INTENTIONAL SCUTTLING OF VESSELS AS A RESPONSE ALTERNATIVE[1]

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ABSTRACT

The intentional scuttling of vessels is infrequently conducted as part of a pollution response. Notable exceptions include the M/V New Carissa in Oregon and the T/B Morris J. Berman in Puerto Rico. The decision to scuttle a vessel is usually complicated and controversial, and hopefully is made only after thorough consideration of the environmental trade-offs. This paper summarizes recent case histories of intentional sinkings and outlines the typical environmental considerations and trade-offs. The paper also summarizes the applicable policies, laws and regulations for both planned and emergency scuttling2. This summary of issues may be useful to both spill responders and resource managers dealing with derelict vessels if scuttling is under consideration as a response or disposal method. Finally, the paper discusses the relationship between scuttling and "places of refuge" and concludes that emergency scuttling should be considered as a component of refuge planning and may be a potential consequence if an appropriate place of refuge can't be found.

INTRODUCTION

The goals of most marine casualty responses are to protect the public and the environment, salvage the damaged vessel and rescue the cargo or vessel contents. Vessel scuttling is generally the option of last resort but there are instances when an analysis of the environmental trade-offs[3] and disposal alternatives, including threat of pollution or other environmental harm, risk to navigation, and health and safety considerations, may lead responders to conclude that destruction or scuttling of a vessel is the best alternative. Examples include the sinking of the *T/B Morris J. Berman* that grounded just off Puerto Rico in 1994 and the *M/V New Carissa* that grounded near Coos Bay, Oregon in 1999. In both incidents the responders concluded that removal of all oil was infeasible and scuttling in deep water was the best alternative, given the potential safety and environmental risks implicit in doing nothing, trying to clean a vessel in place, or bringing an unstable vessel into port. This paper summarizes some of the regulatory and policy considerations that responders should be aware of in order to minimize the environmental harm that might result from a scuttling operation.

REGULATORY BACKGROUND

The Marine Protection, Research, and Sanctuaries Act (MPRSA) regulates the ocean dumping of wastes including disposal of ships at sea. The Environmental Protection Agency (EPA) established criteria for ocean dumping permits including the sites and time periods at which ocean disposal can occur. Under Title 40, Code of Federal Regulation, Section 229.3, entitled "Transportation and Disposal of Vessels", EPA allows vessels to be disposed of at sea under specified conditions designed to minimize potential adverse environmental impacts. Scuttling is generally not the preferred method for disposal, and alternatives such as scrapping or disposal in upland landfills should be considered first. Vessel construction is also a consideration; all fiberglass vessels and wooden vessels less than 50 feet long are not typically permitted for ocean disposal.

BASIC EPA PROCESS

The EPA requires a series of notification and vessel preparation steps in order to obtain an ocean dumping permit (40 CFR 229.3). The general process includes the following steps:

1) At least one month prior to the proposed disposal date, the applicant needs to provide the following written information to the relevant EPA regional office. Copies of the notice should be sent to the USCG and the U.S. Army Corps of Engineers (USACE):
   a) A statement detailing the need for the disposal of the vessel;
   b) Type and description of vessel (including vessel's name and registration number) to be disposed of and type of cargo normally carried;
   c) Detailed description of the proposed disposal procedures and requested date of disposal;
   d) Information on the potential effect of the vessel disposal on the marine environment; and
   e) Documentation that alternatives to scuttling were considered (i.e., upland disposal etc.).
2) The applicant needs to remove all oils, contaminants, debris, and other materials that may pose a risk in the marine environment. Actions may include emptying and flushing all fuel lines and fuel tanks until they are free of petroleum. Other pollutants and all readily detachable material capable of creating debris or contamination should also be removed.
3) At least 10 days prior to the proposed disposal date, the applicant must notify the EPA and USCG that the vessel has been cleaned and make the vessel available for inspection. The vessel may not be transported until EPA and USCG agree that the vessel has been adequately cleaned and is sufficiently seaworthy to be towed the minimum 12 miles offshore.

