

INTERSPILL 2009 AND IMO R&D FORUM POSTER ABSTRACTS

<p>1</p>	<p>Ingrid Johanne Lauvrak, Senior Advisor, Norwegian Coastal Administration, Norway</p>	<p>Pre-evaluation of potential places of refuge in Norway</p> <p>The Authorities' work with selection of potential places of refuge along the Norwegian coastline has been formalised since the mid 1990's. A set of locations which at that time were evaluated by the Norwegian Maritime Directorate have since functioned as a support tool for use in situations including vessels in distress.</p> <p>Despite Norway's very long coastline, fortunately such incidents rarely occur. Nevertheless, 3-4 years ago the Norwegian Coastal Administration, the governmental body in charge of handling vessels in distress and accidental release of oil and other pollutants, started a revision and re-evaluation of potential places of refuge. Simultaneously a legal procedure for situations with ships in distress was developed and implemented.</p> <p>Motivations were partly changes in international regulations as a consequence of the accidents involving "Erika" and "Prestige", partly changes in internal Norwegian affairs. The revision and re-evaluation of locations for places of refuge were initialized in a region consisting of three counties located along the west coast, covering a coastline of 6-7000 kilometres. This was carried out as a part of an EU-project, "Safety at Sea" (Interreg IIIB). Guidelines for selection and evaluation of a sufficient number of suitable places of refuge along the coast were developed. Application of essential specialized knowledge and involvement of concerned authorities and organisations are principal elements in this process.</p> <p>The revision and re-evaluation work is completed in the Coastal Administration's western region, and is still going on in the other four regions.</p>
<p>2</p>	<p>Ivan Calvez, Engineer, Cedre, France</p>	<p>Cedre's "Technological Letters"</p> <p>Since 1997, at the French authorities' request, Cedre draws up a yearly synthesis of recent and significant worldwide cases of accidental spills, involving oil or hazardous materials, both in freshwater and coastal/marine environment.</p> <p>The aim of this "technological watch" is to provide an overview of the main lessons learnt from recent facts and experiences in the field of response to recent pollution cases, most notably in terms of accidentology (annual balance sheet of accidental pollution events), as well as of new developments related to response strategies, techniques, and tools and to national policies (organization, contingency planning, etc.). This work is achieved via an analysis of various information resources, whether available from our own library (scientific publications, technical papers and reports, etc.), accessible online (various websites), provided by contacts in other organizations and attending national and international events (workshops, conferences, etc.).</p> <p>This work has resulted, since 2003, in the publication of "Technological Letters" (TLs) which are issued on a quarterly ("Marine & Littoral Waters TLs") and a six-monthly basis ("Freshwater TLs"). Though sent to specific Cedre's partners (e.g. French Navy, Minister in charge of the Environment, etc.), these TLs are also featured on our website (http://www.cedre.fr). An English version is planned in a near future.</p>
<p>3</p>	<p>Karen Quintin, Head of Information and Documentation Department, Cedre, France</p>	<p>"Understanding Black Tides": a learning guide</p> <p>In 1998, Cedre produced an educational booklet on oil spills financed by the Elf oil company. Since the production of this first version new major spills have occurred (Erika, Prestige...) and new communication tools and media have appeared. In 2004, Cedre and Total decided to update this document in the framework of an educational program conducted by Total and called "Planète Energies". The aim of this project, targeting 10 to 18 year olds and their teachers, is to show how interesting and</p>

		<p>stimulating the energy industry is across the world. In this context, “Understanding Black Tides”, comprising a set of original documents, was produced in French: a 120 page learning guide, 4 posters and a website.</p> <p>This learning aid is divided into 6 parts: oil, pollution, sources, impact, response and rehabilitation. It begins by showing students the importance of oil in our everyday lives. To respond to this demand, oil must be transported from exploitation areas to consumption destinations. Practically all crude oil and vast quantities of refined products are transported over long distances, inevitably resulting in a risk of accidents. After a wrap-up about the origins of pollution and a description of unforgettable oil spills, a chapter explains the impacts of this sort of event. Response operations are described in detail showing the organisational framework and existing response techniques. The document provides material for teachers preparing biology, chemistry, geography or economics lessons. Numerous photographs, graphs and sketches accompany the text. The website also includes video clips, animations and quizzes. The 4 posters can be used for practical exercises during classes.</p> <p>The French version was published in June 2006. The English website www.black-tides.com was online in spring 2007 and the paper version was printed in 2008.</p>
