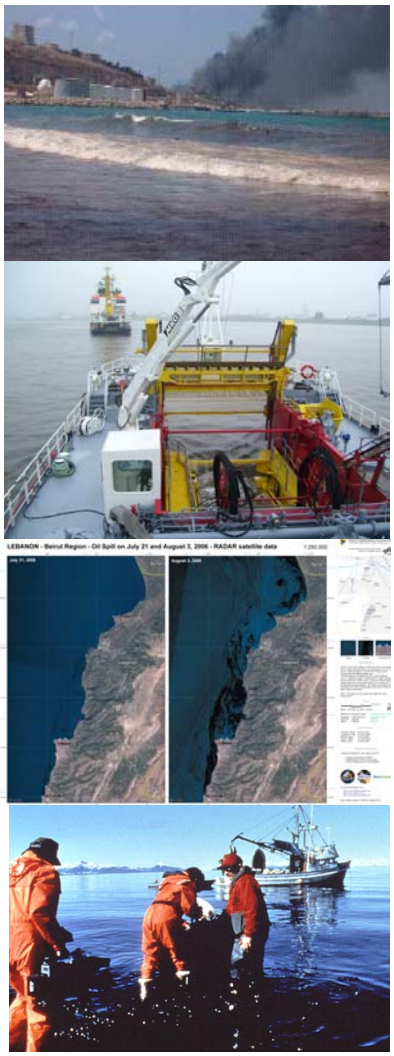
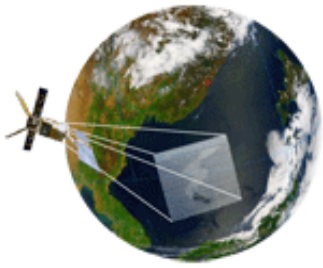
Version 2.0



Guidelines on minimisation of environmental damage in case of marine pollution

- *monitoring*
- *assessment*
- *intervention techniques*
- *health and safety aspects (working with volunteers)*



The guidelines have been produced during the workshop: "Minimisation of environmental damage in case of marine pollution",
11.-14. October 2006, in Bremen, Germany

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Photos of the cover page:

From top to bottom:
- Oil spill from Jiyeh Power Utility, Lebanon *www.moe.gov.lb*
- Stefanie Langer, Institute for Recycling and Environmental Protection, Demonstration of oil combating equipment
- DLR satellite map: Comparison of oil spill extent based on radar data between July 21 and August 3, 2006 (1:250,000), *www.zki.caf.dlr.de*
- Shoreline clean-up after Exxon Valdez oil spill, Prince William Sound, *www.esdim.noaa.gov*
- Oil spill monitoring by remote sensing, *http://cearac.poi.dvo.ru*

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Content

1 Preface

The guidelines base on the results of the workshop “Minimisation of environmental damage in case of marine pollution”, carried out on the 11. – 14. October 2006 in Bremen, Germany. The workshop has been organised by the Institut für Kreislaufwirtschaft GmbH (Institute for recycling and Environmental Protection) and the BLG Consult GmbH.

Seventeen participants from 10 countries (9 Maritime Member States and Hungary, see table 1: List of participants), which have been nominated by their countries based on the invitation by the European Commission, contributed their experiences and know-how on “monitoring”, “assessment”, “intervention techniques” and “health and safety aspects” during the workshop. The findings have been compiled, summarized and edited by the organisers of the event and the moderators of the workshop (table 2: editors of the guidelines).

It must be noted that the resulting guidelines neither represent the opinion of all participants nor the official opinion of their institutions. The guidelines summarise the aspects, which have been identified by the individual professionals during the workshop.

Table 1: List of participants of the workshop “Minimisation of environmental damage in case of marine pollution” (11.-14.10.2006 in Bremen, Germany)

Name	Institution
Mr Steve Benn	Maritime Team Natural England, Peterborough, UK
Mr Ivan Calvez	Service « Suivi des Pollutions » Cedre, Brest, France
Ms Eva Deseo	Ministry of Environment and Water, Budapest, Hungary
Ms Marisa Di Marcantonio	BMM, Belgisch Instituut voor Natuurwetenschappen Brussels, Belgium
Mr Eric Donnay	Directorate General Environment of the Federal Public Service Public Health, Brussels, Belgium
Mr John P. Falvey	MRSC Valentia Island, Ireland
Mr Richard Gabriele	Malta Maritime Authority Ports Directorate, Marsa, Malta
Mr Ger Hegarty	MRCC, Irish Coast Guard, Dublin, Ireland
Mr Andrew Hill	Countryside Council for Wales, Mold, UK
Mr Andas Magyarics	Ministry of Environment and Water, Budapest, Hungary
Mr Edvard Molitor	Swedish Coast Guard, Karlskona, Sweden
Mr José Orge	Portuguese War Navy, Funchal, Madeira, Portugal
Mr Karsten Petersen	Havariekommando, Cuxhaven, Germany
Mr Dionisios Prevezanos	Marine Environment Protection Division Piraeus, Greece
Mr Dimitrios Raptis	Marine Environment Protection Division Piraeus, Greece
Mr Anders Schnell	Swedish Rescue Services Agency, Karlstad, Sweden
Mr Mark Zammit	Malta Maritime Authority Ports Directorate, Marsa, Malta

Table 2: Editors of guidelines

Name	Institution
Dipl.-Ing. Stefanie Langer	Institut für Kreislaufwirtschaft GmbH, Bremen, Germany
Dr. rer. nat. Martin Wittmaier	Institut für Kreislaufwirtschaft GmbH, Bremen, Germany
Dr. rer. nat. Johanna Wesnigk	Environmental & Marine Project Management Agency EMPA Bremen, Germany
Dr. Christopher Wooldridge	Cardiff University, United Kingdom
Capt. Karsten Brünings	BLG Consult GmbH, Germany

The workshop “Minimisation of environmental damage in case of marine pollution” has been implemented in cooperation with a number of experts, who gave lectures on a variety of relevant aspects related to the topics and who provided a wide range of information and many interesting initial points for discussion. Table 3 summarises al lecturers of the workshop.

Table 3: Lecturers of the workshop “Minimisation of environmental damage in case of marine pollution”

Name	Institution
Dipl. Biol. Karl-Heinz van Bernem	GKSS-Research-Centre Geesthacht, Germany
Capt. Ulf Bustorff	Central Command for Maritime Emergencies (CCME), Cuxhaven, Germany
Mr Timo Fricke	Technisches Hilfswerk, Bremen, Germany
Prof. Dr. Arvo Iital	Tallinn University of Technology, Estonia
Prof. Avraam Karagiannidis	Aristotle University of Thessaloniki, Greece
Dipl.-Ing. Stefanie Langer	Institut für Kreislaufwirtschaft GmbH, Bremen, Germany
Dr. cand. Lisa J. Müller	Durham University, UK
Dr. Nils Robbe	OPTIMARE Sensorsysteme AG, Bremerhaven, Germany
Mr. Jakob Lysholdt Sørensen	Storstrøms Amt, Denmark
Prof. Basil S. Tselentis	University of Piraeus, Greece
Dr. rer. nat. Johanna Wesnigk	Environmental & Marine Project Management Agency EMPA Bremen, Germany
Dr. Christopher Wooldridge	University of Wales, Cardiff, United Kingdom

2 Framework and Objective of the guidelines

The development of guidelines on “Minimisation of environmental damage in case of marine pollution” has been initiated by the European Commission, DG Environment, within the community framework for the cooperation in the field of accidental or deliberate marine pollution, call for proposals 2005. The European Commission has set the objective and scope of the guidelines and the workshop, during which the nominated participants have developed the basis for these guidelines.

