

Greening Oil Spill Response

Environmental custodians from cradle to grave during oil spill response operations.

Introduction

During an oil spill response, we are usually really excited about and focused on getting oil out of the water. We need to move past that accomplishment and think about the environments that are impacted by waste generated in the response.

Initially, oil spill response operations are innately driven by our custodial responsibility to protect the marine environment. The purpose for this article is to highlight the ways responders are controlling waste and the need to continue developing technology and response methods consider waste reduction.

Typically during an oil spill response, the activity hierarchy is as follows:

- prevent oil from getting into the water,
- prevent oil in the water from getting to the shore, and
- remove as much oil from the water as possible while
- Minimizing overall impact to the aquatic and shoreline environment. Not hurting the environment in the process.

The other environmental responsibility all responders have is to control the impact on the environment beyond the spill site from the waste generated during response operations. This parallel hierarchy for control should be The actual waste hierarchy is

1. Source Reduction
2. Recycling
3. Treatment
4. Disposal!

- Reduce the amount of waste generated,
- Reuse clean-up equipment, and
- Recycle waste oil.

The National Contingency Plan (40 CFR 300) established a robust system that relies on contracted private Oil Spill Recovery Organizations (OSROs) to conduct most oil spill response operations. OSROs are funded by vessel and facility owners to train and equipment themselves everyday for the best response possible at any given time. This role also puts OSROs in the best position to most directly control waste. This is true independent of whether there is a Responsible Party (RP) funding the response or if the Coast Guard Federal On Scene Coordinator is paying for the response using the Oil Spill Trust and Liability Fund (OSLTF). The exception is when the Navy is the RP and response operations are handled by Navy funded Oil Spill Response Teams.

Waste Generating Activities and Types of Waste

During a spill response activities can be categorized into containment, skimming, absorbing, dispersing, biodegradation, solidifying, and in-situ burning. All of these require some kind of waste treatment, storage, or disposal except in-situ burning and dispersant. Practices that involve burning oil and dispersing it into the water column can be misleading in that they create "waste" but it is allowed to exist in the ecosystem and are not recoverable. Generally all of these activities are within the paradigm of oil spill response that concentrates removing waste from the environment while minimizing impact, the nadir of environmental law requires the FOSC to do just that. The reality is that NCP concentrates on removing the threat to human health and the environment by removing the threat or reducing the impact. Generally, environmental responders

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are excellent stewards of the environment, but this paper suggests that responders shift the paradigm of the response by using the waste management hierarchy just as anyone would within the manufacturing process in the private sector. In other words, the response should not only removing the immediate threat, but to also require the same thought to ensuring that once the problem is removed from the spill location it isn't transferred to a landfill or other treatment facility. Further, that responders are encouraged or even incentivized to reduce the use of disposable PPE in an effort to prevent waste from being created in the first place.

Sorbent pads and sausage boom are typically used for recovering surface contamination. The material in the sorbent attracts oil as it floats on the surface.

Even Personal Protective Equipment (PPE) is a disposable product that becomes a waste. Responders wear protective gloves, Tyvek suits, slip-on booties to keep their shoes clean. These all become part of the waste stream.

When is it considered hazardous? Are we disposing waste that is not hazardous as if it is? What impact does this have on the environment? The Resource Conservation and Recovery Act's mixture rule seemingly ties our hands, but careful management of waste streams can ensure recycling and/or reuse of materials. The mixture rule Any mixture of solid & hazardous waste MUST be considered haz-waste, UNLESS mixture is exempted:

- Mixture doesn't have hazardous characteristics.
- Discharges subject to CWA
- Mixture contains discarded commercial chemicals products from de-minimis losses during manufacture

Again, consciously keeping the waste hierarchy as part of the paradigm of response can ensure that RCRA hazardous waste management doesn't keep the incident response managers from ensuring all aspects of the response are working to minimize impact on-site and minimize the impact of the waste removed from the site.

Comment [EPS2]: PPE can account for a lot of the waste at many oil spills, especially where there is a lot of shoreline cleanup going on. This is a tough one, because PPE is designed to be disposal and not reused. You could decon, but deconing everything uses a great deal of water and other chemicals, this is a trade off, which is the lesser of the two evils? I think I would stress trade-offs and minimization of PPE.

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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	Decant and Incinerate
Skimming	Liquid	Waste water	Incinerated
Using sorbent pads	Solid	Hazardous material	Incineration
Solidifiers	Solid	Solid	Claim they can be disposed of in a landfill (CIAgent)
Personal Protective Equipment	Solid	Gloves, protective suites, shoe covers	Landfill or incinerated
Dispersant	Smaller oil particles	Unrecoverable oil particles	Water Column / biodegradation
In-situ Burning	Smoke and 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 off oil from the hulls.	Decant and Incinerate
Cleaning Oiled Wildlife	Liquid	Soap/Oil/Water Mixture	Collected and treated as hazardous waste.

Ways to Control Waste

Waste Segregation

Decanting

Reusing Sorbants and Boom

Reusing PPE

Using less equipment

Decontaminating equipment and sorbent disposal are areas where using more may not be better. For example, they try to minimize the amount of sorbent boom and pads we use in on water during oil recovery. By using hard boom and skimmers you eliminate oiled sorbents and are able to minimize the solid waste generated. Responders should work to think outside the box and use mechanical with several different types of clean up technologies, a combination of recovery that not only removes the oil based on the specific micro environment, but reduces creation of significant waste streams.

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Beach Clean-up

Picking up debris and trash from beaches that will be oiled reduces the about of hazardous waste.

Comment [EPS3]: I think this should definitely be stressed as part of the pre-SCAT function of the ICS. Also, in light of the mixture rule, this can not only develop lots of solid waste, but hazardous waste streams as well.