4	<p>Brian Gilkison, Waste and Remediation Services Manager, SEACOR Environmental Services, United Kingdom</p>	<p>Techniques and Technologies for the Recycling of Waste Oils and Sludges</p> <p>In many oil producing countries, crude oil sludge from storage tanks has been removed from the tank and stored in pits with no liners, or with liners or in cement basins where it has accumulated over several years or decades. This accumulated sludge has become an environmental issue and concern in many countries. With the environment as the primary driver and the price of crude oil as an added incentive, the removal and processing of oil sludge with recovery of useable crude oil and site remediation has become a desirable objective.</p> <p>This approach is currently being utilized in Algeria. One technology for processing the Algerian oily sludge is the Oil Emulsion Breaking process. This Process can best be described as a chemically assisted, flash separation technology, and was originally developed in the early 1990’s. In the basic process, oil sludge is prepared as feed emulsion with 50 percent or less solid material content that is mixed with a custom mixture of chemical polymers designed to assist in the process and to prevent the creation of mechanically generated emulsions after the oil and water are separated. The mixture is then typically heated to between 200 and 300 degrees Fahrenheit, and pressurized to between 150 and 200 psi. The mixture is then passed through a patented venturi nozzle to atmospheric pressure, which flashes it and cools the mixture. This procedure ruptures the small cages that stabilize the emulsion. The resultant breaking of the emulsion is accomplished. Once the emulsion has been flashed and destabilized, the oil, water, and solids are separated using conventional enhanced gravity separation technologies such as hydrocyclones and centrifuges. As an added benefit, volatiles that may be present are flashed from the incoming feed stream and condensed for recovery. The result is clean, dry oil, clear water that requires no further treatment, and relatively oil-free solids</p>
5	<p>Carlos Sagrera, Operations Chief, Ocean Pollution Control, Panama</p>	<p>A tier 2 Oil Spill in the Caribbean tropical waters</p> <p>All those that are in the harbor operational combat situation know that the week ends and the holidays are specially propitious for incidents and industrial accidents. The mechanical faults of the causal security systems have their place between the main ones sometimes and as anything they serve to the automatism and all the electronics that is wanted to put. Often it is a human fault that is latent and bursts in triggering events. Reasons ? They exceed: reductions of guards, negligence’s, excesses... everything can be behind and being part of these contingencies. Insurances that activate and the consequent investigations will have to prove later, as they were the real causes of the registered events. The corrective and</p>

		<p>preventive measures will not be made wait for later. It was during the first Sunday of February of the year 2007, in which some of these causal ones triggered and determined a spill of more than 5.000 crude petroleum barrels in Caribbean waters of the Republic of Panama, more concretely in the located Oil Terminal in the harbor zone of Ramballa and Great Chiriquí. A fault located in the valves of control of the South pipe located in the beach manifold, determined what in principle it was a terrestrial spill and soon it ended up deriving in a risky marine spill that would contaminate sensible zones that demanded an important mobilization of resources of answer for the region.</p> <p>The presentation tries to describe the successive stages of Notification, Valuation, Mobilization, Operations and Demobilization that were followed in this event during both months that the same one lasted. Also to the containments and recovery, monitoreo and monitoring will be described, as well as of treatment of marine coasts in specially sensible surroundings in the zone of the lagoon of Great Chiriquí. Finally conclusions are made on the installed capacity of the countries of the Caribbean area to give answer in efficient form to this type of events.</p>