Based on the analysis of short, medium and long term environmental impacts of previous oil and chemical spills the resulting guidelines will include discussion and recommendations regarding organisational and practical aspects of minimisation of environmental damage in case of marine pollution, focussing on:

1. Monitoring
2. Assessment
3. Intervention techniques
4. Health and safety aspects (working with volunteers)

The Guidelines review past experiences and lessons learnt from experts working in the field of response to marine pollution. They cover the following main aspects:

- Identification of existing problems,
- Identification of solutions and best practices,
- Formulation of recommendations and identification of further actions

To provide a basis for the structured discussion and presentation of all relevant issues identified by the participants the following categories have been defined:

- Organisational
- Technical
- Procedural
- Legislative
- Communication
- Other

The participants could add categories, combine them if overlapping or leave them out depending on the issues identified.

In order to analyse the environmental impact of marine pollution at different scales the following definitions for the timeframe were made:

Short term

- **Hours to days**: when the accident has happened, reported until the leakage is stopped

Medium term

- **Weeks to month**: still physical-chemical presence of oil, until public awareness has died down

Long term

- **Years**: court case started, nor visible oil/chemicals anymore, fishing/tourism restarted, only chronic effects remain (scientific monitoring on ecosystem/population)

The final guidelines are available to the European Union, all member states and to the public. They represent a summary document compiled for the purpose of a practical approach. It is expected that the Guidelines thus represent a good basis for initiating further actions by the responsible authorities within the countries. Although generic in approach they could be easily adopted to more local use, e.g. they can serve as strategic document providing the necessary framework to encourage the development of more localised plans. Furthermore the guidelines or parts such as the matrix developed by the monitoring group can be used as basis for another training package or training course because structure and format could readily be adapted to a group or a situation.

3 Monitoring

Monitoring is an important tool to collect all relevant data and information in order to assess a situation including all influencing components. It is the basis for decision making, definition of measures and the evaluation of the effect of the measures applied, e.g. whether the implementation of a technique or a plan is achieving the desired outcome or whether assumptions that have been made during planning and responding were valid. The gained findings help to identify the need for necessary adjustments in terms of objectives to be reached, standards to be applied and desired or changing conditions.

The extend of monitoring and the range of available monitoring data vary widely within the European Union. Some countries have well established data bases and monitoring equipment while others are still in the developing process. As a consequence, there are neither international standards on monitoring procedures nor a unified data base available in Europe. Therefore, standardisation of available information and filling the information gaps is recognised as a key challenge for all countries in order to provide a basis for minimisation of environmental impact by marine pollution.

The following chapter aims at identifying the key problems with monitoring and provide possible solutions and recommendations.

3.1 Definition

Monitoring in general:

- Observation of a situation for any changes that may occur over time using measuring devices or systems
- Recording of focussed activities taking place

Incident monitoring in the field of marine pollution:

- Analysis of behaviour and fate of oil and other HNS in the environment
- Data collection systems connected to modelling systems (prediction of movement and fate of spills at sea)
- Also includes observation of effects of response activities
- Long term monitoring of the environment/ecosystem

Timely response to an oil spill requires rapid reconnaissance of the spill site to determine its exact location, extent of oil contamination and verifying predictions of the movement and fate of oil and slicks at sea.

Monitoring is closely linked to assessment (see chapter 4). When responding to marine pollution monitoring and assessment are conducted at several scales and for varying purposes, which require different techniques and tasks. Some examples are the collection of data to assess the ecological, economical, social impacts of a spill or the monitoring or implementation of response procedures in order to evaluate the effectively and adequacy of the applied method and the quality of the management.

Summarised marine pollution monitoring does have the following purposes:

- Instrument for definition of indicators (measurement of the concentration of contaminant in the environment)
- Important instrument for response planning
- Basis for assessment of environmental impact of an oil spill
- Basis for assessment of long time impact and success of response actions (clean-up, restoration)

In general monitoring should:

- Be purposeful and conducted to answer specific questions
- Be done at the appropriate spatial and temporal scale to answer the question
- Be done in collaboration with others (e.g. agencies, researchers) to share the workload (including obtaining data from other sources), gain expertise, and build-up networks
- Use the best available science and established protocols to collect and evaluate the data
- Use modern information management techniques and tools
- Apply stringent selection criteria so that a monitoring activity is only conducted if it is feasible, realistic and affordable

(Aspects modified according to http://www.fs.fed.us)

3.2 Monitoring techniques (spill monitoring)

Airborne oil spill monitoring

- (Satellite) Remote sensing: supplement aerial observations in vast polluted areas of open ocean and/or coastline, limited on land, restricted to good weather conditions (clear sky)
- Aerial surveillance: quick assessment of location and extend of oil contamination, verification of oil movement and fate prognoses at sea, tactical assistance; helicopter particularly over near-shore waters (flexibility)
- GPS and other positioning systems for pinpointing the spill location

- visual observation, still and video photography as basic documentation instruments (no positive detection mechanism !); inoperable in rain, fog, darkness, restricted when detecting thin oil layers, or at high seas; depending on experience of the observer, especially his ability to distinguish between the different appearances of oil floating on water and other phenomena (e.g. under water sea grass beds)
- different sensor systems for detection: e.g. infrared/ultraviolet line scanners, microwave radiometers, laser flourosensors, radar systems (e.g. Synthetic Aperture Radar SAR), multi – sensor systems
- new trends in sensing relative slick thickness

Waterborne analysis

- ships and platforms: chemical sensors as early warning system, shipborne radar

Example Projects: Maritime Spill Monitoring

- North Sea Monitoring System:
  Ocean monitoring system established and currently improved by scientific institutions and industries in Schleßwig-Holstein, co-founded by the federal state government Schleßwig-Holstein. Detailed current recording as basis for movement prediction in case of oil spill as one tool of the system.

International Research Projects

- CLEOPATRA (Chemical Effluent & Oil Pollution Alert and TRAcking): improved and enlarged the monitoring capabilities of the RAMSES system. A research and implementation effort was carried on in order to develop new oil-slick detection tools, to exploit the available operational earth observation platforms for Sea Surface Temperature (SST) estimation and ocean colors observations, to predict the pollutant fate by means of tailored meteo-wave-ocean forecast, up to address the dynamical model coupling problem.

- RAMSES (Regional earth observation Application for Mediterranean Sea Emergency Surveillance): a Thematic Earth observation application was built, for oil-spill detection and monitoring. It was web-based and it was demonstrated at a pre-operational level using ERS-SAR observations and forecast data by meteo-ocean models.

- VASCO (Value Added provision for Slicks and hazardous Cargoes Operational detection): was built on the RAMSES system. At the end of the project the fully operational capability of the upgrade system. At the end of the project the fully operational capability of the upgrade system was demonstrated with ERS observation, but it could process also RADARSAT and ENVISAT data.

3.3 Time frame of monitoring

In most cases monitoring is carried out dynamically and continuously at a time scale that exceeds the incident itself. It may have started prior to an incident, e.g. to get information about an environmentally sensitive area to model a baseline scenario and may be extended to years after the response activities have ended to assess the long-time impact. The implementation of monitoring is not limited to accidental marine pollution. It is also used to get information on deliberate marine pollution whereas it is carried out continuously or at least regularly. To describe a situation with all its components, usually a large amount of information is needed, which causes ample analysing activities. To keep monitoring effective it has to be carried out purposeful. In case of an accident many information on different levels and scales are gathered in rather short time during response. Long-time monitoring, in contrast, may be restricted to a few aspects and timing of data collection may be less compact.