Recycling spilled oil

Liquid wastes are not easy to reprocess given the large amount of debris that are usually entrained in the liquids. Even companies that have a refinery will often have a hard time getting the refinery to accept the waste. Refineries do have some capability to reprocess wastes provided they have a way to remove debris. Then solid wastes must be disposed of or incinerated. In order to be incinerated the recovered oil must have a high BTU rate and no contaminants, OSROs should work diligently to do this.

The Athos I spill that occurred in Delaware Bay in 2004, the salvers worked with local refineries to sell the recovered oil for reprocessing. Initially, no one wanted to buy it but (need to get the story from the guy that came to speak at HQ)

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Dispersants / In-Situ Burning / Bioremediation

There are some response techniques that control waste inherently including using dispersants, in-situ burning, and bioremediation. Dispersants are chemicals applied directly to the spilled oil in order to remove it from the water surface. The idea is that the oil is broken down into small enough particles that they are safely diluted into the water column and are degraded easier. This method has been controversial because it involves adding chemicals into the environment but one benefit is there is not any waste to incinerate.

Waste Control	Plus	Minus	Net
Squeeze out product from sorbant material and reuse during the same spill.	Uses less sorbant material.	The labor costs are high. Process takes time. Hazard exposure is higher for workers.	There is not a net benefit to reusing sorbants during a response.
Decanting	Reduces energy it		

Where does the waste go?

Net Environmental Impact

Response Culture in Controlling Waste

Since OSROs are on-scene doing the response and decontamination activities, they have the most control over the waste. On the other hand, OSROs take great pains to avoid the responsibility for any waste. They always require that the Responsible Party take ownership and responsibility for waste disposal. The effectiveness of this proposal, to essentially "Green" oil spill response, in effect changing the overall paradigm of the response, will hinge on pushing regulators and federal responders to encourage and not punish this kind methodology. The NCP does not suppress nor does it encourage this kind of on-site thinking. EPA and the USCG should encourage RPs and by proxy encourage OSROs to make this paradigm change.

Comment [EPS4]: I think you can say this in a nicer way!

Views between OSROs may differ but in general, there is awareness about waste generation issues and recycling benefits but there is not a real focus on them during spill response. The urgency is focused on dealing with the emergency and waste issues become secondary. Although there may not have been a meaningful reduction of waste through concerted efforts, long time practices can result in waste reduction outcomes. Probably the most significant reduction in waste has been through the reduced number of spills.

Just as with any business, cost will typically determine how a waste is handled. Until it becomes cheaper to recycle wastes compared to disposal there may not be a great incentive to minimize waste. There are some OSROs that have been more marketable because of their reputation for decontaminating boom for reuse. One responder interviewed mentioned that one of the images he still remembers from the Valdez spill was a picture of a mountain of bags containing oiled solid waste waiting for disposal. There seems to be a willingness to improve in this area. WHAT?

Motivators for Controlling Waste

Representing the oil spill response culture over the last 20 years, the International Oil Spill Conference (IOSC) has served as a forum for sharing information about the latest developments in technology and methods. In the entire history of IOSC only ??? papers out of ??? have focused on reducing waste from recovery operations symbolizing the cultural indifference that leads to limited industry based motivation for developing better ways for handling the waste issue.

Regulations that address waste reduction are found in 33 CFR 154 and 155 that

Comment [EPS5]: I'm not sure this is true. These are pollution prevention regulation, and by their very existence they are waste reduction regulations, I guess they are indirect regs, versus direct regulation like RCRA and other federal law that requires end of pipe control of wastes.

Although oil spill response waste control research and development has not been in the forefront of the oil spill response culture, responders have developed techniques to reduce cost that usually have a positive impact on the environmental stewardship.

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Best Achievable Technology:

Motivations for reducing waste in oil recovery industry may have different effects on driving waste reduction efforts. During a spill, if the responsible party is identified, they must pay for clean up operations and waste disposal. Oil Spill Recovery Organizations are hired by the RP to respond and become the waste generators. Since the RP is not directly making decision that could impact the amount of waste generated, and the OSROs are not directly paying for the disposal, the emphasis remains strictly focused on getting the most oil out of the water as possible. If there is not an RP, the Coast Guard becomes responsible for the treatment, storage, and disposal of the waste through the Oil Liability Trust Fund. In this case, there is more a direct relationship between the waste generate and the purse that pays for the disposal. There is also the additional motivation for reducing TSD costs because the OSLTF is a publicly owned government funding source.

Comment [EPS6]: I think a quick reiteration of incentivizing RPs to encourage OSROs to reduce waste streams and minimize actual hazardous waste and the inevitable treatment and disposal that requires. We need to 'fix' the idea that it is just easier and less hassle to not worry about reduction or minimization of hazardous waste...the RP is paying through the nose anyway, why even bother? Besides, if they asked would the government allow it? Would they get some good behavior points for doing so?

Way Forward

There are always new developments being researched for oil spill response operations. Some ideas for specifically developing a way forward in waste control are as follows:

1. To add incentive for control waste agencies may want to consider programs that monetarily affect the RP or OSRO. For example, one idea from an interviewee was for every pound of waste recycled a dollar is taken off the fine for spilling.
2. Another idea is to bring responders together in a workshop with the objective to focus on sharing ways they have control waste during responses within the response community.
3. Agency guidance that tells FOSCs that they should require or incentivize RP lead clean-ups and do the same for federal lead cleanups.

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Conclusion

The environmental protection is the objective for all response operations include recovery operations and waste handling. Motivation to reduce, reuse, and recycle waste comes from this responsibility and as a reduction in response costs. Just as everyone should strive to reduce, reuse, and recycle in their daily lives, even the smallest changes in oil spill response technology or methods can make a big difference overall.