

MARINER Project. Enhancing HNS preparedness through training and exercising

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Introduction

Maritime transportation of chemicals (bulk or containers) has grown considerably in the last few decades. Among seaborne transported substances, those named Hazardous and Noxious Substances (HNS) are chemicals which, if introduced into the marine environment pose hazards to health, ecosystems and legitimate uses of the sea. Recent figures suggest approximately 2,000 HNS types regularly transported by sea in excess of 200 Million tonnes annually. Incidents involving the release of HNS have occurred in all the seas and can present different and often more severe impacts than oil spillages. Data identified over 100 incidents reported globally between 1998 and 2013, with a cumulative volume released of 1,560,000 m³ (IMO, 2016). The nature of many of the chemicals transported means that any incident can have potentially severe public health impacts as well as environmental and societal impacts. HNS spills can be particularly challenging due to the complexity of the identification and assessment of the cargo and associated risks and hazards, and the lack of knowledge on HNS behaviour in the marine environment. The key to effective contingency planning is to provide ready access to relevant information, knowledge and resources and to facilitate regular training and exercises. While a number of EU R&D projects and organisations have examined this issue, research outputs and guidance is often fragmented and not easy to access.

Launched in January 2016, MARINER was a 2-year project funded by the DG-ECHO that aimed at improving preparedness and response to HNS spills in Europe. MARINER counted on the participation of 7 partners coming from UK, France, Spain and Portugal and the support from organisations with competencies on maritime pollution response in these countries. MARINER had four main components. The two first tasks focused on the capture, compilation and transfer of existing knowledge and response protocols. The third task aimed to improve the interoperability and the operational use of models for forecasting HNS fate, transport and impact. Lastly, the fourth task focussed on exercise and training using innovative tools and approaches. As a result of this collaborative work, MARINER delivered knowledge and useful outputs that are described in this paper and will be showcased in the Conference.

Main Results

HNS Knowledge Tool: In an attempt to make the most of the existent knowledge, relevant resources (guides, technical, reports, videos, manuals, software, etc.) produced by previous research projects and organisations working on maritime issues and health or environmental protection were identified. Then

all the compiled information was systematically classified, validated with the project coordinators and organizations and made into a user-friendly database that we named “HNS Knowledge Tool”, which is publicly available online to foster resources accessibility and transfer to contingency planners and responders (<http://knowledgetool.mariner-project.eu/>). In addition to that, we prepared e-booklets that illustrate the type of information available on the database. They are fact sheets presenting the most relevant resources we have found in our searches classified by knowledge areas.

Response protocols: We identified the range of expertise both for maritime and land based response and considered options for application in best practise guidance for maritime incidents. Through visits to their facilities and interviews, all this knowledge was closely assessed and used as a basis for developing protocols adapted to the maritime environment. Specifically, as a case study, these protocols were tailored to the resources available on the response vessels used by the Galician coastguard, and tested during field exercises. The outcome of this work was integrated in a guide for responders including adapted protocols to deal with HNS spills: pre-planning considerations, communication and operational procedures, and technical considerations. Protocols covering different behaviours of HNS (evaporators, floaters, sinkers and dissolvers) were evaluated, as well as recommendations to better interpret the physical properties of HNS. A video highlighting the different stages of response and the main aspects to consider was produced.

Modelling and Interoperability: A key issue when facing a chemical spill is the capability to predict the transport, behaviour as well as the impact of the spilled substances in the ecosystems. The MOHID 3D HNS spill model was optimized in terms of speed and performance to be adequate for use in emergency response operations. In addition to that, the HNS spill model was updated to include an environmental risk module that, according to the concentration reached in the environment and the toxicity thresholds of marine organisms available on the database, it depicts on a map the areas that may be probably negatively affected by the spill. Then a Common Operating Picture (COP) (MARINER Platform) was built in such a simple fashion that the model can be run by anyone regardless their knowledge on modelling or in environmental impact assessment. We also delivered an Application Programming Interface (API) to facilitate interoperability among the different COPs that may be used by the organisations participating in the response. This API allows the exchange of geographic information between these COPs. We also proposed ready-to-use files of a set of symbols (to mark single location) and styles (to mark areas) that could be used to represent HNS-spill related graphic information on maps. Considering that the potential environmental hazards posed by HNS spills are much less understood than oils, we developed guidelines and protocols that could support competent organisations on assessing HNS impact in the marine and coastal environment.

Exercise and Training: To support response teams and their managers in reinforcing their preparedness to such events, we developed an open source downloadable software tool, delivering

region-specific desk top exercises simulating maritime incidents at local, regional or international levels. The tool incorporates a database of HNS and environmental information, which users populate for their own region, together with a modelling interface and a library of exercise materials providing scenarios, feedback and debrief documentation. Exercises are generated based upon the HNS type chosen, the scale of the incident, its location and the prevailing seasonal conditions. The software produces maps, datasheets and modelling simulations, all aligned with injects encompassing each phase of the incident management cycle and incorporating options for cross border alerting and response. We also produced an interactive e-learning course on International Health Regulations and HNS maritime incidents aimed to train response agencies about WHO International Health Regulations, which relate to major cross-border health emergencies, and how they may apply to large scale maritime HNS incidents.

We developed a Training Package on HNS spill management including power point presentations and posters in pdf format covering training for responders on general aspects of HNS, incident prevention and preparedness, incident response and post-crisis actions. Topics covered include maritime transport, regulations, accident causes, chemical behaviour, marine and shoreline response techniques for the different vessels transporting HNS, responder protection, environmental monitoring, communications and compensation funds. Moreover, an additional Training Package on modelling and environmental impact consisting of a Mediawiki webpage covering different aspects of HNS modelling and environmental impact assessment was produced. The main contents are completed with slide presentations, interviews, articles and manuals.

Awareness raising: As we feel it is important that the public are aware of the risks associated to chemical spills and the work of MARINER, we have produced a number of videos available by a range of social media outlets and also a layman's report. All MARINER outputs are accessible through its website (www.mariner-project.eu).

Conclusion

MARINER addressed gaps of knowledge and tools for HNS preparedness and response and based on a collaborative result-oriented approach it delivered useful outcomes applicable for those in charge of responding against HNS spills. This includes *inter alia* an online user-friendly knowledge tool gathering relevant information on HNS preparedness and response; the MARINER Platform, which is a HNS spill model integrated into a Common Operating Picture; a web-based database exercise tool, as well as E-learning materials on exercises and risk assessment to assist users on the functioning of the tool; and training packages on HNS spill management and HNS spill modelling.

References

IMO 2016: International Maritime Organisation HNS Convention (*accessed October 2016*)
<http://www.imo.org/en/MediaCentre/HotTopics/Pages/HNS-2010.aspx>