6	Dr Edward Owens, Principal, Polaris Applied Sciences, Inc., United States	<p>Waste Generation Job Aid for Decision Makers and Planners</p> <p>Oil spill response operations in remote areas can generate large volumes of oily waste and operations waste materials that must then be transferred and either recycled or disposed. The amount of waste generated by shoreline treatment response operation is not directly related to the volume of spilled oil nor to the location, but is primarily a function of treatment end points and treatment methods selected by the decision makers in the spill management team. In situ shoreline treatment options are preferred in remote areas where critical resources are not at risk as they require minimal manpower and logistics support and generate very little waste. Waste management strategies are controlled by the lack of infrastructure and the long distances between communities or support bases.</p> <p>A computer Job Aid has been developed that provides decision makers and planners with relevant information regarding potential shoreline treatment waste generation volumes and waste types from which they can develop response objectives and strategies. This tool allows comparison of the consequences of different decisions for seven (7) substrate (shoreline) types, five (5) oil types, four (4) degrees of oiling, two (2) treatment end points, and seven (7) treatment tactics. For the selected input parameters, the Job Aid (i) identifies the preferred shoreline treatment options, (ii) calculates the estimated amount of waste that typically would be generated, and (iii) identifies the amount and percent of the type(s) of waste that are associated with each treatment option. These numerical values represent a reasonable estimate of the amount and type of waste as compared to actual data obtained from response operations.</p>
7	Frederic Muttin, , Engineering School EIGSI, France	<p>Improvements of oil spill boom contingency plan by a numerical modelling and an exercise in the La Rochelle harbour</p> <p>Two main topics on oil spill boom are presented. The first one concerns the improvement of oil boom contingency plans by using a numerical modelling. The modelling permits to evaluate new ideas concerning boom contingency plan. As example we can cite: a different kind of anchorage system, a higher length of a boom device between buoyancies. The modelling permits also to give precise data for the boom installation.</p> <p>The second topic concerns the boom contingency plan of the former exercise in the La Rochelle harbour in may 2008. We have constructed a specific boom contingency plan. The bathymetry, the sea current and the tide effect are parts of the decision making. The anchorage system definition concerns the chain lengths, the mass of the anchors and the number and volume of the buoyancies. This exercise has provided knowledge on the precision of the anchorage points, and on the effect of the sea current.</p> <p>The numerical model uses FORBAR and a finite-element computational code. The angle between the boom and the current</p>

		<p>can be defined so that the boom tension is reduced. We can estimate by computations the boom stress and the boom position. We have used a deviation plan with respect to the high current velocity in the exercise site.</p> <p>The research was made in collaboration between the “Laboratoire National Hydraulique et Environnement – EDF” which made current and bathymetry measures during the exercise, CEDRE which provided its expertise in antipollution for the exercise. FOST and TOTAL which provided boom materials, expertise, and the work-force, CETMEF which made the current and the boom tension measures.</p>
8	<p>Dr Masaki Saito, Chief Researcher, Oita Industrial Research Institute, Japan</p>	<p>Organic Sorbent and Biodegradation Disposal System for Less Environmental Load</p> <p>This poster describes the development of the oil sorbent made of organic waste material, its biodegradable disposal after use, and the environmental load.</p> <p>We began to develop the oil sorbent made of the bark of Sugi (popular conifer in Japan) in order to provide the resources for marine oil spill response with less environmental load and cost. In 2000, we succeeded to realize and commercialize the SBS (Sugi Bark Sorbent) with the advantage for environmental load in production, use and disposal. In terms of its production, the resources are waste products and the process is simple. During its use if the responder fails to recover the sorbent itself the environment will not be unduly harmed due to the fact that it is made entirely of organic materials. With respect to disposal, there is better way based on SBS's complete biodegradability, however SBS after use can be incinerated safely under the adequate condition without the emission of toxic gasses.</p> <p>Since 2001, we investigated biodegradation disposal of SBS after adsorbing oil, instead of incineration. It was confirmed that the oil content was heavily reduced 164 days (36m³ site) and 170 days (100m³ site) in a biodegradation experiment using Bunker C in the bark compost: 84-90% of oil in SBS was biodegraded.</p> <p>We also considered CO₂ emissions produced throughout the life cycle of sorbent for SBS and anaerobic/aerobic biodegradation disposal, SBS and incineration disposal and polypropylene sorbent and incineration disposal. Finally, we started a new project to diffuse and popularize biodegradation disposal for oil spill recovery, through demonstrations in several regions of Japan</p>
