

Greener Oil Spill Response Operations



Ways to make less of a mess when cleaning one up.

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When marine oil spills occur, government and private sector response officials cooperate to minimize the environmental impact to the spill area. Typically the objectives for on-water operations include preventing oil or debris from migrating to the shore, removing oil from the water, and minimizing overall environmental intrusion.

Ironically, cleanup operations themselves can generate waste and environmental impact, such as:

- contaminated sorbents used in the containment/collection effort,
- contaminated personal protective equipment,
- floating trash that comes into contact with oil.

Waste Makes Waste

It is the responsibility of all responders to minimize environmental impact in the most cost-efficient manner possible. Objectives for minimizing net environmental impact should include reducing the amount of solid waste from boom and sorbents, reducing the amount of liquid waste from decontamination and on-water recovery, reusing cleanup equipment and resources, and recycling recovered oil.

Waste segregation. The “mixture” rule¹ states that any mixture of solid and hazardous waste must be considered hazardous waste, unless:

- the mixture doesn’t have hazardous characteristics.
- discharge conforms to the Clean Water Act.



On-site example of excessive use of soft boom during a waterfront remediation project. Once discovered, the USCG assisted contractors toward creating a static hard boom containment procedure that required a minimal amount of soft boom to direct recovery operations. USCG photo by MST1 Joshua Doud.

- the mixture contains discarded commercial chemical products from de-minimis losses during manufacture.

Consciously keeping different waste types separated during a response can ensure that response actions minimize the amount of hazardous waste, and careful management of waste streams can increase the opportunity to recycle and/or reuse materials.





Example of the potentially excessive use of pads during a response to a hydraulic leak from a booming vessel during cruise ship bunkering operations. USCG photo by MK1 Joe Poma.

Decanting. The idea behind decanting is to separate oily water collected by skimming or other methods using the chemical properties of the oil. The oily water is left in a tank to separate. Water is then removed from the bottom until only the oil layer remains. This method greatly reduces the volume of liquid that requires treatment, which reduces the fuel needed to transport and incinerate it.

solid waste volume is reduced, this option can increase the liquid waste volume.

Personal protective equipment. Human health and safety is the number one priority during any spill response. Personal protective equipment (PPE)² may include one-time-use suits, gloves, booties, and eye protection, and can account for a majority of the waste at many oil spills. This is especially evident where shoreline cleanups take place.

Although health and safety specialists conduct hazard assessments to determine the appropriate level of PPE, many responders have a “more is better” mentality. When additional PPE is not actually necessary to provide protection, it may cause more environmental damage in the long run.

Beach clean-up. When oil hits the shoreline, all of the trash and organic material that comes into contact with it must be treated as hazardous waste. Picking up trash

How Clean Is Clean?

In the past, responders would squeeze oil from sorbent materials and reuse them until they fell apart. However, experience has shown that the amount of labor involved in transporting and squeezing the sorbents outweighs the benefits of reusing. This also increases responders’ exposure and chances for injury. The trend lately has been to dispose of these materials by incineration.

Waste Generation During Oil Spill Response and Typical End Points

Activity	Waste Type	Waste Description	Product End Point
Decontaminating Containment Boom	Liquid	Oil/water mixture	Decantation and incineration
Skimming	Liquid	Waste water	Incineration
Using Sorbent Pads	Solid	Hazardous material	Incineration
Solidifiers	Solid	Solid	Landfill
Personal Protective Equipment	Solid	Gloves, protective suits, shoe covers	Landfill or incineration
Dispersant	Smaller oil particles	Unrecoverable oil particles	Water column / biodegradation
In-situ Burning	Smoke & Solid Residue	Combustion by-products (solid and fugitive particulates)	Atmosphere
Picking up Oiled Debris	Solid	Oiled vegetation and trash	Disposal as hazardous waste
Decontaminating Watercraft	Liquid	Contaminated water from washing oil from the hulls	Decantation and incineration
Cleaning Oiled Wildlife	Liquid	Soap/oil/water mixture	Collect and treat as hazardous waste

All generated wastes require follow-up treatment, storage, or disposal.