4) The proposed disposal site must avoid established shipping lanes, designated marine sanctuaries, and locations where the vessel might present a hazard to commercial trawling or national defense. EPA may consult with appropriate resource agencies (i.e., National Marine Fisheries Service) to evaluate potential habitat and fisheries impacts at the scuttling location.
5) The disposal site should be located in a designated and charted wreck disposal site, or be at least 12 miles from the nearest land and in water depths greater than 300 feet. Consideration of shorter haul distances if the vessel is to be used as an artificial reef.
6) The applicant must notify USCG and EPA 48 hours in advance of the proposed disposal. Within 12 hours of dumping, the applicant must notify USCG and EPA with final logistics including departure time and place, disposal site location, estimated time of arrival on site, and name and communication capability of the towing vessel. Any changes to the plan need to be reported to the USCG, and the USCG may supervise towing to the scuttling site.
7) The disposal needs to occur during daylight hours. All necessary measures must be taken to ensure that the vessel sinks to the bottom rapidly. The towing vessel must remain at the disposal site for at least two hours to confirm that no large portions of the disposed vessel rise to the surface or to recover any floating scrap material.
8) The National Ocean and Atmospheric Administration (NOAA) must be notified in writing within one week with the disposal site coordinates so that it may be charted.

VESSEL PREPARATION

The EPA has recently issued "Draft National Guidance and Best Management Practices for Preparing Vessels Intended to Create Artificial Reefs"[4]. This document represents the current best cleanup guidance for vessels that are scuttled in non-emergency situations. The guidance focuses on maximizing the beneficial use of the vessels as marine habitats and some of the recommendations are not applicable for vessels that are sunk in deep water locations with no known sensitive habitats. The document describes alternatives to scuttling, legal authorities, site selection considerations, and general clean-up goals. The guidance identifies materials commonly found aboard vessels, including likely shipboard locations. It presents methods for addressing shipboard contaminants including oils and fuels, paints, solvents, batteries, coolants, fire fighting chemicals, refrigerants, mercury thermometers, asbestos, polychlorinated biphenyls (PCBs), floatable debris, and other materials of environmental concern.

Removal of debris and rigging:

Although most of the focus on vessel preparation involves removal of oils and contaminants, floatable debris, including carpets, line, and other materials can pose a marine debris problem as the ship sinks or breaks apart. Fishing vessels may have tons of lines, nets, and hooks that can entrap and kill wildlife. This debris should be removed prior to scuttling. Additionally, it may be appropriate to physically modify the vessel. For example, the hatches on the *Ehime Maru* were all closed to reduce floatable debris issues. The masts of fishing vessels and sailboats may be removed to reduce potential for entanglement.

SITE SELECTION AND VESSEL TOW PATH

Scuttling site selection and towpath are related since there is there is always a risk that a vessel may sink before reaching the preferred scuttling location. Planning should take into consideration alternative scuttling sites if the vessel begins to sink in route. Thus, for the towing route, and the preferred and alternative scuttling site, salvors should try to avoid sensitive resources/areas such as coral reefs, traditional trawling grounds, aquaculture sites, cultural and historic sites, threatened and endangered species, refuges, sanctuaries or other special designated areas, navigation channels, and right-of-ways (e.g., oil and gas pipelines and telecommunication cables). In some cases, a longer towpath may be preferable or required[5] if it avoids transiting near or over sensitive areas. In emergency situations, where the vessel may still have fuel and other pollutants onboard, oil trajectory analyses could be used to design the "safest" route to the scuttling site.

The primary considerations for the scuttling site itself are depth and distance offshore. Ideally the vessel should be scuttled in 1000 or more feet of water in Federal or Exclusive Economic Zone (EEZ) waters, but in some locations this may not be feasible or desirable (especially if there is an expectation for creation of an artificial marine habitat). The site should not include any known sensitive resources. Oceanographic conditions and short and long-term trajectories should also be evaluated if there is a potential for releases during or after scuttling.

Environmental Windows for Scuttling Operations

For non-emergency situations, scheduling of operations should include weather and environmental considerations. Adverse weather conditions increase the potential for complications during the scuttling operation and although all fuels should have been removed from the vessel, there is a potential for sheening from compartments that could not be thoroughly cleaned. Environmental considerations might include avoidance of critical time periods such marine mammal migrations, or adverse seasonal weather patterns.

