RECOMMENDATIONS/ CONSIDERATIONS REQUIRED TO SETUP AN EFFECTIVE SYSTEM FOR PUBLIC HEALTH MANAGEMENT OF MARITIME SHORELINE INCIDENTS

Justification

This checklist focuses on the public health management of maritime incidents involving hazardous and noxious substances (HNS) and oils. Events that reach the shoreline have potentially greater impact on the health of the population, the environment, marine life and the economy.

The most effective way of reducing risks posed by such incidents is to implement rapid response. Prior planning and preparedness facilitates timely response, thereby mitigating or preventing public health consequences. A successful management process requires co-ordination among international, national, regional and local structures. Appropriately trained and practised response staff will add to the capacity and resilience and aids successful outcome.

Requirements:

International:

At an international level consideration should be given to:

- Formal recognition of global legislation, policies and conventions
  - ✓ Establishing links with international organizations (IMO, ITOPF EMSA etc.) and conventions (MARPOL, OPRC HNS)
- Contribution to international HNS and oil data registeries.
- Contribution to international collaboration i.e. information exchange, joint exercising and research and development (e.g.ARCOPOL, REMPEC, OSPRAG etc.).
- Seeking agreements with surrounding/neighbouring countries regarding emergency planning preparedness and response, including facilities for mutual aid.

National:

To ensure effective public health management of maritime incidents, the following actions should be considered at national level:

- Identification of a responsible government individual or department to ensure a co-ordinated and integrated approach to strategic management.
- Establishing inter-departmental collaboration with various departments as a part of a co-ordinated and integrated approach to the strategic public health management of spills.
- Developing a national contingency management policy.
- Developing legislation and regulation for operations such as:-
  - ✓ bulk storage,
  - ✓ transportation,
  - ✓ handling

- ✓ Ship to ship transfer.
- ✓ Waste disposal.

- Establishing national structures for key functions such as:-
  - ✓ Command and control
  - ✓ National surveillance and data collection.
  - ✓ Environmental and marine monitoring.
  - ✓ Emergency helpline /emergency contact systems.
  - ✓ Training and exercise systems.
  - ✓ Resourcing.
  - ✓ Inter-agency and public communication.

Local / Regional level:
At the local / Regional level consideration should be given to:

- An up to date regional / localintegrated multi-agency emergency management structure
- Sufficient capacity and resilience for addressing risks identified, including where necessary, risk prioritisation and review mechanisms.
- 24/7/365 access to skills, expertise and resources for local professionals involved.
- Robust, tested and resilient channels of communication with the key stakeholders at national, regional and local level including:-
  - ✓ National regional bodies.
  - ✓ Marine agencies (Coastguard, Port Authorities).
  - ✓ Operators
  - ✓ Emergency services.
  - ✓ Public Health and medical agencies
  - ✓ Media organisations.
  - ✓ Environmental agencies.
  - ✓ Food Standards agencies.
  - ✓ Public stakeholders
- Review and update mechanisms

Further Information Sources

ARCOPOL Project Information - www.**arcopol**.eu/
IMO (Legislation) – http://www.imo.org/About/Conventions/ListOfConventions/Pages/Default.aspx
EMSA – http://www.emsa.europa.eu/
WHO – Chemical incident response guide –
http://www.who.int/environmental_health_emergencies/publications/Manual_Chemical_Incidents/en/

SHORELINE RESPONSE INCIDENT PLAN

Justification

Maritime releases and spills of HNS and oils may lead to a negative or harmful impact on the environment, community and marine life. In order to respond effectively to such events and their potential for shoreline impact, a suitable pre-prepared incident plan should be produced and made available to all responding authorities. The following elements should be considered in this process:

1- Roles and Responsibilities

- Who, when and how to respond
- Clear management structures
- Defined and agreed roles and responsibilities
- Contact details (24/7, 365)

2- Assessment and Decision Making

- Measures for assessment and decision making.
  - ✓ Risk assessment of possible scenarios and prioritisation.
  - ✓ Risk communication / public awareness.
  - ✓ Countermeasures (including resources and training).
- Legislation and agreements such as MARPOL, OPRC HNS, National Contingency Plans

3-Implementation

Arrangements to respond to an incident in a timely and effective manner with consideration of:

- Established detection and alert mechanisms.
- Defined timeframes for response and reporting
- Defined and agreed interagency relationships and resources in respect of:
  - ✓ Response
  - ✓ Monitoring
  - ✓ Communications
  - ✓ Waste
  - ✓ Recovery
  - ✓ Follow up
- Availability of national and international databases to gather information.
  - ✓ Should be integrated and regularly updated.

