

SOLVING THE PROBLEM OF CHEMICAL SPILLS AT SEA

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Abstract

Nowdays, there are many toxic chemicals, which is transported by sea and incidence of accident which results with chemical spills are very often. Many techniques of solving the consequences of chemical spills are developed. But in many cases, it is more desirable to not act and to leave chemicals to disperse in sea column or in the air. Most of chemicals which is transported by sea are not persistent in sea environment and will totally disappear after some time. It is possible to avoid hazards to emergency team (risk of fire, explosion and poisoning) and many problems connected with treatment, transportation and storing of toxic waste by making the decision *not to act*. It is also money saving action. In coastal zones, where it is necessary to remove toxic chemicals, the selection of proper method depends on the characteristics of chemicals, environment and available devices.

Introduction

Chemical spills are serious economical and ecological problem especially near the coast. Usually the damage is temporal and it depends on the range of spill. Sea environment is very sensitive and action against chemical spill have to be efficient and immediate. In the action we would to take care of circumstances of the accident and sometimes the best solution is to apply more than one technique of solving damages of the spill. But first we have to ask ourselves: Is it possible to respond to the situation? and Should we act at all?

Thesis

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Most of chemicals which are transported by the sea are not persistent in sea environment and will totally disappear after some time. In many cases, it is more desirable to not act and to leave the chemicals to disperse in sea column or in the air. It is possible to avoid hazards to emergency team (risk of fire, explosion and poisoning) and many problems connected with treatment, transportation and storing of toxic waste by making the decision *not to act*. It is also money saving action. In coastal zones, where it is necessary to remove toxic chemicals, the selection of proper method depends on the characteristics of chemicals, environment and available devices.

Sources of information

Situations in Which Action against Chemical Spills Is Not Possible

In some cases it is not possible to take actions against chemical spills. It depends on:

- Time needed to act. Before we start the operation it takes at least 24 hours for making decision how to act; searching for and locating the spill; preparing and transporting the equipment from the storage which is usually at land to the site of chemical spill in good conditions. If we add time needed for the operation which is at least 12 hours to the time needed to start the operation, we get the time needed to act of total 36 hours (Kantin, 1996).
- The characteristics of chemicals. The characteristics of chemicals determine persistency of the chemicals and consequently possibility of action. The characteristics of chemicals which determine the possibility of action are: colour, density, solubility, evaporation rate, viscosity, spread coefficient, chemical reaction between chemicals and equipment. The period of 36 hours is too long for successful completion of the operation, if the chemical is not persistent. The chemical will spread in sea water and it will be impossible to act.

When chemical spills happen in the sea port or near the coast, the time needed to start the operation is relatively short and it is easy to confine the location of chemical spill. Due to short time needed for starting the action, it is possible to take operations against larger number of chemicals than offshore. It usually takes 2 to 3 hours to remove harmful effects of chemical spills if the chemical is spilled in the port and 6 to 12 hours if it is spilled along the coast (depends on the accessibility of the site), (Bićanić, 2003). Therefore, action against harmful effects of chemical spills is possible if the chemical is persistent at least 24 hours in coastal area, and at least 12 hours in ports. The persistency of chemicals depends on coefficient of solubility, volatility, spread and temperature of the environment.

Situations in Which Decision *Not To Act* Is Made

Chemical spills can be harmful due to the risk of fire, explosion, air and water toxicity or bioaccumulation...The decision *not to act* is made:

- when life of members of the team are endangered due to risk of fire or explosion, or due to risk of poisoning by touch or respiration;
- when action would cause heavier pollution;
- When spilled chemical is not known. In the case of bulk chemical the name can be found more easily than in the case when chemical is packed.

Preventive measures have to be taken in order to protect people and environment when decision *not to act* is made. It is necessary to provide evacuation for local population, crew members and members of the team which are in contact with chemical spill. It is also necessary to protect the vessels passing near polluted area and to route them out of endangered zone. It is necessary to monitor the spill, the quality of water, as well as sediment and air.

Situations in Which Decision to Act Is Made

The decision *to act* is made when following conditions occur:

- if the persistency of chemical in the water leaves enough time to partially remove the chemical,
- when the chemical is naturally confined (in ports or along the coast) the decision has to be made quickly,
- if the risk to the members of the team is not too big,
- if all necessary equipment is available and compatible to spilt chemical and if it is possible to use it properly,
- if polarized chemical is disposed on shore or in case of floating containers, the decision to act is also made.

Findings

It is rarely possible to remove spilt chemical from sea. In sea transport, many of the chemicals are not persistent and it will totally disappear from the environment after some time. Therefore, in many cases, it is more desirable to leave the pollutant to disperse in water column or in the air. The decision *not to act* enables to avoid many risks to members of the team (risk of fire, explosion, poisoning by respiration...) and many problems connected with treatment, transport and storage of toxic waste. It is necessary to take certain preventive measures, when is not possible to act and remove the pollutant from sea environment:

- to estimate risks to the people (members of the team, crew members, locals) and the environment. It is necessary to collect all the information available of transported chemical and meteorological conditions of polluted area,
- to establish monitoring of polluted area, especially in fishing zones, hatcheries, fish or shell farms,
- to sample the organisms, the pollutants...

In some areas, it is desirable to confine pollutant prior to removing and to remove pollutant from the environment (especially from the ports and coastal zones). It is possible to remove spilt chemical, if it floats on the surface, is unvolatile, coloured, insoluble in the water, and of relatively high viscosity. The selection of proper method of pollutant removing depends on the characteristics of chemicals, effects of the environment and available devices.

References

Bićanić, Z. (2003). *Zaštita mora i morskog okoliša*, vlastita naklada, Split, Hrvatska.
Kantin, R. (1996). *Response options for chemical spills at sea*, IMO, CEDRE, Greece.

Author Bibliography

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