Cleanup Costs for Oil Spills in Ports

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Abstract

This article reviews the cost factors involved in an oil spill cleanup operation and the ways in which responsible parties in an oil spill incident can minimise their costs while still meeting public and governmental demands for an effective response. Included are cost analyses from several case studies of recent spills with a focus on in-port spill incidents.

INTRODUCTION

Dealing with an oil spill, whether small or large, has become infinitely more complicated, and expensive, over the last decade. Greater public demand for environmental responsibility and the increasingly litigious climate in many countries have driven up cleanup costs by as much as four to five times since 1990. Even small spills can be exceedingly expensive as polluters are forced to comply with public opinion and local and national laws in mounting a responsible cleanup operation.

THE FACTORS DETERMINING CLEANUP COSTS

There is almost universal agreement that the "polluter must pay" and "right the wrong" by picking up the costs of an oil spill cleanup response. Occasionally, the spill source is a "mystery," as in the case of illegal bilge discharges or undetected pipeline leaks. Local authorities pay for the cost of cleanup until the responsible party is found or until national or international funds assist in refunding cleanup costs and settling damage claims. In many cases the polluter's insurers become involved as well.

The responsible party faces a large array of costs in the aftermath of an oil spill, some of which extend beyond the scope of the cleanup response itself (Figure 1).

It is nearly impossible to calculate a cleanup cost on the basis of the amount of oil spilled, as no two spills are alike. There are many factors involved, including:

- Type of product spilled;
- Location and timing of spill;
- Sensitive areas affected;
- Liability limits in place;
- Local and national laws;
- Cleanup techniques employed;
- Weather conditions during cleanup operations; and
- Human decision-making.

Figure 1. Potential Oil Spill Costs

Accident Costs
- Value of Lost Oil
- Value of Lost Tanker
- Tanker Repair Costs
- Tanker Salvage Costs

Incident Report Filing Costs
- State
- National
- Insurer
- International Fund

Initial Cleanup Costs
- Consultant Fees (Cleanup Strategy Planning)
- On-Scene Coordinator Fees
- Command Center
- Communications/Computer Hookups Costs

Mechanical Containment and Recovery Costs
- Booms/Skimmers Rental Fees
- Labor Costs (salaries, benefits)
- Protective Clothing and Personal Equipment
- Logistical Costs (e.g., food, lodging, potable water, sanitation)
- Equipment Repair and Replacement Costs
- Equipment Depreciation Costs
- Vacuum Pump Rentals
- Oil Storage/Separation Fees
- Oil and Oily Waste Disposal Costs
- Disposal Permit Costs

Dispersant Use Costs
- Dispersant Permit Costs
- Purchase of Dispersant Chemicals
- Application Equipment Rental Fees
- Equipment Repair and Replacement Costs
- Equipment Depreciation Costs
- Labor Costs (salaries, benefits)
- Logistical Costs (e.g., food, lodging, potable water, sanitation)
- Protective Clothing and Personal Equipment

Bioremediation Costs
- Permitting Costs
- Specialist Consultant Costs
- Chemical Fertilizer Costs
- Microbial Mixture Costs
- Application Equipment Rental Fees
- Labor Costs (salaries, benefits)
- Logistical Costs (e.g., food, lodging, potable water, sanitation)
- Protective Clothing and Personal Equipment

In-situ Burning Costs
- Permitting Costs
- Specialist Consultant Fees
- Fireproof Boom Costs
- Ignition Equipment Rental Fees
- Equipment Repair and Replacement Costs
- Labor Costs (salaries, benefits)
- Logistical Costs (e.g., food, lodging, potable water, sanitation)
- Air Quality Testing Costs
- Protective Clothing and Personal Equipment

Manual Shoreline Cleanup Costs
- Labor Costs (salaries, benefits)
- Logistical Costs (e.g., food, lodging, potable water, sanitation)
- Protective Clothing and Personal Equipment
- Heavy Equipment Rental Fees
- Equipment Repair and Replacement Costs
- Equipment Depreciation
- Disposable Equipment Costs (e.g., sorbents)
- Long-Term Monitoring Costs