9	<p>Melinda Pascale, Project Manager, Kymenlaakso University of Applied Sciences, Finland</p>	<p>Shoreline response for the worst case oil spill developed as a joint effort in Finland (SOKO project).</p> <p>Finland is the neighbouring country of one of the world’s top crude oil producer Russia, and over the past few years the transportation of oil has significantly grown in the Baltic Sea. Thus, the oil combating authorities in southern Finland are enforcing preparedness for oil spills with the help of the SOKO project. The SOKO project is innovated and administered by a vocational education institute of seafaring and logistics in Kotka, Finland. The SOKO plan seeks to enhance response logistics with an aim of reducing the time required to implement oil spill response and thus minimising environmental damage and response costs.</p> <p>The results of the project are presented in regional guidebooks achieved as a joint effort between oil combating authorities, educational institutes, civic organisations and businesses. The first guidebook was accomplished in 2007 for the eastern fire and rescue service region in Finland (Kymenlaakso). Three new guidebooks are to be produced by the year 2011 including regional updates along new topics. Overall, the SOKO plans are looking for a consistent and balanced level of preparedness across Finland as well as for flexibility so as to meet diverse regional needs.</p> <p>The plan covers response at sea, cleaning operations, oil combating equipment and temporary storage sites, transportation of oily wastes, waste disposal. Detailed operative charts will be produced. Most studies have been accomplished by adult students. In the projects, the role of the oil combating authorities and project personnel has been to identify unresolved</p>

		issues in preparedness, collect data, supervise and evaluate the result. Working together transparently and openly has been the clue ingredient in the success of the project.
10	Mark Kirby, Team Leader Ecotoxicology & Chemical Risk Assessment, Centre of Environment, Fisheries & Aquaculture Science (CEFAS), United Kingdom	<p>Cefas' role in the MSC Napoli incident</p> <p>On the 18th January the MSC Napoli developed cracks in the engine room wall en-route from Felixstowe to Durban resulting in engine room flooding and the crew evacuation. Whilst being towed to Portland harbour the ship developed further cracks and the decision was taken to beach her in Lyme Bay. The ship was carrying over 2000 containers, including 1600 tonnes of dangerous chemicals, and 6000 tonnes of oil.</p> <p>From the start Cefas staff participated in the environment group advising on likely grounding sites and potential pollutant impacts on fisheries. As the situation progressed involvement included spill modelling and cargo hazard assessment. Models were used to track the potential movement of lost containers and spilled oil, whilst hazard-based colour coded charts were created for the on-site response team. Potential impacts on the fisheries and human food chain were also assessed and advice provided to the Food Standards Agency (FSA) and Defra.</p> <p>After grounding the ships holds became flooded increasing the potential that container contents would leach into the surrounding water. In order to assess the potential risk Cefas conducted a series of toxicity tests of the hold water using standard invertebrate and algal species. Cefas also co-ordinated the extensive monitoring programme involving several partners measuring water quality, PAH shellfish levels, benthic and sediment surveys, necropsies of affected sea birds, biological effects, hold water toxicities and environmental impact assessments This poster provides a brief overview of these activities.</p>
11	Leonard Rich, Environmental Protection Specialist, United States Coast Guard 5th District, United States	<p>The intent of the Oil Pollution Act of 1990 (OPA90)</p> <p>The intent of the Oil Pollution Act of 1990 (OPA90) is to ensure the U.S. Government is prepared to protect the environment from a catastrophic spill of the magnitude and complexity of the 1989 EXXON VALDEZ oil spill. The OPA90 legislation resulted in an overall restructuring and enhancement of the National Strike Force (NSF), and establishment of District Response Groups who are staffed and equipped with mechanical spill recovery assets and are prepared to take prompt actions to mitigate a worst case discharge scenario. During the early 1990s, over \$31 million dollars worth of oil spill response equipment was acquired and placed at 23 locations throughout the United States. Since then, an additional \$10 million dollars of environmental emergency response equipment has been added to the USCG's inventory, and are now located at 16 additional sites.