4- Assessment and Review

- Appropriate training and exercises.
- Audit against Performance standards
- Incorporation of past incident and exercise outcomes

Further Information

IMO Manual on Chemical Pollution 1999 Section 1 http://www.imo.org/Pages/home.aspx
WHO – Chemical incident response guide –
http://www.who.int/environmental_health_emergencies/publications/Manual_Chemical_Incidents/en/

TOXICOLOGICAL DATA SHEET

Justification

Toxicological properties of HNS and oil should be fully understood in order to assess the impact on the environment and population/community. Datasheets should be compiled as a part of planning and preparedness phase.

Datasheets should include information regarding:

- Volumes/amounts of chemicals synthesised, utilised, stored and transported.
- The hazardous properties of a given chemical or family of chemicals
- The risk posed to the environment and health.
- Reactivity with environmental media and other chemicals.

Considerations

The following aspects need to be considered when constructing toxicological datasheets:

- ✓ Risk-prioritised
- ✓ Timely Availability and accessibility to all key stakeholders
- ✓ Based upon best-available evidence (and/or expert consensus opinion if appropriate)
- ✓ Regularly updated
- ✓ Targeted towards health care and allied professionals
- ✓ Summaries for public consumption and responders

The following key aspects need to be covered:

- ✓ Chemical and hazard identification and synonyms, formula
- ✓ Physico-Chemical properties (Solid, liquid, gas, solubility, volatility, reactivity, density)
- ✓ Fire Hazards (Flammability, combustion products, how to put it out, monitoring and personal protection)
- ✓ Health hazards and routes of exposure (Inhalation, ingestion, dermal contact, acute and chronic health effects such as neurological, cardiovascular, respiratory, immunological, haematological, reproductive and developmental, carcinogenicity, biomarkers of exposure and effect).
- ✓ Environmental hazards (Storage and carriage, environmental contamination (air, water, soil, food) persistence, degradation and fate).
- ✓ Emergency Contacts (Details of responsible agency or authority of substantial incidents)
- ✓ Incident management:
  - ➢ Decontamination and first aid
  - ➢ Personal protective equipment requirements.
  - ➢ Exposure limitation

- Spread prevention.
- Monitoring and modelling methods
- Decontamination requirements
- First aid response.
- Fatality management.
- Management/Disposal of Wastes and personal possessions.

✓ Technical data on:

- Health-based toxicity values (such as tolerable daily intake (TDI), minimum risk levels (MRLs) or Reference Dose (RfD); threshold or non-threshold via ingestion, inhalation or dermal contact – typically mg/kg body weight/day).
- Published emergency response guidelines.
  - Emergency response planning guidelines (ERPG) values.
  - Acute exposure guidelines levels (AEGLs).
  - Occupational exposure standards and guidelines.
  - Legislative environmental / public health standards
  - Public health follow-up biomarkers

Further Information Sources

ARCOPOL Project Information - www.arcopol.eu/
EMSA – http://www.emsa.europa.eu/
REMPEC http://www.rempec.org/tools.asp?theIDS=2_70&theName=Tools&daChk=1
HPA - http://www.hpa.org.uk/Topics/ChemicalsAndPoisons/CompendiumOfChemicalHazards/
WHO – Chemical incident response guide –
http://www.who.int/environmental_health_emergencies/publications/Manual_Chemical_Incidents/en/

STANDARD OPERATING PROCEDURES (SOPs)

Justification

Standard operating procedures (SOPs) are detailed and written instructions that provide the basis for a uniform performance in responding to a given function, in this case HNS and oil spills at shoreline. They inform the user as to how to respond; standards are rules, definitions or benchmarks. They reflect best available evidence and/or consensus expert opinion.

Considerations:

- Standard operating procedures should:
  - ✓ Provide detailed instruction on key aspects of emergency planning, preparedness and response.
  - ✓ Reflect current practice.
  - ✓ Reflect consensus opinion.
  - ✓ Reflect the agreed roles and responsibilities of the organisation.
  - ✓ Compliment the functions, roles and responsibilities of other organisations.
  - ✓ Be reviewed and tested regularly.
  - ✓ Be the subject of audit.
  - ✓ Be readily available during an emergency.
  - ✓ Be familiar to those responding to an emergency.
  - ✓ Be updated following incidents, exercises and other training.
  - ✓ Reflect performance standards.

- Standards should
  - ✓ Define performance for key aspects of planning, preparedness and response.
  - ✓ Reflect best available evidence and/or expert consensus opinion.
  - ✓ Be reviewed periodically.
  - ✓ Be familiar to participants in planning, preparedness and response.
  - ✓ Provide the basis for training and CPD.
  - ✓ Be attainable.
  - ✓ Provide the basis for performance evaluation, wash up and audit.
  - ✓ Be reviewed following participation in exercises, scenarios and incidents.