Additional Costs for Any Cleanup Method
- Cleanup Worker Injury and Health Impairment Claims
- Worker Insurance and Compensation Costs
- Damage Costs from Cleanup Work (e.g., damage to property during cleanup work)
- Public and Media Relations

Wildlife Rehabilitation Costs
- Rescue and Rehabilitation Center Construction Costs
- Equipment Costs
- Equipment Repair and Replacement Costs
- Equipment Depreciation Costs
- Consumable Supply Costs (e.g., detergents, feeding syringes)
- Animal Nutritional Costs
- Veterinary Consultation Costs
- Veterinary Supplies (e.g., medicines, syringes)
- Non-volunteer Labor Costs (salaries, benefits)
- Post-rehabilitation Animal Tracking Research Costs

Natural Resource Damage Assessment
- Restoration Costs (e.g., replanting damaged wetland plant species, restocking fish)
- Diminution of Value Costs (reduction of services due to oil spill damages)
- Damage Assessment Costs (expert evaluation of spill damage)
- Contingent Valuation Surveying Costs (determining the non-use values of impacted resources)

Research Costs
- Research Consulting Costs
- Research Team Labor Costs (salaries, benefits)
- Research Equipment and Incidental Costs
- Long-Term Monitoring Costs
- Research Publication Costs

Property, Economic, and Environmental Damage Claims
- Defense Lawyers' Fees
- Other Legal/Litigation Costs
- Settlement Costs

Fines and Penalties
- Legal Fees
- Criminal Fines on the Polluter
- Fines for Negligence During Cleanup Operations
- Civil Penalties

LOCATION, TIMING AND LUCK

Most experts agree that the most important determinant of cleanup costs is location. Even a relatively small spill in an "inopportune" location or time, such as one near a sensitive marshland during a bird migration, near a beach at the height of the tourist season, in a boat marina during the annual regatta, near a fish farm, or in the vicinity of a desalination plant water intake during operations, can be expensive to clean up. Almost any spill in a port is likely to fall into this category. Figures 2-4 give examples of spill costs for small spills in several different harbours and ports.

Cleanups within ports need to be thorough and conducted to the satisfaction of local and national authorities and property owners to avoid legal action.

Figure 2 (top) Small Port Spills in Latvia (1995-1996)

					Spilled	cleanup, claims, fines)	
18 October 1995	Mika (vessel)	Cyprus	Riga	No. 2 fuel	29 gallons (0.1 tonnes)	$4,000	$137.93/gallon ($40,551.42/tonne)
7 March 1995	Krimulda (vessel)	Latvia	Riga	Unspecified petroleum products	74 gallons (0.25 tonnes)	$3,900	$52.70/gallon ($15,493.80/tonne)
9 January 1995	EW McKinley (vessel)	Panama	Riga	Unspecified petroleum products	29 gallons (0.1 tonnes)	$1,391	$46.93/gallon ($13,797.42/tonne)
1995 (date unavailable)	Gelovani (vessel)	Georgia	Ventspils	Unspecified petroleum products	44 gallons (0.15 tonnes)	$2,000	$45.45/gallon ($13,362.30/tonne)
7 August 1995	Konstantins Cjolkovskis (vessel)	Latvia	Ventspils	No. 2 fuel	9 gallons (0.03 tonnes)	$400	$44.44/gallon ($13,065.36/tonne)
15 May 1995	Blue Sea (vessel)	Malta	Ventspils	No. 4 fuel	1.5 gallons (<0.01 tonnes)	$2,000	$1,333.33/gallon ($391,999.02/tonne)
21 January 1995	Rundale (vessel)	Latvia	Ventspils	No. 2 fuel	6 gallons (0.02 tonnes)	$340	$56.67/gallon ($16,660.98/tonne)
16 January 1995	Grigori Nesterenko (vessel)	Russia	Ventspils	No. 2 fuel	18 gallons (0.06 tonnes)	$2,000	$111.11/gallon ($32,666.34/tonne)
7 January 1995	Thorsaga (vessel)	Norway	Ventspils	waste oil	unknown	$500	—
14 February 1996	Aniara (vessel)	Liberia	Ventspils	No. 2 fuel	392 gallons (1.33 tonnes)	$2,000	$5.10/gallon ($1,499.40/tonne)
25 November 1996	CT Star (vessel)	Sweden	Riga	gasoline	6 gallons (0.02 tonnes)	$2,000	$333.33/gallon ($97,999.02/tonne)