</p> <p>This paper will elaborate on the evolution of the USCG's environmental emergency response capabilities. In terms of preparedness, it will explain how, where and why the Coast Guard has adjusted its resources and capabilities since the OPA90 legislation. The expanded mission requirements include; redistributing and adjusting the locations of the Vessel of Opportunity Skimming Systems, expanding functional use of the pre-positioned equipment for dewatering during shipboard fires, designing and implementing an offload pumping system for viscous oil at each NSF Strike Team, revisiting the condition and continued use of OPA90 procured first response "band-aid" equipment, modifying the basic response equipment systems for fast current spill response, and the implementation of the Spilled Oil Recovery System.</p>
12	Lieutenant Commander Wade Gough, Office of the	<p>Public Sector Response: An in-depth look at the metamorphosis of post 9/11 Pollution Response Policy</p> <p>Coastal and maritime oil pollution response policies have been impacted significantly post 9/11 as a result of new security related legislation, regulations, and policies. Prior to the 9/11, pollution response within the U.S. Federal Government was</p>

	<p>Director of Response Policy, U.S. Coast Guard, United States</p>	<p>handled primarily by specialized environmental response experts and tenured marine inspectors who spent much of their careers focusing on the latest developments in responding to, mitigating, and recovering from a major maritime disaster. The authorities under which these pollution responders operated was comparatively simple and focused on the prevention or response of the pollution event. The terrorist attacks of 9/11 have redefined the pollution response paradigm. No longer would the marine safety experts be seen as a separate community within the agency. The field of pollution response has, as a result of the post 9/11 legislation and policies, received invigoration and a new sense of vitality to carry the mission into the next generation.</p> <p>Some of these new challenges included integration with other response missions to increase its overall capability for the worst possible cases that emergency responders and law enforcement could think of, including the hijacked ship that is threatened to be used as a weapon of mass destruction (WMD), which added great complexity to the response. This paper argues that the best response model for such a policy is the U.S. Government's 2008 National Response Framework, that provides the needed overriding response structure for interoperability to address the latest threats involving complex maritime disasters in addition to catastrophic maritime oil spills while allowing for flexibility, interoperability, and adaptability of the response network whether responding to a catastrophic oil spill or a ship used as a WMD.</p>
<p>13</p>	<p>Carmen Garcia, Ph.D candidate Kyushu University permanent intern Otsuka Law Firm, Kyushu University, Japan</p>	<p>The role of MARPOL in preventing oil spills from ships</p> <p>The international piece of legislation known as MARPOL73/78 had its origins in updating OILPOL 1954, that was the first international convention in dealing with the prevention of pollution of the sea by oil. MARPOL had a very difficult beginning, it suffered a slow progress in receiving ratifications, and it was only after several serious tanker accidents such as the Argos Merchant; the Hawaiian Patriot; and the Amoco Cadiz; plus the adoption of a protocol to the Convention in 1978, that finally MARPOL was able to get enough numbers of ratifications by 1982 to enter into force on the 2nd of October 1983.</p> <p>The purpose of the current presentation will be to provide an explanation on how MARPOL73/78, and specifically Annex I plays and important role in preventing oil pollution from ships, and also to recommend on how the States that had ratified it and fail to implement some of its regulations could achieve that goal. Under the MARPOL the parties have obligations, and also privileges, but understanding the full text of this convention is something that requires a lot of time and study. MARPOL is a legal instrument that has a very complex structure and the continues update it suffers makes its understanding even more difficult</p> <p>In the current presentation we will explain how MARPOL plays an important role in preventing oil pollution from ships, mainly by imposing strong restriction of oil discharges or by prohibiting them completely on certain conditions. Also we will explain how the correct implementation of Annex I will contribute to achieve the goal of preventing pollution from oil; and we will focus specially on the issues of ship survey, certification, control of discharges and the Ship oil pollution emergency plan (SOPEP).</p>