EMERGENCY SITUATIONS

The disposal process summarized above is intended for non-emergency situations when the subject vessel is stable and there is time to conduct the necessary vessel cleanup and fulfill the required notification schedule. However, when an emergency situation exists, where the vessel poses an immediate peril, is at risk of sinking, and is likely to result in a pollution event or hazard to navigation, decisions on the fate of the vessel often must be made in a matter of hours or days. According to the EPA website, *http://www.epa.gov/region02/water/oceans/wrecks.htm*, the disposal process can be expedited when the USACE and/or the USCG determine that an emergency exists. For example, exceptions can be made regarding the notification requirements, the daylight requirement, and the requirement that all oils and contaminants be removed. If sunk within three nautical miles from shore, the appropriate state agency must be consulted.

In most emergency instances involving vessel scuttling, the vessel owner is involved in the decision-making. However, in cases where the owner is unknown or uncooperative, the USCG, in accordance with the National Contingency Plan (NCP), has the authority to remove and, if necessary, destroy a vessel. Note that while the Federal On-Scene Coordinator (FOSC) makes the initial determination of whether a vessel should be removed or destroyed, only the USCG Commandant can authorize such action.

The decision to scuttle a vessel in an emergency is based on the facts of the incident and the perceived trade-offs. Typically, the USCG works to remove as much oil from the vessel as possible, while balancing worker safety and logistical concerns. Safety issues are beyond the scope of this paper but it is important to note that a full evaluation of trade-offs needs to carefully consider worker safety concerns inherent in emergency response actions such as pumping bunker tanks that may require confined space entry into a dark, rolling, structurally questionable, and potentially unstable vessel.

CASE HISTORIES

Over twenty-five case histories of intentionally scuttled vessels were reviewed in the preparation of this paper. Several of the more illustrative incidents are summarized below.

Morris J. Berman

On January 7, 1994, the barge *Morris J. Berman*, loaded with 1.5 million gallons of heavy fuel oil, went aground in San Juan, Puerto Rico, after its towing cable parted. The cargo began spilling and impacted nearby shorelines and shallow intertidal habitats. The USCG Gulf Strike Team was brought on scene and began lightering operations, but the barge continued to leak fresh oil, re-oiling historical structures and prime tourist beaches. As time progressed, the oil on the barge became more viscous and difficult to pump making lightering ineffective. On January 15, with Regional Response Team (RRT) concurrence, the barge was refloated, towed to a scuttling site 20 miles offshore, and sunk in 6,000 feet of water. An option to tow the barge further offshore was reviewed, but was rejected since it increased the risk of tarballs and oiling of other Caribbean islands. During the barge refloating, towing, and scuttling operation there were several expected discharges of oil. A large initial release occurred as the barge was refloated and as the barge was towed offshore, it trailed a heavy sheen. At the scuttling site, an estimated 200 barrels of oil was released when the barge sank and a near constant sheen was observed at the scuttle site for several months. This oil moved westward and broke into tarballs. Within two weeks of the scuttling, oiling was reported on the northeast end of Puerto Rico, necessitating additional shoreline cleanup.

The *Morris J. Berman* incident illustrates that some of the inherent trade-offs with vessel scuttling. The removal of the barge allowed the cleanup at the immediate grounding site to be completed. Further impacts to the reef, recreational beaches, historic structures, and other local resources were reduced. However, the oil released during the tow and scuttling did result in broader geographic impacts to the northeastern shoreline of Puerto Rico. This additional oiling does not mean that the alternatives would have been any better.