Source: Ministry of Environmental Protection and Regional Development of the Republic of Latvia, Marine Environmental Board, 1997

Figure 3 (middle) Port Spills in Poland (1995-1996)

Date	Source	Location	Amount Spilled	Product	Cause	Cleanup Costs	Cost/Gallon
3 January 1995	Fishing vessel UST 102	Darlowo	1,453 gallons (4.94 tonnes)	Fuel oil	Grounding	$1,440.00	$0.99/gallon ($291.06/tonne)
19 April 1995	Unknown	Gdynia	211 gallons (0.72 tonne)	Unspecified oil	Unknown	$1,102.50	$5.23/gallon ($1,537.62/tonne)
11 May 1995	Unknown	Gdynia	8 gallons (0.03 tonne)	Unspecified oil		$868.30	$108.54/gallon ($31,910.76/tonne)
10 July 1995	Unknown	Ustka	40 gallons (0.14 tonne)	Unspecified oil	Unknown	$360.00	$9.00/gallon ($2,646.90/tonne)
25 August 1995	Motor Vessel Lobo[1]	Pommersche Bucht	132 gallons (0.45 tonne)	Unspecified oil	Unknown	$180.00	$1.36/gallon ($399.84/tonne)
27 September 1995	Unknown	Pommersche Bucht	13 gallons (0.04 tonne)	Unspecified oil	Unknown	$472.50	$36.35/gallon ($10,686.90/tonne)
15 January 1996	Unknown	Ustka	106 gallons (0.36 tonne)	Unspecified oil	Unknown	$216.64	$2.04/gallon ($599.76/tonne)
28 February 1996	Unknown	Ustka	106 gallons (0.36 tonne)	Unspecified oil	Unknown	$333.30	$3.14/gallon ($923.16/tonne)
14 March 1996	Unknown	Pommersche Bucht	66 gallons (0.22 tonne)	Unspecified oil	Unknown	$450.00	$6.82/gallon ($2,005.08/tonne)
3 July 1996	Fishing Vessel KOL 102	Mielno	1,057 gallons (3.6 tonnes)	Unspecified oil	Sinking	$366.63	$0.35/gallon ($102.90/tonne)
16 July 1996	Unknown	Ustka	79 gallons (0.27 tonne)	Unspecified oil	Unknown	$233.31	$2.95/gallon
6 September 1996	Unknown	Wladyslawowo	Hard to evaluate	Unspecified oil	Unknown	$5,053.09	—