Further Information Sources

ARCOPOL Project Information - www.arcopol.eu/

EMSA – http://www.emsa.europa.eu/

WHO – Chemical incident response guide – http://www.who.int/environmental_health_emergencies/publications/Manual_Chemical_Incidents/en/

Checklist 005

DETECTION AND ALERT

Justification

Maritime spills impacting on the shoreline may result in potential harm or risk to the environment and communities. However not all spills or incidents are immediately obvious due to the scale or immediate impact of the event. In all cases early detection of a spill or incident will reduce potential impacts by alerting management agencies at an early stage enabling rapid response and deployment of resources, timely risk assessment and the opportunity to prevent or mitigate public health impact. Training and exercising play a vital role in ensuring an effective detection and alert mechanism.

Requirements

The following need to be considered:

- On-going multi-agency incident recognition training.
- Robust and resilient, well-advertised 24/7/365 contact "hotline"
- On-going monitoring of media broadcasts
- Establishment of and access to -environmental monitoring data such that deviations from accepted standards are recognised and potential health effects are recognised.
    - ✓ Flora and fauna surveys
    - ✓ Fisheries surveys
    - ✓ Water quality
- Access to accurate, practical, accessible, up-to-date and consistent general health statistics such as:
    - ✓ Censuses
    - ✓ Poisons service consultations
    - ✓ Mortality rates.
    - ✓ Hospital admission data.
    - ✓ Cancer registration.
    - ✓ Congenital malformations register

Once an incident has been declared, the following need to be considered:

- Logging of incidents according to operating procedures and standards involving paper and/or electronic mechanisms.
- On-going timely transmission to appropriate bodies, organisations and agencies in a timely manner according to the incident management plan.
- Post incident surveillance, such that trends and patterns are recognised and used to contribute to future planning and preparedness
- Regular audit such that planning and preparedness are tailored to prioritised environmental hazards.

Checklist 006

EXERCISE AND TRAINING

Justification

In order to ensure that a multi-agency response is timely, co-ordinated, efficient and effective, it is necessary to ensure that all staff involved are suitably trained and practised by means of teaching, training, continuing professional development, including participation in relevant exercises.

Considerations

Training *- Training programmes should be:*

- ✓ Appropriate for the roles undertaken by personnel.
- ✓ Recorded and reviewed regularly to ensure they are suitable, contemporary and reflect current operational practise and equipment.
- ✓ Suitably accredited formal courses as well as informal modules such as e-learning modules.
- ✓ Form a part of on-going continuing professional development (CPD).
- ✓ Contribute to attainment of technical or academic qualifications.

Exercises - *Exercises should be:*

- ✓ Undertaken on a regular basis.
- ✓ Be carefully planned.
- ✓ Involve relevant agencies and personnel
- ✓ Be realistic, involving appropriate, real-time scenarios and using actual resources.
- ✓ Involve realistic injects at timely points.
- ✓ Designed to test specific components of planning, preparedness, response and recovery.
- ✓ Be evaluated at the end such that key points and lessons learnt are disseminated and factored into planning and preparedness.

Exercises can be:

- ✓ Single agency or multiple agencies.
- ✓ Desktop.
- ✓ Command centre based.
- ✓ Full practical simulation.

Further Information Sources

ARCOPOL Project Information - www.arcopol.eu/
WHO – Chemical incident response guide – http://www.who.int/environmental_health_emergencies/publications/Manual_Chemical_Incidents/en/

RESPONSE

Justification

A timely and co-ordinated response to a shoreline incident including HNS and oil spills is vital as it may prevent, reduce or limit exposure to potentially harmful contaminants, thereby limiting public health and environmental impacts. It can only occur if planning has been undertaken as part of preparedness, including appropriate training.

Considerations

1. ***Incident detection, identification and alerting***
   - ✓ Detection of incident or event (see **Detection and Alert checklist**)
   - ✓ Logging of vital statistics about the event (i.e. time, place, area, population exposed).
   - ✓ Scale of the incident and hence response.
   - ✓ Alerting of stakeholders through robust and well established, tried and tested channels of communication (see **Detection and Alert checklist**).
   - ✓ Activation of the chemical incident plan.
   - ✓ Timely notification of key partners and stakeholders.