MV New Carissa

On February 4, 1999, the *M/V New Carissa*, a 639-foot freighter, went hard aground near Coos Bay, Oregon. The vessel was unladen, but had 400,000 gallons of fuel oil onboard. Heavy surf and high winds throughout the next several days drove the ship further aground and made salvage and lightering operations difficult and dangerous. Initial attempts at refloating the vessel failed and by February 9, a 15-foot crack was observed in the hull and the engine room began to flood. A major storm system was forecasted that had the potential to further damage the vessel and cause the loss of the remaining oil. Based on these considerations and the fact that the underwriters had declared the vessel a total constructive loss, the Unified Command decided to burn as much oil as possible before the ship broke apart. On February 11, a Navy team used explosives to rupture and ignite the fuel tanks. The fire burned for 33 hours but left the vessel broken in two, with an estimated 130,000 gallons of fuel left in the bow. On February 17, the Unified Command decided to tow the bow section to sea and scuttle it as the most effective way to prevent further discharge of oil. The scuttling process was designed to keep the bow section mostly intact in order to trap the oil inside the hull. The plan involved carefully placed explosive charges to slowly sink the section.

The *New Carissa* incident illustrates the complexity of vessel scuttling. On March 1, the bow section was towed offshore but the towline parted in heavy seas and the bow came ashore in Alsea Bay, Oregon, approximately 60 miles north of the initial grounding. The bow was refloated a week later and towed to the scuttling location 282 nautical miles off the Oregon coast. The demolition charges were ignited and the vessel began to slowly sink. The USCG, concerned about adverse weather, and safety risks associated with recapturing the bow section if it had not sunk by nightfall, decided to complete the sinking using a torpedo from the submarine *USS Bremerton*. At approximately 4 PM on March 11, 2000, the bow was sunk in 1,811 fathoms.

Ehime Maru

On February 9, 2001, the submarine *USS Greeneville* collided with the *Ehime Maru*, a Japanese fisheries training vessel, approximately 9 miles south of Honolulu, HI. The *Ehime Maru* sank in 2000 feet of water, presumably trapping 9 crewmembers. The US Navy initiated an extensive salvage effort that involved lifting and transporting the vessel to a shallow-water site to facilitate recovery of the bodies of the crew, and then sinking the wreck in a deepwater site. The Navy conducted an Environmental Assessment (EA) prior to the operation, and carefully considered the environmental implications and mitigation options for multiple salvage alternatives.

The primary environmental issues identified during the *Ehime Maru* EA process were site selection for the recovery area, selection of the deepwater scuttling site, tow paths, and the potential release of oil pollution. These considerations were related since the towpaths and sites selected for recovery and scuttling could potentially be oiled if there was an operational release. The *Ehime Maru* had approximately 65,000 gallons of diesel fuel on board. Much of that was spilled during the sinking, but the Navy concluded that up to 45,000 gallons of oil might remain onboard. The Navy concluded that the salvage operations would have no significant spill related impacts provided that appropriate environmental protection measures were used. Briefly, these included operational restrictions to ensure optimal oceanographic conditions and pre-deployment of response equipment, including equipment for dispersant application if containment efforts failed.

Site selection and towpath routes were also carefully considered. Several sites were evaluated and the Navy, in consultation with the resource agencies, scored each site based on environmental considerations and operational requirements. The temporary site had to be in reasonable dive depths to allow teams to work on the wreck. Potential sites and towpaths were surveyed to avoid shoals, seagrass beds, live corals, or critical habitats for fish and wildlife. The surveys also considered man-made structures such as pipelines and unexploded ordinance. Careful consideration was given to minimizing anchor damage from the salvage and support vessels, and a multipoint mooring system was designed to provide position control during diving and lifting operations. Ultimately, the Navy selected a site in 110 feet of water near the Honolulu airport for the recovery site, and an offshore site in 8500 feet of water for the final scuttling. Prior to scuttling, divers removed oil and over 79 miles of fishing long-line, cargo nets, hooks and two tons of floatable debris to reduce the potential for entrapment of marine life.

While the emergency nature of most wreck removal and salvage operations preclude preparation of such a thorough assessment, the *Ehime Maru* operation highlights many of the environmental issues inherent in marine salvage operations, and the EA serves as a useful benchmark for what constitutes a very thoughtful analysis of trade-offs. In the end, the recovery operations resulted in only minor seafloor disturbance. Only minor sheening was observed and it later determined that nearly all of the fuel and lube oils were released during the initial collision.