Source: Polskie Ratownictwo Okretowe (Polish Ship Salvage Company) 1997

Figure 4 (bottom) Cleanup Costs of Small Spills in UK Ports in 1995

						Cost	
1 January 1995	vessel	Tadorne II	London	159 gallons (0.54 tonne)	fuel oil	$9,555	$60.09/gallon ($17,666.46/tonne)
16 January 1995	unknown	—	Felixstowe	unknown	unspecified oil	$7,824	—
27 February 1995	vessel	Mikelbaka	Aberdeen Harbor	1,321 gallons (4.49 tonnes)	bunker fuel	$82,500	$62.45/gallon ($18,361.09/tonne)
19 April 1995	pipeline	—	Falmouth Harbour	5,880 gallons (20.0 tonnes)	fuel oil	$81,675	$13.89/gallon ($4,083.75/tonne)
21 April 1995	fishing vessel	unnamed	Bramble Bay	24 gallons (0.08 tonne)	diesel/ hydraulic oils	$4,003	$166.79/gallon ($49,036.75/tonne)
2 September 1995	underground pipeline	—	Kirkwall Harbor	6-week seepage	fuel oil	$14,355	—
14 October 1995	industrial facility	Unilever Crossfield Chemical Company	River Mersey	588 gallons (2.0 tonnes)	fuel oil	$14,484	$24.63/gallon ($7,241.85/tonne)
1 December 1995	tanker	Artomisium	London	92 gallons (0.31 tonne)	unspecified oil	$12,062	$131.11/gallon ($38,546.34/tonne)

Source: Advisory Committee on Protection of the Sea. 1995. *Oil Pollution Survey Around the Coasts of the United Kingdom.*

By contrast, a spill of over one million gallons (3,400 tonnes) in stormy weather far from any shoreline will likely disperse naturally and cause virtually no compensatable damage.

When an oil spill occurs in a particular location, the most important factors to consider are:

- Did the oil spill in a location where it is likely to reach any shoreline? Is the oil spill close enough to shore or under the influence of currents and wind conditions that make it likely that the oil will impact the shoreline?
- What type of shoreline is involved?
- How close is the shoreline to inhabited areas?
- What value does the population place on the shoreline or resources likely to be impacted?

KEEPING THE OIL AWAY FROM SENSITIVE LOCATIONS

When oil spills near a potentially sensitive coastline or resource (and near a potentially sensitive public), the most cost-effective approach to a cleanup operation is to invest as much equipment, personnel and energy into keeping the oil away from the shoreline or sensitive resource. Spill experts have estimated that in spill incidents in which the oil impacts a coastline, as much as 90%-99% of the cost of cleanup and rehabilitation is associated with shoreline cleanup procedures.

Keeping the oil away from the sensitive resource by protective booming and by using mechanical recovery methods, employing in-situ burn techniques, or using chemical dispersion is the most prudent strategy from both financial and environmental protection perspectives. Of course, on-scene response co-ordinators and local authorities will always have to carefully assess which cleanup methods should be employed by taking into account the weather conditions, sensitive wildlife populations and human safety factors at each stage of the operation.

The cost to the polluter is not uppermost in the minds of government officials directing the spill operations. However, since financial cost and degree of environmental impact are generally directly correlated, most environmentally responsible decisions on cleanup procedures will, in the end, correlate with reduced financial costs to the responsible party as well, particularly with regard to subsequent damage claims and natural resource damage assessments.

OIL TYPE IMPACT ON CLEANUP COSTS

The type of oil spilled is another significant factor in determining cleanup costs. The more persistent and viscous the oil the more widespread the contamination and the more difficult the cleanup will be. The composition and physical properties of the oil will affect the degree to which it evaporates and disperses naturally and the ease with which it can be cleaned up. Lighter crude and refined oils evaporate and disperse to a greater extent than heavier oils, except in situations where water-in-oil emulsions form.

Cleanup costs for lighter crudes and refined oils tend to be below the average spill cleanup cost. Heavier crude and fuel oils, as well as emulsions, are considerably more persistent and viscous. These oils are difficult to clean up using dispersants, skimmers and pumps, resulting in considerably higher cleanup costs.