2. ***Terminate release, prevent spread and limit exposure.***

At the scene, the following aspects need to be considered:

   - ✓ Nature, source, state and quantity of chemical(s) released (labels, manifests etc.)
   - ✓ Establishment of exclusion zones ("hot", "warm" and "cold" zones).(see **Decontamination Checklist**)
   - ✓ Establishment of multi-disciplinary/multi-agency command and control structures.
   - ✓ Rapid risk assessment (setting priorities for possible course of action).
   - ✓ Deployment of PPE (see **PPE checklist**).
   - ✓ Casualty decontamination (see **Counter measures checklist**).
   - ✓ First aid (see **Countermeasures checklist**).
   - ✓ Deployment of field resources, such as medical equipment, pharmaceuticals and oxygen (see **countermeasures checklist**).
   - ✓ Risk communication to the public (radio broadcasts, web-based information, social networking, frequently asked question sheets and datasheets etc.); see **risk communications checklist**).
   - ✓ Termination through fire fighting, plugging releases, environmental decontamination etc.

3. ***Wider Community Exposure***

Protection of the wider community should be considered through:

- ✓ Timely risk/media -communication and updates.
- ✓ Advising to shelter or evacuate.
- ✓ Provision of alternative accommodation if required.
- ✓ Provision of clean clothing, potable water and non-contaminated food.
- ✓ Environmental monitoring and sampling (see **Sampling and Monitoring checklist**).

4. ***Public health response***

The public health response is central to successful outcome and as such, the following components need to be considered:

- ✓ Access to 24/7/365 expertise.
- ✓ Activation of the chemical incident plan and emergency operating procedures.
- ✓ Dynamic risk assessment based upon available information.
- ✓ Effective coordination between agencies to ensure rapid notification.
- ✓ Advising and alerting medical services.
- ✓ Registration of exposed/potentially exposed individuals.
- ✓ Biological sampling.
- ✓ Epidemiological follow up.
- ✓ Psychological effects.

5. *Incident Termination*

Once the incident has been terminated, the following should be considered:

- ✓ Internal and external debrief.
- ✓ Review of chemical incident plan, operating procedures and standards.
- ✓ Dissemination of information through publications.
- ✓ Contribution to the recovery process (see **recovery checklist**).
- ✓ Audit (see **Audit checklist**).

Further Information Sources

ARCOPOL Project Information - www.arcopol.eu/
WHO – Chemical incident response guide – http://www.who.int/environmental_health_emergencies/publications/Manual_Chemical_Incidents/en/

PUBLIC HEALTH COUNTERMEASURES

Justification

A countermeasure by definition refers to an intervention to counter the impact of an initial event. In public health terms, it refers to a suite of measures to prevent/reduce or mitigate the impact of exposure to a hazard. The timely implementation of such countermeasures is an important component of the public health management of chemical incidents. Such measures include removal from the scene, decontamination, first aid, antidotes and other medical interventions, sheltering/evacuation as well as risk communication and subsequent community investigation. Countermeasures therefore

Requirements

- ✓ Removal from source of exposure (employing triage if necessary)
- ✓ Shepherding upwind
- ✓ Personal protective equipment
- ✓ Decontamination and decontamination facilities
- ✓ Access to water or other decontaminant
- ✓ Employment of first aid as appropriate
- ✓ Deployment and instigation of pre-prepared medical equipment and facilities as appropriate:
  - ➢ Field facilities
  - ➢ Antidotes and other pharmaceutical agents
  - ➢ Portable ventilators
  - ➢ Portable oxygen
  - ➢ intra-venous lines and fluids
  - ➢ Intra-osseous lines
  - ➢ Endo-tracheal tubes and laryngeal masks
  - ➢ Biological monitoring kits (whole blood/serum/plasma/urine)

- ✓ Guidance on sheltering or evacuation
- ✓ Environmental monitoring, modelling and sampling strategies
- ✓ Pre-prepared risk communication strategies
- ✓ Clinical, laboratory and epidemiological follow up as appropriate
- ✓ Remediation and rehabilitation strategy

Further Information Sources

Checklists – Decontamination, PPE, Response
ARCOPOL Project Information - www.**arcopol**.eu/
REMPEC - http://www.rempec.org/tools.asp?theIDS=2_130&theName=Tools&daChk=3&pgType=1
WHO – Chemical incident response guide –
http://www.who.int/environmental_health_emergencies/publications/Manual_Chemical_Incidents/en/

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Justification

In the event of shoreline spills of HNS and oil, personal protective equipment (PPE) protects the responders from injuries and illness ensuring the ability to work in a safe manner. Proper selection and use of PPE is vital and requires skill and experience. PPE is mostly used in combination with other protective methods including exposure control procedure and equipment. Full and ongoing training must be provided prior to use of PPE.