T/V Insiko

On March 13, 2003, the Indonesian flagged Tank Vessel Insiko suffered a major engineering fire, which killed 1 crewman and left the vessel adrift and without power for 20 days. On April 2, a cruise ship rescued the crew and left the tanker adrift 330 miles south of Hawaii. Because the unattended vessel was a potential spill threat and drifting towards Johnston Atoll, a sensitive ecological environment, the USCG funded a salvage effort. The vessel was towed to Honolulu, HI for environmental cleanup. After responders removed 227,000 gallons of oily water and lube oil, the vessel was towed offshore and, with RRT concurrence, sunk at a pre-designated disposal site.

Pago Pago Longliners

On December 10, 1991, Hurricane Val struck Pago Pago Harbor, in American Samoa, causing extensive damage to the island's port, including the grounding of nine longliners on reef flats in the harbor. The USCG responded and after the immediate threat from the vessels was abated, began an effort to identify the owners of the vessels. However, no viable responsible owners could be identified. In 1999, as the vessels continued to deteriorate, the USCG, working with NOAA and the Government of American Samoa, developed a plan to remove the wrecks. Eventually, seven vessels were cut apart, and two vessels were temporarily patched, pulled off the reef, towed to an offshore site and scuttled in 1000 fathoms.

The *Insiko* and Pago Pago longliner removals are examples of situations where there was sufficient time to preclean the vessel prior to scuttling. The island location of the incidents is significant. Many remote locations, whether in the tropics or in Alaska, have significant solid waste disposal challenges and logistics may preclude scrap recycling. Samoa was too remote to make hauling the scrap economically feasible, but there was no space in the landfills. Without at sea disposal, it is likely that vessels will be left on the reef and allowed to slowly break apart.

DISCUSSION AND CONCLUSIONS

Response theorists talk about the range of potential alternatives and the selection of the optimal mix of response actions that result in the best environmental outcome. In the case of a leaking, sinking vessel, there is no best environmental outcome, only the "least worst" outcome. The On-Scene Coordinators report for the *M/V New Carissa* summarized the fundamental trade-off: "Sinking a ship laden with oil in deep, cold waters where it should have negligible environmental impacts is ...an effective, albeit challenging means to reduce the risk of a spill in highly productive shallow marine waters". Many in the scientific community may argue that this assumption is unsupported and we simply do not know enough about the ecology and environment of the deep ocean to make that trade-off. Without that information, responders will continue to face difficult trade-offs based on limited information.

One long-term solution is to conduct follow-up environmental investigations on scuttled vessels. However, depths and locations of many of those vessels make this a daunting challenge. One interim solution is to build upon the on-going discussion on "places of refuge". Although the intent of a place of refuge is to provide a safe place for lightering and repair, intentional scuttling is closely related. Both are concerned with environmental trade-offs, and both hope to protect the marine environment and reduce the overall environmental impacts of an incident but both may result in increasing the risk of localized impacts. The environmental criteria for towing to either a refuge or scuttling site are identical: avoid sites and pathways that have sensitive resources/areas. Finally, both are controversial time-critical decisions that must be made by the USCG in consultation with other agencies and stakeholders. Emergency scuttling should be considered as a component of refuge planning. If places of refuge can't be found, it is conceivable that the next option may be emergency scuttling.

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BIOGRAPHY

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1 Although released by NOAA, the information in this paper does not reflect, represent, or form any part of the support of the policies of NOAA or the Department of Commerce. Further, release by NOAA does not imply that NOAA or the Department of Commerce agree with the information contained herein.

2 This article is a brief summary of the issues related to vessel scuttling; responders, salvors, and vessel owners should consult directly with the relevant agencies and applicable laws and regulations governing ocean disposal.

3 There are still environmental and safety trade-offs if the vessel is towed to a foreign country for shipbreaking, or the ship is cut apart and placed in a landfill.

4 The report can be found on-line at: http://www.epa.gov/owow/oceans/habitat/artificialreefs/artificialreefguidance040624.pdf

5 EPA Region 9 places specific conditions on transportation routes to avoid EPA-designated ocean dredged material disposal sites (ODMDS) to avoid termination of such disposal locations.