WEIGHING OPTIONS FOR CLEANUP STRATEGIES IN WATER

Choices made in cleanup strategies and the decision-making process in the aftermath of a spill can significantly

Technique	BasicStrategy	Procedures	Advantages	Disadvantages
Mechanical Containment and Recovery	Corral as much oil as possible and remove it from the water surface where it floats; for spills in calm wate or near sensitive areas.	• Deploy boom to contain oil slick • Collect oil with vacuum hoses and skimmers • Transfer collected oil/water to tanks that separate oil and water	• Causes the least environmental impact by preventing oil from mixing with the water • Prevents oil from reaching shoreline	• Very inefficient (often 15% of oil recovered) • Very time consuming and expensive • Booms must be deployed quickly to contain oil slick • Does not work well in rough water • Requires large numbers of personnel and equipment
Dispersants	Application of chemicals to break up oil into tiny droplets; smaller droplets more easi biodegraded; dilute toxicity; for spills in turbulent water, aw from sensitive habitats	• Determine appropriate chemical • Apply chemicals from boats or airplanes	• Quickly removes oil from water surface, reducing danger to wildlife and coastline • Less expensive than mechanical methods • Reduces need for shoreline cleanup • Works well in rough water	• Narrow window of effectiveness • Chemicals may be toxic to marine life • Requires approval of government authorities • Limited usefulness in calm waters • Requires planes or boats for application
In-Situ Burning	Concentrate and ignite oil to burn off as much as possible; for spills on ice orcalm, open water, away from populated areas	• Concentrate oil with fireproof booms • Ignite oil with flares or lasers deployed by helicopters • Allow fire to burn until fuel runs out or conditions change	• Extremely effective, usually burning off 80-98% of oil • Prevents oil from reaching shoreline • Prevents oil from mixing into water column	• Causes air pollution; cannot be used near populated areas • Few workers trained in technique • Can be difficult to get government approval • Burning leaves tarry residue
Doing Nothing (Natural Cleaning)	Allowing oil to break down naturally; for spills on open water, away from shoreline, or spills near shorelines exposed to significant wave action	Oilweathers naturally, breaking down physically and chemically with turbulent wave action and effects of sunlight.	• Inexpensive; requires no equipment or personnel except for monitoring • Often very effective • Avoids environmental damages associated with invasive shoreline techniques	• Oil may reach sensitive areas • Often perceived by public as being irresponsible • Difficult to predict how weather, currents, and wave action will act on spilled oil

Figure 5
Cleanup Control Strategies

affect overall cleanup costs in responses to spills of all sizes and in all locations. Among the earliest decisions that the spill management team and on-scene co-ordinator must make is to determine the strategy or strategies that the response crews will follow in containing and removing the spilled oil and protecting any potentially sensitive areas. There are four main strategies that work crews currently employ to clean up oil spills in water. In many spill situations, spill responders employ more than one strategy in different locations or in different phases of the cleanup operation. They include:

- Mechanical containment and recovery;
- Dispersant application;
- In situ burning; and
- Natural cleaning.

Figure 5 presents an overview of the four strategies, their advantages and disadvantages, and suitability for applications in different spill situations.

SHORELINE CLEANUP STRATEGIES

Once the oil reaches the shoreline, the cleanup becomes significantly more complicated, expensive, time-consuming and fraught with socio-political implications. The points to remember about shoreline cleanup are:

- The best approach may be to do nothing. Experience has shown that shoreline cleanup operations often cause more environmental damage than if the oil were left alone. All too often aesthetic considerations and public pressure to "do something" override long-term environmental considerations in the decision-making process.
- The most difficult type of shore to clean is a cobble or pebble beach. The oil penetrates deeply through the spaces between the stones.
- The rate of natural "self-cleaning" on a beach depends largely on the amount of wave action and the degree to which the beach is exposed. The stronger the waves the greater the breakdown of the oil. The more exposed the beach the more it will encounter wave action.
- Aggressive manual cleaning can, in some cases, cause more harm than good. Using heavy equipment and having many personnel on a beach can cause the oil to move deeper into the sand and pebbles than it would naturally. This activity can also harm sensitive shoreline plants and animals more than exposure to oil. Likewise, the use of high-pressure water hoses or dispersant chemicals can destroy shoreline plants and animals. Moving the rocks on a rocky beach to clean them can also cause damage to shoreline organisms and the physical integrity of the beach.