Considerations

Types of protection:

For all types of PPE, ensure the following:

- Risk assessment undertaken prior to selection
- Utilisation of specialist suppliers
- Compliance with appropriate international equipment standards.
- Thoroughly checked prior to use
- Storage in an appropriate manner
- *Respiratory Protection:*

  Respiratory protection serves to prevent exposure to volatile liquids, gases, particulates and hypoxic/anoxic environments where an independent air supply is provided. The following aspects should be considered according to intended use:

  - ✓ Gas tight PPE
  - ✓ Positive pressure self-contained breathing apparatus (SCBA) or,
  - ✓ Positive-pressure supplied air respirator or,
  - ✓ Air-purifying respirator.
- *Eye and face masks:*

  Provide protection from hazardous fragments, irritant gases, volatile liquids, hot sparks and chemical splashes. The following aspects should be considered according to intended use:

  - ✓ Full face masks.
  - ✓ Safety goggles.
  - ✓ Face shields or safety glasses (not applicable for gases or volatile compounds).
- *Skin protective suits*

  Prevents dermal exposure to harmful substances. The following aspects should be considered according to intended use:

  - ✓ Fully encapsulating protective suit.
  - ✓ Chemical resistant clothing
  - ✓ Fire resistant clothing
  - ✓ Gloves.
  - ✓ Boots.

- *Head protection:*
  Protection from falling objects. The following is required:
  - ✓ Helmet or hard hat.
- *Auditory protection:*
  Protection from excessive noise. The following needs to be considered:
  - ✓ Earplugs or earmuffs.

Types of PPE

- *Consider level A when:*
  - ✓ Highest level of protection needed for the respiratory system, skin and eyes
  - ✓ Protection against gases and volatile liquids required
  - ✓ Respiratory, skin, eye and mucous membrane protection is needed
  - ✓ Working in "hot" zone
  - ✓ Working in a hypoxic environment

- *Consider level B when:*
  - ✓ High level of protection is required for the respiratory system, but less required for skin and eyes
  - ✓ Liquid protection against chemicals (chemical resistant clothing) required.
  - ✓ Working in "warm zone"
- *Consider level C when:*
  - ✓ The concentration and amount of an air-borne substance(s) is known and criteria for respiratory filters are met.
  - ✓ Air-borne contaminants, liquid splashes or direct skin contact will not result in an adverse outcome.
- *Consider level D when:*
  - ✓ No known air-borne hazard
  - ✓ Working environment precludes exposure to hazardous chemicals.
  - ✓ Contamination is but a nuisance only.

Further Information Sources

Emergency Response Guidebook
http://phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/erg2008_eng.pdf
WHO – Chemical incident response guide –
http://www.who.int/environmental_health_emergencies/publications/Manual_Chemical_Incidents/en/

DECONTAMINATION

Justification

Decontamination involves the removal of harmful substances from victims, and responders, as well as equipment and vehicles at the site of the incident and at locations where chemicals may have been transported or carried e.g. hospitals. Various techniques are available for decontamination depending on type of contaminant and its spread. Decontamination plays a vital role in the public health management of a shoreline response and can be effective to some extent even without exact knowledge of the substances involved.

Decontamination may also apply to the environment, although this usually comprises part of the works covered within the recovery phase. As such, key points below relate to decontamination of personnel and equipment at the scene.

Considerations for decontamination procedure:

- Should be carried out as soon as possible to save lives and prevent injuries.
- Human lives take precedent over environmental damage
- Prevent movement of hazardous substances from contaminated to clean areas.
- Written posted instructions or signs for victims and personal at the scene.
- Privacy and needs of vulnerable people should be considered.
- Decontamination system should be appropriately designed for all age groups.
- Access to different zones should be tightly controlled.

Chemical incident control zones:

- Control zones are setup at the scene (or at treatment centres) to prevent the spread or movement of hazardous substance from contaminated to clean areas. These are most commonly divided into three zones.

1. **The exclusion (hot) zone:**
   - ✓ Access only to suitably trained persons with appropriate personal protective equipment (PPE) with self contained breathing apparatus (SCBA)(see checklist 010)
   - ✓ Prevent primary contamination of people and material outside this zone.
   - ✓ No decontamination or patient care except triage.
   - ✓ Evacuation and source control is carried out.
2. **The contamination reduction (warm) zone:**
   - ✓ Area around hot zone where decontamination is carried out to reduce the risk of secondary contamination.

- ✓ Contains two decontamination corridors one to enter warm zone and other to exit.
- ✓ Corridors ideally located upwind of source and such that run-off remains within this zone. (may not be possible for maritime)
- ✓ Decontamination operators to wear appropriate liquid tight PPE (Checklist 010)

3. **The support (cold) zone:**
   - ✓ This zone should be free clean and free of all contamination.
   - ✓ Everyone decontaminated before entering this zone.
   - ✓ Inclusion of command post and staging areas.

Individual decontamination:
The following methods should be considered for decontamination of an individual, within the warm zone.

