Oil Spill: Are We Doing Enough to Avoid It?

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Abstract

This paper reviews the recent studies on the identification and cleaning methods, as well as the consequences of oil spill. The future progression on oil spill prevention studies are also projected here.

Mini Review

Oil spill represents a devastating form of environmental disaster which causes irreversible impacts to the sea and marine creatures. The increase demand of petroleum due to the intensified growth of worldwide consumption leads to the threat of oil spill in various oceans during its shipping. Study by [1] in worldwide oil spill hotspots further identified that European Atlantic to be a key battlefield to avoid oil spill judging by its annual accommodation of crude oil shipping.

The crude oil spilled contains of high risk substances and in the form that is hard to be removed by current technology and removal methods as stated by the review in [2]. Besides, it also causes several of negative side-effects to the open seas, such as changing sea temperature, destroying natural habitats and disturbing shipping routes and activities. In the detailed study by the proposed combined hydrodynamic numerical and temperature statistical approach in [3]. The change of sea temperature is found to be related to the shrinking of coral reefs, which can further affect the marine creature habitats and natural coastal protection provided by the existence of coral reefs.

After the recent oil spill disasters, such as Hebei Spirit [4-6]. Dalian oil tank explosion [7-8] and Gulf of Mexico [9-10]. The public awareness of such issue has been re-heated. Even though, the engineering mitigation methods are of vital importance to oil spill events, the current techniques of removal are far from satisfaction. In the review of current techniques employed for oil spill removal, majority of them are either utilizing the mechanical or chemical approach. The mechanical approach uses physical measures to clean up the spills, such as by deployment of booms, skimmers or in-situ burning, and is generally dangerous to manage, slow and less efficient as its treatment is usually time-consuming. Furthermore, it is usually incapable to totally remove oil spilled before its natural hardening takes place. On the other hand, the chemical approach represents a method usually functions by speeding up the natural biodegradation of spills. It works by using dispersants to break down oil spill into droplets to make it easier to mix with water and absorb into aquatic system. This method usually associates with high environmental risk due to the chemical side-effects.

Viewing the limitation of the afore-mentioned cleaning methods, various of studies including via numerical [11] and fingerprinting approaches [5,7] have been further investigated to enhance the effectiveness to trace the sources and full impacts of oil spill and to incorporate into the use of cleaning methods. Out of these numerical and fingerprinting studies, there are several clear guidelines being established, include the importance of reaction time for cleaning and the sea environment impacts (such as sea waves and tides that increase the oil spreading). Hence further and more advance studies on numerical modelling of hydrodynamics [12] and flow turbulence [13] are crucial to understand the pattern of oil spreading to inform the cleaning process. Recent events have taught us the lesson that prevention is better than solution when considering the treat of oil spill, which have also been concluded in most of the cleaning approach studies discussed in this review paper.

Conclusion

This paper summarized the research efforts to minimize the impacts of oil spill in various major seas and oceans. From various suggested cleaning methods as well as oil spill source and impact predictions, it can be concluded that the oil spill is hard to be traced and cleaned effectively without proper guideline and

technology advancement. This further suggests that precaution will be the best solution to prevent oil spill.

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