<p>14</p>	<p>Dr Claus Apneseth, Project Manager, Miko Marine AS, Norway</p>	<p>The ShipArrestor Project</p> <p>All in our business are familiar with the threat posed by a vessel carrying hazardous cargo which becomes disabled or damaged on a lee shore, with the risk that the vessel runs aground before assistance can reach the scene to ensure a timely and effective towing connection. Any system that delays the drift or facilitates the emergency towing of such a vessel can have a great benefit.</p> <p>Miko Marine have for some years been developing a ShipArrestor system, combining a sea anchor capable of holding a ship's head into the wind and slowing its rate of drift as well as a form of tow line connection and deployment suitable for helicopter</p>

		<p>application to deal with these problems. But there is more to be done. This has now been recognized by the recent establishment of a joint venture project between the European Union and the participating partners running for 24 months and ending with a full-scale sea trial.</p> <p>Currently the system enables a helicopter to attach a towing line to the windlass. With the use of this connector there is no longer a need for a salvor to board the casualty and the need for a very risky marine operation is therefore eliminated. This system consists of a lasso arrangement attached to a cradle beneath a helicopter. The continuing development of this system is conducted by a consortium lead by Miko Marine. The consortium consists of Small and Medium sized Enterprise (SME) and Research and Technical Development (RTD) partners all over Europe. The project is organised under the auspices of the EUs 7. Framework Program – Research for SMEs. The overall budget is € 1.4 million of which the EUs 7th. Framework Program will provide 1.14 million.</p>
15	<p>Dr Isamu Fujita, Head, Oil Spill Response Research Group, Port and Airport Research Institute, Japan</p>	<p>Experimental Study on Emulsion Breaking of Water in Oil Emulsion and its application to viscous oil offloading</p> <p>Crude or heavy oil, which is once released from a wrecked ship, usually forms water in oil emulsion (W/O emulsion) due to the wave mixing action. This weathered oil increases its volume and at the same time becomes highly viscous. The viscosity is usually as high as several hundred Pa.s so that it may impede oil spill response measures in various stages such as oil skimming or off loading. The Nakdohka oil spill incident in 1997 in Japan was one of the oil spill incidents which severely suffered from high viscosity oil. The weathered oil was reported to have as high viscosity as 1,000,000mPa.s or more. It made the off loading of the recovered oil from oil recovery vessels very difficult. It was impossible to pump up the oil from the tank in usual manner.</p> <p>USCG and its collaborators have studied on the viscous oil pumping system using the water injection method. In this method, a small amount of water is injected to the pipes or tubes through a ring wise device. This method is easy to be carried out and very effective. However, the oil offloaded from oil recovery vessels stored at the port waiting for the final disposal still has high viscosity and become difficult to handle again. The best way to resolve the problem may be to demulsify the oil while it is offloaded.</p> <p>For this purpose, we carried out basic laboratory tests to assess the desemulsification effectiveness of some chemical agents. The results showed that dissipation energy is very important factor to promote the emulsion break, and reaction speed is almost proportional to the energy dissipation. The oil treated by this method never forms the emulsion again. It may be a better option than the water injection method.</p>
16	<p>Kenneth Richards, , COO Windsor Innovations, United States</p>	<p>Pipeline Submerged Fluid Recovery System</p> <p>A new solution, termed Pipeline Submerged Fluid Recovery System (Pipeline SFRS), is discussed that addresses subsurface containment, collection, and reclamation of oil and other contaminants leaking from submerged pipelines in waterways and oceans. Pipeline SFRS is a submerged pipeline leak containment and collection system and incorporates a new water filtration technology that minimizes the water content in the oil collected, which further decreases the cost associated with disposal and/or recycling of captured oil.</p> <p>Some pipelines were constructed prior to World War II and are still in service. As a result of their age, billions are spent maintaining the integrity of the aging pipeline infrastructures. Shutting down of pipelines as a result of certain types of leaks may not be immediately feasible or possible. The considerations for a decision to shut a pipeline down to repair, replace a pipe segment, or perform leak containment and abatement is influenced by a leak classification, economic cost considerations, impact on a production cycle, impact on critical life support systems, socioeconomic impact, and at times lack</p>