- The use of bioremediation (i.e., enhancing natural biodegradation by applying fertilisers to accelerate the growth rate of micro-organisms) has produced mixed results, particularly when used on shorelines. Remediators have used this technique with great success in rehabilitating land spill sites. Further research is needed before this technique can be widely used on shorelines or even on water, but it is an attractive 'natural' alternative.

- Manual shoreline cleanup is labour intensive, slow and expensive. While it can often become a "goodwill gesture" on the part of the responsible party, it can have disappointing results.

If after taking into account the above considerations, the on-scene co-ordinator or other decision-maker recommends shoreline cleaning, the response team should consider that different shoreline types require different cleanup strategies.

Rocky and pebble/cobble beaches require manual cleanup with pumps, vacuum trucks and skimmers (in shallows nearshore) for removal of heaviest oil concentrations. Manual cleanup with buckets and scoops, as well as the use of oil-attracting sorbents, might also be required. To clean up any remaining oil residue workers can use high-pressure washing to push the oil back into the water where it can be collected with skimmers or sorbents. This technique is also applicable to oiled seawalls, docks and boats. Occasionally, response teams will apply chemical dispersants, but only where they will be quickly diluted by seawater. Pebble/cobble beaches might also be due for the use of heavy earth-moving equipment to push stones into water for natural cleanup by wave action or loading oiled stones into a mobile incinerator that burns oil and returning the stones to the beach.

Sandy beaches require a different strategy, manual collection with scoops, shovels and rakes. In the second phase of this cleanup, crews might use heavy machinery to push oily sand into the wave zone for natural cleaning. Occasionally, the use of beach cleaning machines, which separate tar balls and clumps of oily sand from the beach, might be necessary.

Muddy shores should always be treated with caution. Spill experts warn not to do anything unless absolutely necessary. Mudflats and beaches are very sensitive environments that are easily damaged by people and machinery. Conservative cleanup measures include: low-pressure washing with hoses to push oil into open water for recovery by skimmers and removal of oiled plants if birds are endangered by them.

PUBLIC PRESSURE FOR AGGRESSIVE CLEANUP TACTICS

In some cases, public and government pressure for the responsible party to undertake radical and expensive cleanup procedures may not always be in the best interest of environmental protection, even if they are well intentioned. In these cases, public pressure for the spiller to "do something" to quickly restore the environment to its previously "pristine" state may be motivated more by aesthetics than by true environmental concerns. While a beach might appear clean after aggressive cleanup efforts, the procedures employed may actually result in more environmental damage than the spilled oil itself.

Experience with a number of catastrophic spills, particularly the 'Exxon Valdez' spill in Prince William Sound, Alaska, USA, has shown that efforts to aggressively clean an oiled shoreline may result in more long-term environmental damage than leaving the shoreline to "clean naturally" by wave action and winter storms. The potential spiller must keep informed of ongoing research into the environmental damage associated with such inappropriately aggressive cleanup efforts to be able to present a reasonable and cost-effective long-range plan in the case of catastrophic spills.

EXAMPLES OF CLEANUP COSTS

Cost analyses of data in the International Oil Spill Database indicate that spill cleanup costs vary considerably. A simple manual recovery can cost as little as $0.37/gallon ($108.78/tonne), whereas extensive shoreline cleanups, wildlife rescue and rehabilitation and any other labour-intensive operations add significantly to the cost, making it as high as $296.29/gallon ($87,110.55/tonne). In some unusual cases involving particularly sensitive resources or property, costs are even higher.

Spills in ports are likely to fall somewhere in between since there will likely be sensitive resources and property at risk, but there is unlikely to be extensive shoreline impact unless currents pull the oil out of the harbour/port area. Some examples of cleanup costs (with costs converted into 1997 US dollars) for spills in ports are:

- Dae Wong: The cleanup of the June 1995 spill of 294 gallons (1 tonne) at the port of Kojung, South Korea, resulted in $53,505 in cleanup costs — $36,817 for Korean Marine Police costs and $16,688 for private contractor costs — or about $182.00/gallon ($53,505/tonne).

