<p>1. Flushing ▶ Datasheet n°12 <i>Aim: to wash surfaces in a large quantity of water to dislodge residual and recover it at a collection point</i></p> <ul style="list-style-type: none"> - prepare a collection area, channel the effluents - wash - recover freed waste 	<ul style="list-style-type: none"> - pump unit (4 to 8 bar individual pump, 25 to 30 m³/h) - fire or impact hose - hoses, connectors - shovels - worksite boom (floating, shore-sealing) - skimmer, pump, sorbents - storage tanks, settling of recovered products 	<ul style="list-style-type: none"> - nature and evolution of the oil, viscosity, weathering, thickness of the layer, adherence etc. - dangerousness of site (height, rock fall, slipping, exposure to waves etc.) - accessibility of the coast - tidal range (put equipment away daily) - limited efficiency of washing using cold water on sticky or overly weathered pollutant
<p>2. High pressure washing using hot or cold water (with or without a washing agent) <i>Aim: to remove oil from polluted surfaces using hoses under high pressure. Always comply with environmental and safety instructions.</i></p> <p><i>Prior operation:</i></p> <ul style="list-style-type: none"> • manual scraping <i>Aim: to remove the bulk of residual layers (viscous pollutant) before pressure washing to increase effectiveness</i> • protection from projections <i>Aim: to protect unsoiled rocky areas from being polluted by the projection of contaminated effluents and aerosols</i> <p>High pressure washing with hot water ▶ Datasheet n°19 Hot water is needed whereas use of a washing agent (for preference a solvent) is not systematically necessary</p>	<ul style="list-style-type: none"> - scrapers, brushes - bags, bins etc. - flexible geotextile sheeting, possibly with stakes - <u>thermal washer</u> (50 to 150 bars, 0° to 90°C) - hoses, pipes, connectors - selected washing agents - horticultural spreading means 	<ul style="list-style-type: none"> - nature and evolution of the oil, viscosity, weathering, thickness of the layer, adherence etc. - dangerousness of site (height, rock fall, slipping, exposure to waves etc.) - accessibility of the coast - tidal range (put equipment away daily) - limited efficiency of washing using cold water on sticky or overly weathered pollutant - potentially high impact of clean-up on the environment (cracking of rocks, destruction of unsoiled flora and fauna, removal of biological film etc.): - accept the temporary presence of an oily film after washing (destroyed in the long run by UV rays) - adjust pressure and temperature according to the requirements and objectives set - possible spreading of pollution: by projection and migration into the sediment - possible recontamination by released oil - toxicity of washing agent: choose a product tested by a recognised organisation (Cedre keeps an up-to-date list) - efficiency of selected product: conduct an onsite test
<p><i>Systematic complementary operation:</i></p> <ul style="list-style-type: none"> • effluent recovery <i>Aim: to stop the pollution from spreading by installing a recovery system</i> <ul style="list-style-type: none"> - make the most of natural run-off channels - should be set up before washing begins: - on the water ▶ Datasheet n°14 - on the foreshore ▶ Datasheet n°15 	<p><i>(should be adapted to suit the pollutant and the site)</i></p> <ul style="list-style-type: none"> - shovels etc. - containment equipment: floating or shore-sealing booms, bunds, pits etc. - recovery and evacuation means: pump, sorbents etc. - settling and storage tanks 	<ul style="list-style-type: none"> - tide - agitation of the water body