3.4 Problems with monitoring

[Ideas developed by participants during the workshop "Minimisation of environmental damage in case of marine pollution", 11.-14.10.2006 in Bremen, Germany; edited by the organisers and the moderators of the workshop]

Data related & Technical issues:

- Intermediate data availability:
  - data are not transferred to the right people (e.g. aerial surveillance team → modelling team, forecast team)
- Databases:
  - individual databases are not integrated into a universal database or they can not easily be linked to other databases
  - databases do not exist at all for some areas
- Background levels/baseline data:
  - are not available at all
  - do have a low priority
  - are not taken seriously
  - there is no clear definition about what to monitor
- Equipment: monitoring equipment is
  - limited
  - not ready to use

Procedural issues:

- Methodologies (scientifically based):
  - need for further research on how to integrate data in general?
  - there are individual methodologies, which may not be suitable for integration
- Wildlife/species/protected wildlife monitoring:
  - must be based on scientific evidence
  - how to manage without pre-spill scenario ?
  - 'Doing nothing' is not usually an option given the intense media and public interest. However, the media needs to be kept adequately informed but without their very presence compromising the execution of the monitoring programme itself.

Communication related issues:

- Communication: need for an appropriate methodology/strategy on how to communicate
  - In-situ
  - with media
  - Scientifically
  - to the general public

3.5 Potential solutions and examples for Best Practices

[Ideas developed by participants during the workshop "Minimisation of environmental damage in case of marine pollution", 11.-14.10.2006 in Bremen, Germany; edited by the organisers and the moderators of the workshop]

Data related & Technical improvements:

- Immediate data availability:
  - provide appropriate data to modelling / at sea monitoring teams
  - transfer data from models back to onshore teams / on scene commanders
- EU data base:
  - establish, maintain and update an EU-wide database
- Background levels/baseline:
  - establish pre-spill monitoring
  - increase priority
- Equipment:
  - establish stockpile of equipment
  - test stockpile regularly

Procedural improvements:

- Methodologies (scientifically based):
  - Standardise monitoring methodologies and procedures
- Wildlife/species/protected wildlife monitoring:
  - The media can be used to mutual advantage by the provision of focussed briefings, appropriate presentation packs of information, and promise of reliable up-dates. There is an inherent responsibility in the element of selection (of material to be released) that is an inevitable consequence of satisfying a wide range of stakeholder interests. Formally issued statements need to be authoritative, clearly attributable, and honest.

Communications related improvements:

- train people on in-situ communication
- take control of media
- share knowledge scientifically and also for the general public

Financial improvements:

- Funding:
  - prioritise marine incident response
  - commit to long term funding

3.6 Recommendations and further actions

[Ideas developed by participants during the workshop "Minimisation of environmental damage in case of marine pollution", 11.-14.10.2006 in Bremen, Germany; edited by the organisers and the moderators of the workshop]

Data related & Technical issues:

- Immediate data availability should be enhanced by:
  - Exchange and access of data on appropriate scale (to the incident)
  - Use of National Plan as supporting instrument

To solve the problem of data transfer in terms of immediate data availability the establishment of an agreed method of data transfer is recommended.

- EU-wide data base:
  - Agreement on monitoring parameters and information technology
  - Check for integration of data into existing EU marine database

It is recommended to establish a database working group to set up, maintain an update an EU wide database for the benefit of all Member States.

- Background levels/baseline:
  - Implementation of ecological data into (human health) day to day activities by individual agencies founded by national government according to EU guidelines

Within 2 years a monitoring programme for ecological data should be established.

- Equipment:
  - Agreement on stockpile contents according to countries development of testing kit (physical/chemical parameters), that has to be settled and controlled through the National plan of the countries

Within 2 years an agreement on stockpile and kit of defined ports of the European Union should be established.

Procedural issues:

- Methodologies (scientifically based):
  - Agreement on methodologies used for monitoring between the EU countries

It is recommended to implement standard monitoring methods and procedures in all Member States under the leading role of the European Union.

- Wildlife/species/protected wildlife monitoring:
  - Preparation of a wildlife habitat monitoring plan by nature conservation agencies/the Ministry of Environment
  - Sensitivity maps to summarize sensitivity information as basis for accident response and management

The problem of wildlife monitoring and suitable actions to solve the problem should be discussed with appropriate working groups of the European Union, e.g. (Habitat, LIFE, BDC).

Communications related issues:

- Development of appropriate communication plans through the countries national plans
- Communication through EU website, which has to be established, maintained and updated by the European Union

Within 2 years communication plans should be established and agreed, which cover issues related to website, media, science and general public.

Financial issues:

- Provision of appropriate funding in terms of:
  - Permanent and periodic infrastructure of facilities and personnel. This includes both on-going research, 'blue-light' response activities, on-site operations and long-term data base building
  - Programme of training and education for official bodies, NGOs and volunteer organisations (where appropriate)
  - Storage, maintenance and mobilization of specialist equipment, substances and support logistics for monitoring programmes (as appropriate)
  - Access and availability of funding before, during and post incident
  - Adequate funds for duration of incident
  - Cost recovery and insurance

- *Example:* P&I club funding: National Agency funding, Local Authority initiatives, dedicated research projects, and collaborative links with sponsored or voluntary activities.

3.7 Summary of relevant aspects with regard to monitoring

	Activities	*Problems*	*Solutions / Best Practise Example*	*Actions*	*Responsibility*	*Recommendation*
Organisational	Intermediate data availability	✓ Transfer of data to the right people (aerial surveillance)	✓ Provide appropriate data to modelling / at sea monitoring teams ✓ Data from model to onshore teams / on scene commanders	✓ Establish communication pathways	✓ National Plan coordinated by EU	✓ Establish agreed methodology of data transfer
Technical	Equipment	✓ Limited / ready to use	✓ Establish stockpile of equipment including testing	✓ Agree on stockpile contents according to countries ✓ Development of testing kit (physical/ chemical parameter)	✓ National Plan	✓ Within 2 years establish agree on stockpile in agreed ports over EU + kit
	Background levels	✓ Not available ✓ Low priority ✓ Not taken seriously ✓ What to monitor	✓ Establish pre-spill monitoring ✓ Increase priority	✓ Implement ecological data into (human health) day to day activities	✓ Individual agencies funded by national government according to EU guidelines	✓ Within 2 years establish monitoring programmes for ecological data
Procedural	Methodologies (scientifically based)	✓ Integration of data ✓ Individual methodologies unable to integrate	✓ Standardise	✓ Agreement on methodologies	✓ EU countries	✓ EU leads on implementation of standard methods and procedures
	Wildlife / species / protected areas monitoring	✓ Media is leading, need to take control ✓ based on scientific evidence ✓ no pre-spill plans for monitoring wildlife available	✓ Feed the media the message you want to give	✓ Prepare plan for wildlife habitat monitoring / use sensitivity maps	✓ Nature Conservation Agencies / Ministry of Environment	✓ Bring the subject to the appropriate working group of EU
Communications related	communication	✓ In situ ✓ Media ✓ Scientifically ✓ general public	✓ train people ✓ Take control ✓ Share knowledge ✓ also for the general public	✓ Develop appropriate communication plans ✓ EU website	✓ National plan ✓ EU	✓ Establish an agreed communi-cation plan within 2 years covering web site, media, scien-tific, general public
Data	EU database	✓ Individual databases on national and EU level	✓ EU wide database	✓ Agree on parameters ✓ Agree on information technology	✓ Check for integration into existing EU marine database	✓ Establish a working group on database

Figure 1: Summary of relevant aspects with regard to monitoring

3.8 Conclusion

Many aspects that have been discussed refer to collecting and handling of monitoring data: Intermediate data availability requires international exchange and availability of data throughout the European Union. Ecological data should be given higher priority through monitoring programmes. Another key issue identified was communication, especially with media, which requires trained people and the use and control of media as one instrument to transport messages. In general it has been recommended to standardise monitoring methods and to enhance the quick availability of data through an EU-wide database.