- Kriti Sea: The cleanup of the August 1996 spill of 5,880-14,700 gallons (20-50 tonnes) at Agioi Theodoroi, Greece, cost $6,617,482 or $450.17-$1,125.42/gallon or $132,350-$330,874/tonne.

- Peruvian Reefer: The cleanup of the April 1991 spill of 15,000 gallons (51 tonnes) at the port of Helinsborg, Sweden, cost $702,000, or $46.80/gallon ($13,759/tonne).

- Mystery spill: The cleanup of a 15,000-gallon (51-tonne) oil slick from an unknown source at the Eilat Port, Israel in August 1992 cost $113,700, or $7.58/gallon ($2,228.52/tonne).

- Fernando: The cleanup of the January 1990 spill of 50,000 gallons (170 tonnes) at Balayan Bay Terminal, Philippines, cost $100,533 for mechanical/manual recovery, $15,311 for dispersants, and $897 for miscellaneous expenses for a total of $116,741 or $2.33/gallon ($686.44/tonne).

- Era: The cleanup of the August 1992 spill of 87,000 gallons (296 tonnes) at Port Bonython, Australia, cost $1,137,000, or $13.07/gallon ($3,842.28/tonne).

- Presidente Arturo Umberto Illia: The October 1992 spill of 184,800 gallons (629 tonnes) at Puerto Rosales Terminal, Argentina, cost an estimated $568,500 or $3.08/gallon ($904.43/tonne).

- American Trader: The cleanup of the February 1990 spill of 417,000 gallons (1,418 tonnes) at the port of Huntington Beach, California, USA, cost a total of $15,412,680, $14,472,000 for responsible party costs and $940,680 for state response costs. The per-amount costs came to $39.96/gallon ($10,866.49/tonne).
- Sea Empress: The cleanup of the February 1996 spill of 21,274,000 gallons (72,361 tonnes) at Milford Haven in the United Kingdom cost an estimated $18,324,000 or about $0.86/gallon ($253.23/tonne). A breakdown of the government's cleanup expenses reveals: $925,515 for aerial dispersant spraying and surveillance; $888,494 for dispersant chemicals; $82,455 for dispersant mobilisation/demobilisation; $3,638,114 at-sea vessel charter; $2,818,613 for at-sea equipment/labour; $5,921,611 for beach cleaning/labour; $901,956 for beach cleaning materials; $631,033 for scientific support; $259,144 for additional operating costs and $2,257,065 for additional cleanup costs.
- Aegean Sea: The cleanup of this December 1992 spill of 21.9 million gallons (74,490 tonnes) at La Coruna, Spain, cost an estimated $8,555,960 or $0.39/gallon ($114.86/tonne).

BEST COST REDUCTION STRATEGY IS PREPAREDNESS

From these examples, it is clear that the cleanup of oil spills is expensive. Effective responses require careful planning and monitoring as well as large numbers of properly trained personnel and effective equipment and materials. But even more expensive, in many cases, are the damages that result from poorly executed responses or oil spills that impact sensitive resources or overwhelm the response capability of the port.

The key to reducing the overall financial costs of oil spills is to reduce the environmental, economic and property damages they cause. The best strategy for reducing damages is to remove as much oil as possible and prevent the oil from impacting shorelines and other sensitive locations. The key to an effective spill response is to respond quickly and effectively. The experience of 30 years of oil spills has shown time and again that preparedness, with trained response personnel and equipment, along with realistic and appropriate contingency planning to put these people and resources into operation are key to reducing damages and thus costs. And merely having crews and equipment on standby and updated contingency plans on paper is not sufficient. Contingency plans, equipment, and personnel need regular exercising to assure that when a real emergency takes place, the port will be prepared to deal with it as effectively as possible.

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