- ➢ Decontamination of first responder:
  - ✓ Washing of PPE using water or 0.5% detergent solution and soft brush to remove any contaminant.
  - ✓ Remove PPE by rolling downward from head to toe.
  - ✓ Place all PPE in labelled bags (double bagged) and dispose of or clean accordingly.
- ➢ Decontamination of victims:
  - ✓ Removal of victim from the contaminated area and into the decontamination corridor.
  - ✓ Remove clothing and place in labelled durable bags.
  - ✓ Thoroughly wash and rinse victims' skin.(Casualties should undertake this themselves, where possible)
  - ✓ Cover victim and move to area where medical treatment is provided.

Mass decontamination:
Mass decontamination is carried out when normal facilities are overwhelmed or where time is the primary concern to prevent the spread of hazardous substances.

- ➢ Establish emergency decontamination corridor.
- ➢ Spray water or decontamination substance in every feasible direction.
- ➢ Multiple victims may be decontaminated together.
- ➢ Reception area with supply of dry clothing and trained staff.

Further Information Sources
HPA - http://www.hpa.org.uk/Topics/ChemicalsAndPoisons/
WHO – Chemical incident response guide –
http://www.who.int/environmental_health_emergencies/publications/Manual_Chemical_Incidents/en/

ENVIRONMENTAL SAMPLING & MONITORING

Justification

Maritime spills may result in release of chemicals in large quantities which can result in widespread contamination and subsequent public health and environmental impact. Monitoring, modelling, reconnaissance and sampling provides the basis for assessing the predicted and actual impact of such incidents, informing response and resources allocation. Such data provide an indication of potential environmental contamination and thus serves as a proxy of exposure. Collectively they form the basis for ongoing incident management as well as subsequent clinical, public health and epidemiological follow-up. Surveillance may form part of data collection although this applies principally to post-incident follow-up rather than response phases.

Considerations

Following should be considered for sampling and monitoring, data modelling and site reconnaissance:

- Sampling and monitoring:
  - ✓ Establishment of a baseline environmental monitoring programme.
  - ✓ Appropriately trained staff.
  - ✓ Clear understanding of the lead agency/organisation whose role it is to conduct such monitoring.
  - ✓ Provision of appropriate equipment for on scene analysis, together with training in correct utilisation of equipment.
  - ✓ Representative sampling, such that samples taken reflect the true extent of contamination in a given area.
  - ✓ Prior liaison with duly accredited laboratories as part of planning and preparedness to ensure that samples for laboratory analysis are correctly collected and transported (pre-analytical considerations).
  - ✓ Timely analysis of samples (analytical considerations).
  - ✓ Timely interpretation of sampling, comparing with national or international standards, guidelines and objectives as appropriate (post analytical considerations).
  - ✓ Timely sharing of data with key stakeholders.
  - ✓ Risk communication with partners and other agencies, as well as the public.
- *Reconnaissance*
  - ✓ *Use of approved approaches e.g. SCAT shoreline assessment*
  - ✓ *Trained operatives*

- *Modelling*
  - ✓ *Appropriate predictive modelling tools for atmospheric and marine forecasting*
  - ✓ *Clear indication of lead agencies for predictive modelling*
  - ✓ *Trained competent staff to produce and interpret results*
  - ✓ *Timely actions incorporating real data from surveillance and monitoring*

- *Surveillance (Post-incident)*
  - ✓ *Reference to pre existing databases e.g. medical admission data*
  - ✓ *Trained operatives*

Limitations:

- *Potential limitations for environmental sampling and monitoring may include:*
  - ✓ Sensitivity-the limit of detection (LOD) for a given contaminant may be higher than levels likely to be measured. On-site monitoring will often have less sensitive LODs than laboratory analysis.
  - ✓ Potential delay or lag time in laboratory analysis
  - ✓ The collection matrix (air, soil, water or food) may interfere with the measurement.
  - ✓ Some chemicals may interfere with the measurement, producing falsely low results.
  - ✓ Cross –reactivity may result in falsely elevated levels.
  - ✓ Use of monitoring equipment can be influenced by factors such as temperature and humidity.

- *Potential limitations in modelling may include:*
  - ✓ Limited information to input into model - on spills, quantities, composition etc.
  - ✓ Conservative assumptions regarding fate and transport and possible interactions
  - ✓ Constraints of the model itself

Further Information Sources

ARCOPOL Project Information - www.arcopol.eu/
CEFAS – http://www.cefas.defra.gov.uk/premiam.aspx
WHO – Chemical incident response guide – http://www.who.int/environmental_health_emergencies/publications/Manual_Chemical_Incidents/en/

RISK COMMUNICATION

Justification

Risk communication is the dynamic flow of information and risk evaluations between academic experts and other professionals and the general public. It forms the basis for a constructive dialogue between all interested parties and provides the basis for taking action (such as evacuation) or for implementing a series of risk-reducing measures (such as shelter). It plays a vital role in managing a chemical emergency or incident.