3.9 Publications and guidelines (selection)

(All web sites have been last accessed on 09.02.2007)

Cabioc'h, F., Ed. Cedre, Centre of Documentation, Research and Experimentation on Accidental Water Pollution: *Containers and Packages lost at Sea* (2001). Operational Guide, Brest, France, http://www.cedre.fr/uk/publication/colis/colis.htm

Cedre, Centre of Documentation, Research and Experimentation on Accidental Water Pollution (Ed.): *Aerial Observation of Oil Pollution at Sea* (2004). Operational Guide, Brest, France, http://www.cedre.fr/uk/publication/aeri/aeri.htm

Cedre, Centre of Documentation, Research and Experimentation on Accidental Water Pollution (Ed.): *Surveying Sites Polluted by Oil* (2005). Operational Guide, Brest, France, http://www.cedre.fr/uk/publication/reco/reco.htm

Fingas, Mervin F., Brown, Carl E.: *Review of Oil Spill Sensing* (2000). Paper, Environmental Technology Centre, Ottawa, Ontario, Canada http://www.aip.com.au/amosc/papers/fingas_m.doc

Harsdorf, S., Janssen, M., Reuter, R.; Toeneboen, S.; Wachowicz, B.; Willkom, R.: *Submarine Lidar for Seafloor Inspection* (1999). IOP Publishing Ltd, UK http://www.iop.org/EJ/abstract/0957-0233/10/12/309

International Working Group on Aerial Surveillance: *Bonn Agreement Aerial Surveillance Handbook, 2004* (Version 2006). Bonn Agreement Accord de Bonn, London, European Union http://www.bonnagreement.org/eng/doc/Aerial Surveillance Handbook 2004 - English version.zip

International Working Group on Aerial *Surveillance: Co-operation on aerial surveillance over the North Sea*. Bonn Agreement Accord de Bonn, London, European Union http://www.bonnagreement.org/eng/html/aerial-surveillance/welcome.html

O'Sullivan, A. J., Jaques, T. G.: *Impact Reference System* (2001). Brussels, Belgium http://ec.europa.eu/environment/civil/pdfdocs/irsfinal_98.pdf

Pavlakis, P., Tarchi, D., Sieber, A. J., Ed. European Commission: *On the Monitoring of Illicit Vessel Discharges* (2001). European Communities, Italy http://ec.europa.eu/environment/civil/marin/reports_publications/jrc_illicit_study.pdf

Reuter, R.: *Nachweis von Chemikalien im Meer* (1999). University of Oldenburg, Institute of Physics, Oldenburg, Germany http://las.physik.uni-oldenburg.de/projekte/chemie2/chemikaliensensoren.pdf

Robbe, N., Hengstermann, T.,; Ed. WIT Wessex Institute: *Remote Sensing of Marine Oil Spills from Airborne Platforms using Multi-Sensor Systems* (2006). WIT Press http://library.witpress.com/pages/PaperInfo.asp?PaperID=16968

S. B. Mansor, H. Assilzadeh, H.M. Ibrahim, A. R. Mohamd: *Oil Spill Detection and Monitoring from Satellite Image*. University Putra Malaysia, Selangor, Malaysia http://www.gisdevelopment.net/application/miscellaneous/misc027pf.htm

Stevens, L.: *Rapid Guide for Oil Spill Monitoring*. Neslon, New Zealand http://www.amsa.gov.au/marine_environment_protection/National_plan/Environment_and_Scientific_Coordinators_Toolbox/Workshop_Proceedings/2004/Day1/rapid_guide_table.pdf

The National Oceanic and Atmospheric Administration (Ed.): *Aerial observations of oil at sea* (1996). HAZMAT Report 96-7, Seattle, Washington, USA http://response.restoration.noaa.gov/book_shelf/662_OilatSea.pdf

4 Assessment

Assessment is the analysis of data and information that have been collected by monitoring aiming at evaluating a project or a process with regard to defined criteria and its potential for improvement. It is a tool to determine how well objectives have been met and it provides the basis for the development of measures, standards or methods. Assessment (or evaluation) is close connected to monitoring. With the assessment results monitoring questions can be answered and the adequacy and adaptability of defined standards, methods or strategies can be determined. When responding to marine pollution monitoring and assessment are the basis for the decision making on the intervention technique to be implemented and the instrument to evaluate the success of the strategy chosen. Furthermore monitoring and assessment support the variability of procedures to changing situations or conditions by verifying the effectiveness of underlying plans or strategies.

In the following chapter main problems that arise when assessing the impact of accidental or deliberate marine pollution are discussed and ideas for solutions and recommendations are presented.

4.1 Definition

Environmental Assessment

A process that assesses and predicts the environmental impact of a proposal for example, a road scheme or new development - that is subject to a decision by a competent national authority. It identifies alternatives and presents its findings in such a way that decision-makers can be informed of what needs to be done. Environmental assessment is equally applicable to policy proposals. (definition of 'EcoPorts Foundation, 2006, Guidelines for the Self Diagnosis Methodology (SDM). www.ecoports.com)

- Assessment (also evaluation or estimation) of the environmental damage and the impact on the environment that a (marine) incident has.
- Here used in the context of evaluating the monitored data (and other information) after the incident (or damage) has occurred in preparation for decision making and intervention techniques. (Like finding out what the exact problem is, which in turn gives an idea of the possible strategies for solving it.)
- aspects to consider when assessing environmental impact: environmental sensitivity, economical and social factors

Pollution damage

- "…loss or damage caused outside the ship by contamination resulting from the escape or discharge of oil from the ship, wherever such escape or discharge may occur, provided that compensation for impairment of the environment other than loss of profit from such impairment shall be limited to costs of reasonable measures of reinstatement actually undertaken or to be undertaken."
  (definition of 1992 International Convention on Civil Liability for Oil Pollution Damage (1992 Civil Liability Convention) / 1992 International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (1992 Fund Convention))

4.2 Time frame of assessment

Depending on the scale of the provided monitoring data assessment does have different time frames. In general the following aspects for quick or short term and long term assessment can be distinguished:

- Short term:
  - organisational issues which provide the appropriate framework to support the quick response in case of an accident
  - administrative issues in terms of determination of protection priorities and provision of necessary information about the clean up in order to support advisory tasks
- Longer Term:
  - Measures to assure sustainability of assessment , assessment of long-term effects and cost recovery

4.3 Problems with assessment

[Ideas developed by participants during the workshop "Minimisation of environmental damage in case of marine pollution", 11.-14.10.2006 in Bremen, Germany; edited by the organisers and the moderators of the workshop]

Framework (organisation)

- Need for a clear definition of a procedure for the following aspects:
  - Communication
  - Rapid Response procedures
  - Responsibilities
  - Education: Training, Practice, Briefing, Qualifications (as appropriate)
  - Media liaison

Rapid Information Gathering

- Need for rapid information gathering on:
  - Pollutant
  - Type of accident, circumstances etc
  - Resources available for responding.
- Quick access to information is sometimes limited by I.T. infrastructure
- Lack of information about baseline due to insufficient availability and reliability of pre-spill data

Administrative issues / Information on clean-up

- Conflicting priorities often cause conflicting advise
- Lack of information on the consistency of the clean-up technique applied
- Indefinite advise/definition on end point of clean up process
- Need for a definition on the impact of the pollution in comparison to the clean-up effect
- Need for clear protocols on
  - clean up procedure
  - information transfer of clean up procedure
- Need for baseline data for further assessment

Critical evaluation of assessments and long term effects

- Need for record keeping
  - to evaluate the assessment
  - to assess long term effects of an accident
- Commitment – recognition of role and status of the assessment process
- Need for definition of termination status (When to stop actions?)