Reducing and reusing sorbents and booms. Sorbents and booms float at the surface and are made of material that attracts oil. These materials are very convenient and are almost certainly overused in the urgency of the moment. It takes discipline and understanding to decide how much sorbent to put in the water.

Another option is to use hard boom for collecting oil. This option does not work as quickly as sorbents but is still effective. Hard boom is designed for reuse but requires decontamination (with water). So although the

on beaches before the oil can migrate there reduces the total amount of hazardous waste. National Oceanic and Atmospheric Administration (NOAA) trajectories can help target which beaches to clean by providing an idea of which beaches have the highest potential to become “oiled.”

Reprocessing, incinerating, and recycling recovered oil. Liquid-recovered oil is not easy to reprocess, given the large amount of debris that is usually entrained in it. Some refineries can process recovered oil, provided they



Coast Guard Pacific and Atlantic Strike Team members watch as other responders apply oil-lifting chemicals to oiled rocks. Three areas were surrounded by containment boom and used to test two chemicals. This helps to determine the most effective, environmentally friendly method to supplement ongoing response efforts. USCG photograph by Petty Officer 2nd Class Andrew Kendrick.

have a way to remove debris, but usually only do so if the spill involves them or it occurs on their property. Even when this occurs, solid wastes must be incinerated or disposed of in a hazardous waste site. Recovered oil can also be incinerated, but the process must utilize a high BTU rate and the oil must contain no contaminants.

Another option is to send recovered oil to a waste recycling facility. This costs between 25 cents to a dollar a gallon, depending on how much contamination (solids, debris, water, etc.) the recovered product contains.

Dispersants, in-situ burning, bioremediation. Dispersants are chemicals applied directly to the spilled oil to remove it from the water surface. The idea is to break down the oil into small enough particles that they are diluted into the water column and are biodegraded easier. This method has been controversial because it involves adding chemicals into the environment. With in-situ burning, the tradeoff is that the contamination moves into the air in the form of particulates and smoke. Bioremediation uses micro-organisms to break down the oil through natural processes. This can take a very long time, and its effectiveness is still being studied.

Influencing Change

Over the past 20 years, the response community has not yet focused an effort to address decontamination and disposal options. However, some responders have made independent changes in technology and response methods which have had a small positive impact.

There are always new developments being researched for oil spill response operations in general. As pointed out in the incident specific preparedness review of a recent oil spill response in San Francisco, Calif., some programs require “best achievable technology” in response operations. Under this paradigm, success is measured by the ability to recover oil, not by waste control capability.

This leaves out the motivation for incorporating waste control. Putting a focus on all aspects of oil spill re-

sponse technology and methods into established research and development programs may lead to greater influence on the net environmental impact.

Some ideas for specifically developing a way forward in waste control include:

- Programs can provide added motivation by providing monetary benefits. For example, one idea from industry was for every pound of waste recycled, a dollar is taken off the fine for spilling.
- Oil response contractors can share technology and methods for minimizing net environmental impact.
- Responsible parties and on-scene coordinators can emphasize waste reduction capabilities when choosing response options and objectives.
- Safety officers can ensure an appropriate level of protection in a way that minimizes waste.
- Determining “how clean is clean” can take into account the waste generated in balance with the recoverability of the remaining oil in the environment.

There’s More Than One Way to Soak up Oil

There are other variations on sorbents that are designed to reduce environmental impact. One example was reported during a recent oil spill response.

Volunteer responders used more than 1,000 mats made from hair to pick up the oil that washed up on shore. These mats are designed so that after they are oiled, oyster mushrooms can be grown on them, turning the mats into nontoxic compost.

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References:

U.S. Coast Guard M/V *Cosco Busan* Incident Specific Preparedness Review Part II, May 7, 2008.

Meredith May, “Hair and mushroom create a recipe for cleaning up oily beaches.” *San Francisco Chronicle*, November 14, 2007.

Endnotes:

- ¹ See Resource Conservation and Recovery Act.
- ² The Occupational Safety and Health Administration 29 CFR 1910.120(q) and applicable state laws require responders to wear PPE based on their expected exposure to hazardous substances.