Considerations

Good risk communication lays the foundation for effective crisis communication. The following procedures need to be implemented beforehand as part of planning and preparedness:

- ✓ Organisational support for a risk communication programme
- ✓ Identification of resources
- ✓ Clear and agreed objectives
- ✓ Establishment of robust channels of communication with stakeholders, including the media.
- ✓ Pre-preparation of generic messages (FAQs / Q and As)
- ✓ Regular exercises involving risk communication strategies
- ✓ Audit and governance
- ✓ Identification of key spokespersons
- ✓ Training and continuing professional development of staff

Following declaration of an incident, the following need to be considered:

- ✓ Timely, concise, delivery of information on:
  - ➢ The incident
  - ➢ Who is in charge
  - ➢ The measures being undertaken to contain the release and/or stop exposure
  - ➢ Who is (and not) currently under threat
  - ➢ What the expected health effects might be
  - ➢ What the public can do to protect themselves
  - ➢ How to get further information or treatment (facilities, hospitals, hotlines, web sites, social media sites etc)
  - ➢ The time at which an update is to be expected

- ✓ Information should be provided:
  - By a trusted individual with good communication skills
  - In an open and transparent manner
  - As soon as possible
  - Using simple to understand words
  - Concisely
  - Accurately
  - Acknowledging limitations of knowledge
  - Credibly

- ✓ Media should be engaged to help disseminate accurate messages and advice. Engagement should be
  - At an early stage
  - Open and transparent
  - Via official spokespersons and messages
  - Via conventional and social media networks

Further Information Sources

ARCOPOL Project Information - www.arcopol.eu/
WHO – Chemical incident response guide –
http://www.who.int/environmental_health_emergencies/publications/Manual_Chemical_Incidents/en/
HPA http://www.hpa.org.uk/Topics/ChemicalsAndPoisons/CompendiumOfChemicalHazards/

RECOVERY

Justification

Recovery refers to returning the status quo following a maritime incident. It encompasses measures to allow economic recovery, environmental remediation, and community recuperation and its consequential impact on communities, health and the local environment / ecology.

Considerations:

In the aftermath of an incident, the following need to be considered:

1. ***Victim support:***
   - ✓ On-going community engagement.
   - ✓ Single point of contact for the public to approach with all the problems and queries rapid availability of appropriate health assistance.
   - ✓ Establishment of an Information Advice Centre.
   - ✓ Provision of first aid.
   - ✓ Timely treatment of casualties.
   - ✓ Provision of "psycho-social first aid" (housing, clothing, food,).
   - ✓ Provision of accurate and timely information regarding victims.
   - ✓ Identification and prioritisation of vulnerable groups.

2. *Risk and health outcome assessment*:

In order to assess the risk and evaluate health outcome, the following approach is required:

   - ✓ Population exposure assessment (develop exposure index, sample collection-biomarkers).
   - ✓ Environmental assessment.
   - ✓ Long term environmental monitoring.
   - ✓ Identification of groups at particular risk.
   - ✓ Compilation of register.
   - ✓ Health outcome assessment during or immediately after the incident.
   - ✓ Risk communication.
   - ✓ Information dissemination.

3. *Rehabilitation*

It comprises mixture of remediation and restoration.

Remediation comprises:

   - ✓ Characterisation of extent of environmental contamination.
   - ✓ Environmental clean-up.
   - ✓ Decontamination.
   - ✓ Remediation of contaminated media e.g. soil, crops, sediment.
   - ✓ Subsequent risk assessment.

Restoration comprises:

- ✓ Landscaping and rebuilding.
- ✓ Building and equipment replacement.
- ✓ Repair of damaged dwellings.
- ✓ Replacement of services, facilities and amenities.
- ✓ Reconstruction of the local economy.

4. ***Prevention of incident recurrence***

Reducing the likelihood of an incident recurring involves the following:

- ✓ Identification of the underlying causes
- ✓ Establishment of an independent accident investigation team
- ✓ Implementation of corrective measures
- ✓ Incident response evaluation
- ✓ Post-incident "wash up"
- ✓ Audit
- ✓ Review of operating procedures and standards
- ✓ Publication and collation of findings
- ✓ Undertake appropriate research and development

Further Information Sources

WHO – Chemical incident response guide –
http://www.who.int/environmental_health_emergencies/publications/Manual_Chemical_Incidents/en/
CEFAS http://www.cefas.defra.gov.uk/premiam.aspx
HPA
http://www.hpa.org.uk/ProductsServices/ChemicalsPoisons/UKRecoveryHandbookForChemicalIncidents/

AUDITS

Justification

Audit is the process whereby systematic review of procedures is undertaken in order to assess compliance with explicit and pre-determined criteria. Where there are recognised deficiencies, procedures should be put in place to implement change. Audit therefore contributes to quality improvement.