Cost recovery

- Conflicts that might arise between marine and terrestrial interests with regard to insurance and liability

4.4 Potential solutions and examples for Best Practices

Framework (organisation)

- Application of (statutory) framework planning
- Awareness of existing protocols[1] and contingency planning

Rapid Information Gathering

- Provision of necessary information through inventories
- Improve I.T. structure and support availability of data by unified databases

Administrative issues / Information on clean-up

- resource/sensitivity mapping to support the determination of protection priorities
- data and information should be drawn from an multi-agency integrated approach, i.e. on-site person in duty will get advice from integrated data base
- Establish a communication-infrastructure to transfer information on clean-up
- Provide guidance for clean-up operation and information transfer through clear protocols
- Prioritise further monitoring to get information on baseline data, consistency and endpoint of an operation
- Application of criteria-based choices

Critical evaluation of assessments and long term effects

- Definition of acceptable level of impact
- Restorations

Cost recovery

- *Example:* P+I / ITOPF as institutions that could help solving conflicts with regard to insurance or liability. It is important that existing cost recovery opportunities are clearly defined in the context of the legislative and regulatory regime of a particular geographical location prior to any incident and the execution of a particular assessment programme. This would help to avoid misunderstandings that may arise during the high intensity atmosphere of the incident itself and reduce the chance of costly litigation post-event.

[1] Protocols: agreed procedure in form of log books, records of activities

4.5 Recommendations and further actions

Framework (organisation)

- The framework planning for environmental assessment should be integrated into the national contingency planning
- All national plans and activities should be integrated and coordinated on an international level
- Provide education/training on adequate assessment strategies as significant components of an integrated strategy
- Identification of lessons learned from previous incidents

Rapid Information Gathering

- Rapid information gathering should be supported by data access protocols
- Enforcement of MARPOL obligations[2]

Administrative issues / Information on clean-up

- Establish pre-spill agreements on protection priorities
- Include risk assessment
- Define decision-making protocols as part of the procedure as they can serve as a useful tool for the identification of lessons learned from previous incidents (e.g. Sea Empress)

Critical evaluation of assessments and long term effects

- Use forecasting and risk assessment as tools for the assessment of long term effects

Cost recovery

- To prevent conflicts between parties involved provide
    - Information/Agreements on insurance and liability
    - Identification of the responsible polluter for the recovering of costs
    - Record keeping to support auditing and tracing of decisions

[2] Since many marine industries and sectors are demanding “a level playing field” in terms of the application and enforcement of international resolutions and legislation there is an increasing expression from a wide range of marine operators for equitable enforcement of MARPOL standards.

4.6 Assessment - Matrix

The findings of the assessment group have been compiled in form of a matrix, which vividly summarises the different aspects that have been discussed (Figure 2). Following the different boxes solutions and measures can be identified for a specific problem. Furthermore links between different activities and their interdependence can be derived. One example: *Conflicting priorities may cause conflicting advice. By integrating all involved agencies as advising committee to perform risk assessment and to set up pre-spill agreements protection priorities can be determined. This integrated approach will also support a unified database that increases the availability and reliability of necessary information.* The matrix summarizes the aspects outlined in the previous chapters and thus can be used as quick-access tool.

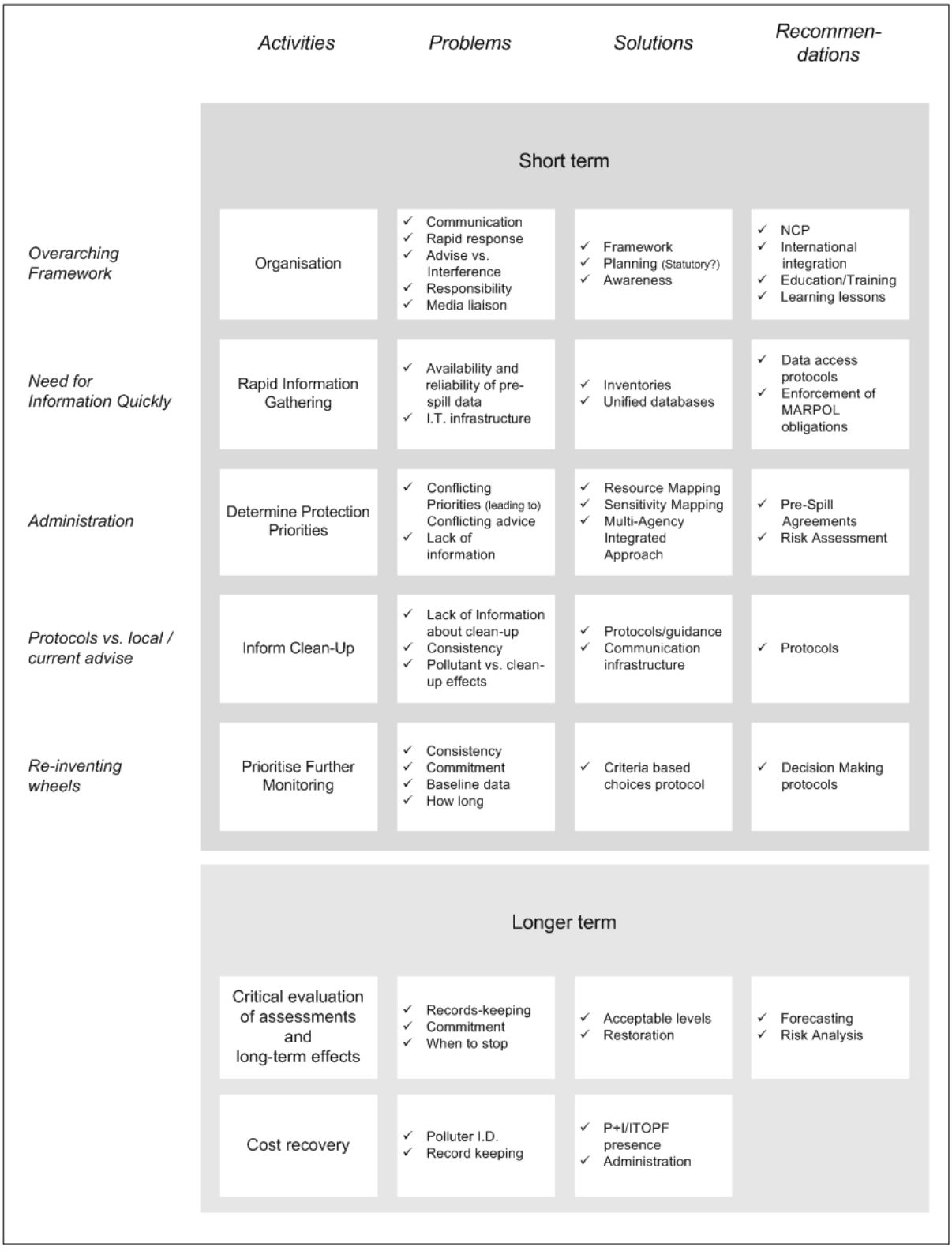

Figure 2: Matrix summarizing relevant aspects of assessment

4.7 Conclusion

Availability and reliability of information especially of pre-spill data have been identified as key issue when assessing the impact of marine pollution. For quick access to information data should be available in form of baseline data and inventories that are collected in unified databases. In order to carry out clean up operations the procedure as well as protection priorities have to be clearly defined, which could be successfully done by an advisory committee. The analysis of previous incidents can provide valuable information especially about achievable end points of clean-up operations. Longer term issues relate to the assessment of long-terms effects, which should involve risk analysis as well as forecast.

4.8 Publications

All publications with regard to assessment have been listed with the monitoring section in chapter 3.8.

5 Intervention Techniques

Based on the information that is gained from monitoring and assessment of a particular situation the strategy of response in general and all necessary actions in order to minimise the environmental impact are defined. Adequacy and efficiency of intervention strongly relies on the equipment available. The intervention techniques used within the European Union still differ widely from country to country. Some countries are well equipped and have been developed effective response strategies that also comprise best practise examples from past lessons learned. Other countries are still in the process of developing adequate plans. Therefore it is a vital task to further utilise already existing know-how and best practice for the definition of international standards and adequate equipment for response to marine pollution.

The following chapter aims at providing an overview about the state of the art of intervention techniques, the identification of problems and the formulation of possible solutions. Based in the identification of best practise examples recommendations for further implementation are formulated.

5.1 Definition

Intervention techniques in general

- Intervention in general: Actions in order to minimise environmental impact of an spill after accident
- Given the assessment of environmental damage, intervention techniques are used to make decisions about and then go through with the necessary actions.
- The intervention techniques (where to intervene means to prevent or alter the result or course of events) or response strategies (where response means the instance of responding; answer or reaction) include the tools (techniques) and the plan (strategies) for the actions that need to be taken. (After finding the exact problem a plan is made which gives the order of what to do and when and which resources are required.)
- Environmental benefit analysis (balancing environmental sensitivities against socio-economic factors) as instrument to determine the most appropriate technique.

Classification of Intervention techniques

- **Monitoring:** knowledge of type of oil and predictions of probable movement, behaviour and fate, necessary basis for development of response strategies Response is sometimes limited to monitoring (e.g. light crude oil spill, severe weather conditions)

- **Containment and recovery:** floating booms to contain and concentrate floating oil using specialised skimmers; effectiveness supported in sheltered coastal areas or in case of on-going release from the source, effectiveness often limited on open sea by rapid spread, fragment and disperse of oil as well as sea conditions (wind, waves and currents)

- **Chemical dispersants:** enhance natural dispersion in order to limit impact of oil on coastline/sea birds, effectiveness limited by natural weathering of the oil, applicability limited with some types of oil, e.g. heavy fuel oil; use of dispersants restricted in many countries due to concerns about biological damage caused by the dispersed oil droplets

- **In-situ burning:** containment and concentration of floating oil in fire-resistant booms, positive effects result from overcoming of oil pumping and storing; serious limitations: restrictions by thickness of oil able to burn and ignition, potential long-term-impacts resulting from sinking residues from burning, other concerns regarding health and safety aspects result from burning close to shore and fall-out from the smoke plume

- **Others,** whose applicability is restricted to particular circumstances: sinking agents, chemicals that solidify oil, bacteria and nutrients to enhance natural biodegradation

- **Protection techniques:** booming of sensitive coastal areas, temporary fencing (on shore) to prevent animal movement into contaminated sites/water, configuration of protection equipment, e.g. removal of accumulated oil

- **Shoreline cleanup**: removal of *concentrated oil on water* with combination of specialised booms, skimmers and locally available resources (vacuum trucks, suction devices), removal of *immobilised oil on shorelines* by combination of cleanup techniques based on locally available equipment and manpower (e.g. front-end loaders, road-graders, sieving, flushing with sea water, harrowing), less specialised equipment, more intensive techniques, such as high pressure water washing, necessary for *hardly accessible oil* (penetrated into rocky or gravel ground), for sensitive or rocky shorelines it might be most appropriate to leave oil to natural processes

- **Evaluation** of clean up activities in order to ensure their applicability

5.2 Time frame of intervention techniques

The time frame of intervention techniques strongly depends on the decision making period. Usually the time frame for an operation is limited and controlled by dynamics of prevailing and dominant conditions, e.g. wind, water or tidal dynamics. The time frame will therefore be different for different operations. Recovery and clean-up operations are of a definite time span due to applicability an availability of equipment.

5.3 Problems with intervention techniques

Organisational

- Deployment: need for appropriate method for quick response
- Preparedness: need for appropriate equipment, personnel, finances (which is often lacking)
- Command and control: need for definition of responsibilities (Who does what?)
- Adaptability: need for appropriate method to adapt in changing situations
- End of operation: need for definition of clean-up level at that the operation can be stopped (How clean is clean?)

Technical

- Equipment: risk of insufficient equipment in terms of
  - availability of equipment
  - adequacy / effectiveness of equipment
- Waste: need for appropriate methods for waste management
- Continuity of operations: availability and use of back-up capacities

Procedural

- Decision making:
  - need for appropriate decisions quickly (i.e. best possible decision in shortest time)
  - need for definition of priorities

Legislative

- Competency: need for clear definition of responsibilities, rights and duties with regard to
  - management of legal conflicts
  - guidance to ship

Communications related

- Media: risk of broadcasting incorrect information

Educational

- Limited knowledge or experiences on use (and possible impact) of equipment and associated recovery substances

5.4 Solutions and examples of Best Practices

Organisational

- Deployment:
  - Choose strategic locations (that are optimally equipped with an intervention container) as base for intervention activities
  - Organise and secure all kinds of transport needed (e.g. staff, medical, waste, equipment)
  - Define priority areas for response actions with regard to organisational, procedural and technical aspects
- Preparedness:
  - Installation of stockpiles for equipment
  - Definition of procedures and implementation of trainings for personnel
  - Political support (financial) for measures to support preparedness
- Command and Control:
  - Definition of procedures (check-list)
  - Establishment of a command and control centre on scene with communications
- Adaptability: Reassessment and feedback to adapt procedures to changing situations

Technical

- Back-up equipment as key intervention capacity, therefore:
  - Installation of minimum stockpile at strategic locations for quick availability of equipment
  - Stockpile of various equipment according to different techniques so that response can be adequate and effective
- Waste: include pre-planning of waste management (e.g. storage, transport, removal) as part of strategic plan
- Provide basis for continuity of operation in terms of:
  - Provision of back-up equipment
  - External assistance

Procedural

- Decision making:
  - application of predetermined procedures, which include predefined priorities (most environmental benefit)
  - enable responsible persons to make decisions on-site
  - no financial restriction for initial response

Legislative

- Competency:
  - Provision of an legal advisor on scene to prevent legal conflicts
  - Establishment of laws and regulations for guidance to ship

Public relations and communications

- Select the appropriate media for information (e.g. briefings/press conference)
- Media training of agencies and representatives involved
- Regular updated information on progress

Educational

- Training, Practice and Briefing as basis for adequate application of equipment (see footnote 5 on page 39)

5.5 Recommendations and further actions

Organisational[3]

- Maintain and/or further improve preparedness by:
  - Provision of continuous access and availability of equipment on site
  - Adequate qualification and availability of personnel
  - Political support in terms of permission to proceed
- Command and Control:
  - Check protocols for procedures
  - Flexibility built into the procedure
  - Command and Control Centre: implement, test, commission
- Adaptability: review procedures built into plan
- End of operation:
  - definition of target conditions as criteria for end of operation
  - re-assessment
- Develop a strategy for maintaining, updating, improving response capacity

Technical

- Equipment:
  - Standing conditions check
  - Decision making criteria check
  - Regular update of quality and quantity of equipment
  - Regular check of adequacy of equipment, upgrade if necessary
- Waste: pre-arranged storage, removal…
- Continuity of operation: sustainability of assets/resonances

Procedural

- Decision making:
  - Confirm protocol
  - Confirm change of command
  - Deploy all relevant means

[3] With regard to adequate and quick response there will be considerable overlaps and linkage between local, regional and national actions throughout an event. This highlights the significance of chain of command, official protocols and designated responsibilities.