Audit is therefore an important part of chemical incident management and contributes towards prevention, planning, preparedness and response, thereby mitigating community risk. It should be undertaken regularly by all principal agencies and organisations involved in chemical incident management, collectively and individually.

Requirements

- ✓ Criteria for audit.
- ✓ Development of agreed standards.
- ✓ Multi-agency/organisation agreement
- ✓ Definition of audit cycle
- ✓ Identification of resource
- ✓ Training requirements and continuing professional development
- ✓ Systematic comparison of performance against agreed standards.
- ✓ Dissemination of key findings
- ✓ Implementation of change

Standards and Performance Indicators

- ✓ International, national, regional, local Standards
  - ➢ ISO
  - ➢ CEN
  - ➢ Industry bodies (IRCA)
  - ➢ Regional bodies

- ✓ Performance indicators (SMART)
  - ➢ Specific
  - ➢ Measurable
  - ➢ Achievable
  - ➢ Relevant
  - ➢ Timely

Chemical Hazards, Environmental Distribution, Persistence and Fate

Justification

The nature and behaviour of chemicals involved in a shoreline incident represent a key factor in the subsequent potential extent of impact upon human health and the environment. The Following elements will apply to both oil and HNS materials and should be considered during initial planning and subsequent response;

1- Behaviour

- Materials will behave differently when packaged and unpackaged
  - Codes have been developed to identify packaged and unpackaged chemicals

- Packaged chemicals may include drums, IBCs, boxes, cylinders, bags etc
  - Packages may float, sink or immerse in water depending upon their buoyancy and water-tightness and may travel for many miles
  - Packaging will provide protection but may become damaged allowing release of chemicals.
  - Knowledge of packaging and contents will aid assessment

- Unpackaged chemicals may include bulk cargo e.g. tankers or may occur from release from packaged goods by various mechanisms such as impact, corrosion, fire etc.

- Unpackaged chemicals will behave in various ways in water dependent upon their physical chemical properties. Behaviour classes include
  - Gases – Will primarily enter the atmosphere and migrate with prevailing winds. Risks from inhalation / contact
  - Evaporators – Will primarily enter the atmosphere and migrate with prevailing winds. Risks from inhalation / contact
  - Gas or evaporator dissolvers – Will form atmospheric plumes and solutions. Dissolved fraction may enter atmosphere over time.
  - Floaters – form surface slicks with potential for direct exposure at sea and shoreline. Will migrate with tides and currents. Major source of contact likely to be dermal and oral. Key receptors include swimmers and other recreational users
  - Dissolvers – form solutions within the water with risks at sea and shoreline. Will migrate with tides and currents Major source of contact likely to be dermal and oral. Key receptors include swimmers and other recreational users
  - Sinkers – travel to the sea bed where they may slowly dissolve or adhere to solids and marine life. Will travel less with currents and tides. Potential to bioaccumulate. Key receptors include marine food chain and final consumers.

- Key parameters to assess behaviour of a chemical include physical state, density, water solubility and vapour pressure, as well as partitioning (octanol : water constant, Henrys Law) and degradation half-life

2. Toxicity

- Toxicity may be assessed in respect of human health or marine and wider environmental impact.

- Human health assessment of maritime cargo will typically consider :
  - ✓ Inhalation toxicity
  - ✓ Ingestion toxicity
  - ✓ Irritancy (skin and eye)
  - ✓ Non threshold effects (carcinogenic, mutagenic, teratogenic)
  - ✓ Potential to contaminate food

- Ecological assessment will typically consider
  - ✓ Aquatic toxicity
  - ✓ Bioaccumulation / bioconcentration
  - ✓ Persistence / degradability

3. Reactivity, Corrosiveness / incompatibility and Flammability

- Chemicals may react with air, water or other cargo to produce additional hazardous products.

- Chemicals may be corrosive or incompatible with materials affecting structural integrity of tanks etc

- Explosive and flammable chemicals may ignite and generate physical effects and hazardous combustion products.:
  - ✓ Respiratory irritant gases such as Nitrogen oxides, Sulphur dioxides
  - ✓ Irritant gases such as HCl and HBr
  - ✓ Toxic gases such as Carbon monoxide, phosgene, ammonia
  - ✓ Particulate matter
  - ✓ Partial combustion products such as dioxins, furans and PAHs

Further information
ARCOPOL www.arcopol.eu
GESAMP http://www.gesamp.org/
OSPAR http://www.ospar.org/
IMO Manual on Chemical Pollution 1999 Section 1 http://www.imo.org/Pages/home.aspx