Legislative

- Provide basis for competency on different levels
  - implementation of legislation and safety procedures
  - confirm status designated personnel

Communications related[4]

- Media:
  - Prioritise fast and complete information
  - Relevant decisions with regard to correct form of information refer to form of media, form of outlet and authorized spokesmen
  - Preventive media training, e.g. before the incident; to include media training in combating exercises might be an appropriate approach

Educational

- consider options for gaining experience during event
- regularly training/exercises with equipment

Other recommendations (that have not been assigned to any category)

- "Pool of knowledge": on the basis of lessons learned provide response standards and involved environmental issues as well as information on selected aspects, e.g. on environmental impact of use of dispersants, to other countries (that might be less experienced),
- Natural clean-up vs. technical clean-up:
  - Encouraging the "do-nothing" option
  - monitor natural clean-up
- Early Warning: appropriate communication paths and data transfer methods on an international level as basis for quick response in order to minimise the impact of an accident

[4] Communication with media is increasingly important but should not compromise response plan.

5.6 Conclusion

The complex topic of intervention techniques has been discussed with regard to a number of issues ranging from quick response to public relations. As a matter of preparedness adequacy and availability of equipment based on strategic locations as well as trained personnel and political support have been identified as key issues. Reassessment, flexibility and feedback are important tools to adapt an operation or a strategy to changing situations or varying conditions. Quick and adequate response can be supported by predetermined procedures on one hand but also by authorizing the person responsible to decide on scene. The recurring problem of correct information of the public through the media could be solved by media training of the person responsible or by employing an authorized spokesman.

5.7 Publications and guidelines (selection)

(All web sites have been last accessed on 09.02.2007)

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European Maritime Safety Agency (Ed.): *Action Plan for Oil Pollution Preparedness and Response* (2004). Brussels, Belgium http://www.emsa.eu.int/Docs/other/action%20plan.pdf

Experts Working Group: IMO, REMPEC, UNEP, UNEP-MAP, UNDP, OCHA, EC MIC, ITOPF, ICRAM, CEDRE: *Lebanon Marine and Coastal Oil Pollution International Assistance Action Plan* (2006).
http://www.unep.org/PDF/lebanon/LebanonOilSpill_ActionPlan20060825.pdf

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http://www.ipieca.org/downloads/oil_spill/oilspill_reports/Vol13_OiledWildlife.pdf

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http://www.ipieca.org/downloads/oil_spill/oilspill_reports/English/Vol10_NEBA_670.47KB.pdf

Merlin, Francois Xavier (Ed.), Cedre (Centre of Documentation, Research and Experimentation on Accidental Water Pollution): *Using Dispersant to Treat Oil Slicks at Sea* (2005). Response Manual, Brest, France
http://www.cedre.fr/uk/publication/dispersant/disp.htm

Moller, Dr. T. H.: *Recovery of Sunken Oil in the Sea of Marmara*. The International Tanker Owners Pollution Federation Ltd., London, UK http://www.itopf.com/recovery.pdf

Participations of the 14th Ordinary Meeting of the Contracting parties to the Protection of the Marine Environment and the Costal Region of the Mediterranean and its Protocols in Portoroz in Slovenia: *Regional Strategy for Prevention of and Response to marine Pollution from Ships* (2005). Mediterranean Action Plan, REMPEC, Malta http://www.rempec.org/admin/upload/publications/IG.16-10-Regional%20Strategy%20(E).pdf

6 Health and safety aspects (when working with volunteers)

Health and Safety aspects when responding to marine pollution, particularly with regard to working with volunteers, is an area which has not been considered sufficiently in the past. The risk for volunteers, especially if they are involved in great numbers, insufficiently trained or supervised, is considered very high.

In the following chapter problems that arise will be identified and important health and safety issues that have to be considered, especially when working with volunteers will be summarized.

6.1 Definitions

Health and Safety aspects (with regard to marine pollution)

- prevention of harm to humans originating from response activities
- varying safety management methods in different countries

Human health and safety should have the highest priority when responding to a spill. Health and safety aspects should be taken into account at every stage of planning and organisation. Special attention should be paid to voluntary responders because they may be inexperienced and untrained for clean up activities after a spill. Due regard should be paid to compliance with existing legislation.

Potential hazards:

- Working environment including varying terrestrial and see conditions
- Weather and climate conditions, the equipment and the machinery
- Exposure to the toxic spill by ingestion, injection but primary by skin contact and inhalation of the vapours
- Possibility of explosions, fires and the absence of oxygen

Points to consider when assessing the risk for the spill responder:

- The spill itself and its toxicity, explosion risk, flammability and its tendency to evaporate
- Identification of contaminated/decontaminated areas and distribution paths
- Risks that rise from the clean-up equipment and machines
- External conditions such as temperature, climate and available daylight

Health impact classification:

- Direct physical e.g. injury or illness, plus potential of fatigue and stress
- Short term impacts and acute diseases as consequence of high doses of a chemical or of an accident, typically immediate symptoms
- Long term impacts and chronic diseases as consequence of exposure to small doses of a chemical for a longer time, typically delayed symptoms

Health and Safety requirements

- Personal protective clothing and equipment, such as boots, lightweight overalls, gloves, respirators, life vests (when operation on water)
- Arrangements regarding decontamination, food and accommodation for responders
- Rest and relief periods

6.2 Definition of persons involved

[Ideas developed by participants during the workshop "Minimisation of environmental damage in case of marine pollution", 11.-14.10.2006 in Bremen, Germany; edited by the organisers and the moderators of the workshop]

Health and safety officer

- Role and Tasks:
  - Assessment of immediate risks
  - Coordination with the regulars
  - Provide definition of volunteers
  - Ensure medical fitness of volunteers.
  - Establish communication with team leaders (e.g. mobile phones in case of not an explosive atmosphere, or other intrinsically safe communication devices)
  - Definition and control of reasonable working hours and rest times

Team leader

- Role: keep a close eye on his team (e.g. watching for health problems)
- necessary information to be known and transferred
  - Name
  - Mobile phone
  - Assigned area
  - Assigned number of team members (e.g. +6)
  - Work roster (e.g.: left at…, back at…, still out)
  - Which teams are back and which are still out (major H&S issue)
  - Responsibilities of team leader in relation to H&S

- control of reasonable working hours and rest times

Personnel

- Regulars: members of staff, employed for such purpose on a full-time basis
- Volunteers: members of staff, who are usually not paid for their work[5]

Best Practice Example Volunteers

Italy: as volunteers are considered all those not in military service, even if paid.

6.3 Time frame of health and safety issues when responding to marine pollution

[Ideas developed by participants during the workshop "Minimisation of environmental damage in case of marine pollution", 11.-14.10.2006 in Bremen, Germany; edited by the organisers and the moderators of the workshop]

Identification of immediate actions to be implemented

- Appointment of an Health and Safety Officer (H&S officer)
- Performance of risk analysis/assessment: identification of hazards in order to prescribe necessary personal protection equipment/clothes (PPE/C)
- Establishment of a first-aid station (in case of an accident during the incident)
- Set up of medical officer(s)
- Alerting and preparation of closest hospital(s) and helicopter(s) or any other necessary air- or sea-born assets for transferring injured personnel
- Restrict access to the spill site
- Provision of safety gear for all persons involved
- Establishment of a stock house (not necessarily next door)
- Train volunteers to be instructed in safety matters ('proper instructional briefing' instead of 'training')
- Production of accurate list of persons involved (full details plus immediate communication capability)

[5] Definition provided in *"Guidelines on minimisation of environmental damage in case of oil spills with regard to Role of NGOs, Access to environmental expertise, Information available on environmental sensitivity"*. The Guidelines have been produced during the Workshop "Minimisation of environmental damage in case of oil spills", carried out in September 2005 in Bremen, Germany.
Sometimes the terms Volunteer and NGO (Non-Governmental Organisation) are mixed up in discussions. NGO and volunteers are not synonymous. Often many people working for NGOs are volunteers. But NGO staff also can consist of paid staff, e.g. experts or staff for administration. On the other hand not all volunteers belong to NGOs. For example many private persons offer to volunteer in oil spill response, without being a member of an organisation.

Medium-term issues

- Management of people on site
  - Daily briefing to all personnel on the field
  - Staff / volunteer declarations completed
  - medical follow-up studies
- Preservation of measures put in place in the short term, until the final demobilization of personnel and equipment
- Medical officer(s) to assess and monitor the medical conditions (from purely emergency status to partly 'routine' tasks, e.g. checks)
- Medical profile of both regulars and volunteers (check-ups of different levels, medical conditions, interviews)
- Maintain communication with each of the teams on health issues
- Check on resources of backup equipment (as most of it has to be changed e.g. every 4-5 hours).
- Continuous monitoring of accident scene (hazards may be changing due to weather changes, as wind / tide / current / waves may change; reliable and accurate short-term weather information)

Long-term (future) issues

- Evaluation of lessons learned to review the response plan
- Medical follow-ups and counseling
- Checking on chronic illnesses

6.4 Review of lessons learned and best practise examples: Health and safety issues to consider when responding to marine pollution

[Ideas developed by participants during the workshop "Minimisation of environmental damage in case of marine pollution", 11.-14.10.2006 in Bremen, Germany; edited by the organisers and the moderators of the workshop]

Contingency plan

- A contingency plan has to be in place already and periodically reviewed
- Feedback to the plan from the current incident from now on (e.g. number of masks foreseen vs. used)

Hazards – risk analysis

- Identification of all hazards:
  - not only related to the spilled material but also to the necessary working conditions (e.g. working from boats, bulldozers, on slippery rocks)
- Any equipment used (communications, e.g. mobiles, or other) has to be safe for the particular type of environment in the spill site

Sampling

- Establishment an (e.g. in-situ, portable) laboratory as one of the first things to be done
- Results are immediately necessary to the safety officer in order to:
  - Know the dangers
  - Identify the equipment required for the different teams, especially if they work at the sea

Laboratory

- Content of Laboratory: appropriate for monitoring and safety warnings of the prevailing environmental conditions
- Main issue: Immediate availability to the H&S officer and immediate use
- Question: How, where, who will provide the information.
- Consideration of lessons learned from past incidents (e.g. Exxon Valdez)

Best Practice Examples Laboratory

- **Malta:** Civil Protection Department and Environment Authority (warnings issued by the Health Department)
- **Germany:** Specialists are available in the fire brigade; industry also provides support provided the spilled stuff is known
- **Greece:** Hellenic Coast Guard plus backup expertise
- **Ireland:** Fire brigade plus backup expertise
- **Hungary:** Environmental and water authority

- Analysis: Do we need a special H&S team and laboratory?

Restricted access to spill site

- Prevent public from entering spill site
- Establish Work rosters (working hours, rest time, etc)

Volunteer management

- Formation of teams lead by a regular team leader
- Get declaration and medical profile
- Control that all personal protection cloths distributed is used
- Entry of volunteers on-site only if needed (no need for surplus or redundant people on-site)
- Team size: Some examples of rules of thumb:
  - e.g. Sandy beach: Relatively big
  - Dependant on climatic conditions
  - General overall availability of people
  - Kind of work needed (e.g. with trucks or bulldozers you only need drivers)
  - Skills needed and offered (drivers, mechanics, maritimers for boats, etc.)
- Volunteers need to understand also the risks involved (duty of care) → instruction in safety matters
- Volunteers who are approved to be involved should be adequately trained, briefed and experienced

Education

- Can also be done on a team-by-team basis by the team leader
- Inventory of people plus declaration that they do not suffer from acute diseases

Backup and support

- Adequate nutrition (food and water)
- Rest areas (option of a safe place within close walking distance after decontamination)
- Ambulances
- Rescue officers
- Fire truck

Decontamination center

- Control of hygiene and safety
- Definition of status of decontamination: people need to be decontaminated before they leave the site
- If not well run, decontamination area is a possible infection and pollution area
- Minimisation of waiting lines and time.

6.5 Recommendations and further actions

Training[6]

- Training has emerged as a critical component of the preparedness plan in terms of producing qualified personnel and programs of practice to retain and sustain competence
  - Periodical and sometimes frequent training is fundamental for Regulars
  - Volunteers who are approved to be involved should be adequately educated, trained and briefed

Health and Safety

- Enforcement of standing regulations

Backup equipment

- Resume of lessons learned from of past incidents with regard to:
  - Use, amount and type of personal protection equipment (PPE)
  - Maintenance of PPE and backup equipment
  - Availability and Applicability of equipment from other countries (agreements)
  - Disposable vs. reusable equipment.
  - Hygienic criteria (all clothing is to be disposed off)
  - Stockpiling of equipment
  - Agreements with suppliers and manufacturers

Financial support

[6] Training in context of qualifying activities in terms of preparedness:

- **Training** may be designed as a focussed and structured period of interaction in a particular activity or use of equipment prior to the person being deployed.
- **Practice** is the period available for experience and demonstration of competence in that particular activity.
- **Briefing** is the focused exploration of the scenario or conditions in which the operator is to perform including strategy, procedure and standard operating procedures.

Example:

- Training in use of e.g. high-pressure hose
- Practice in deployment, use, H&S issues
- Briefing on location, pattern of use, other activities

- Availability of funds for training, claims, insurance, looking after people found to suffer from exposure

6.6 Conclusion

Risk assessment and the set up and compliance control of Health & Safety procedures have been identified as important aspects in response to marine pollution, which require clear definition of responsibilities and tasks of all persons involved. From the analysis of past incidents conclusions with regard to use, amount and type of personal protection equipment can be drawn. Special attention should be paid to the compliance of established working rosters in connection with reliable backup and to the medical checking (on site and long-term) of the workers. For adequate reaction and competence different kind of preparation, such as education, training (i.e. practice) and briefing are necessary. This is especially important if Volunteers are involved, because their knowledge on and experience with the use of personal protection equipment, health risk but also on the handling of equipment might be limited.

6.7 Publications and guidelines (selection)

(All web sites have been last accessed on 09.02.2007)

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