		<p>of immediate resources to repair or replace sections of aging pipe. Boom containment is subject to weather conditions and requires further maintenance for the removal of the contained oil and disposal or recycling of oil and water collected further adding to the costs</p>
<p>17</p>	<p>David Sheahan, Senior Chemical Risk Assessor, Cefas Fisheries Laboratory, United Kingdom</p>	<p>Identification of the highest priority HNS and the prediction of their fate, behaviour and effects</p> <p>The aim of the HNS Protocol is to provide a global framework for international co-operation in dealing with and combating major incidents involving spills of hazardous and noxious substances, which could have a detrimental impact on the marine environment and ecosystems. For the purposes of the HNS Protocol, a Hazardous and Noxious Substance is defined as any substance other than oil which, if introduced into the marine environment, is likely to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea.</p> <p>The UK has a highly developed Oil Spill Contingency Plan - but the understanding, threat and consequences of maritime HNS spills is not as well developed. Whereas most oils float on the sea surface and are immiscible with water, HNS chemicals exhibit a wider range of both behaviour (sinking, floating, evaporating, and dissolution) and toxicity to marine organisms. In order to be well prepared for possible future incidents involving the release of HNS chemicals, such behaviours need to be predictable in advance.</p> <p>To enable the UK Marine and Coastguard Agency to provide a strong and consistent lead in the response to HNS incidents at sea, work was undertaken to refine the available toolbox for the determination of chemical fate and behaviour, and to improve the prediction of environmental impact.</p> <p>Consideration is given to the prioritisation of HNS to enable prediction of the most likely chemical spills and to assist in the management of actual incidents involving HNS. Prediction of the most likely HNS spills helps identify appropriate responses including the use of models during emergency training. Identification of an approach to prioritisation of HNS improves the speed with which decisions can be taken to manage them during an actual incident.</p>
<p>18</p>	<p>Alessandro Calor, Maintenance Manager, Alpina Briggs Defesa Ambiental SA, Brazil</p>	<p>Preventive Maintenance on Response Equipment in Order to Minimize Time to Respond to Emergencies Involving Hydrocarbon Spills</p> <p>Alpina Briggs has developed a maintenance plan called Alpina Briggs' Corporate Maintenance Strategy. One of the main factors that ensures time to response is the "ready to operate" status of equipment. The Alpina Briggs plan therefore establishes the programme for preventive maintenance that, when carried out in accordance with a given frequency ensures the ability to operate, availability and reliability of equipment, thus avoiding, identifying and correcting failures, minimizing the time required to respond to emergencies.</p> <p>The stages of the maintenance plan are: (1) Input to the system, where different pieces of equipment depending on technical classification are inputted into the maintenance programme, the system generates an identification number for each piece of equipment and establishes levels and frequencies of maintenance; (2) production of a maintenance list, sorted by technical classification and location of equipment; (3) performance of maintenance task, the different lists are distributed to those responsible for maintenance, who apply specific procedures to identify and solve faults; (4) Maintenance task records, after the task is carried out the information generated by the maintenance task is recorded on reports and software; (5) Printing lists for the up coming period; (6) Indicators for equipment that is out of operating order. Corrective actions are created in order to minimize equipment out of operating order.</p>

		<p>The onset of the development of the plan was in 2002, since then many updates have been made. An analysis of the indicators since the onset of the plan till 2007 has identified that the number of corrective maintenance tasks have fallen in 64%, thus increasing the availability of equipment and ensuring higher reliability</p>
19	<p>Alexander Kurchenko, General Director, Priroda Ltd., Russian Federation</p>	<p>System for collection and cleanup of oil spills generated during cleanup of accidental oil spills operating on the territory of Timano-Pechorsk oil and gas province in the north of European Russia</p> <p>Basic directions of activities of the organization Priroda Ltd are oil spill response, processing oil (petroleum) contaminated wastes, petroleum contaminated soils and grounds, restoration and bio- recultivation of oil contaminated soils and grounds, operations management in protection of the water column from oil spills, installation of facilities for processing oil contaminated wastes, consulting services and training of the attendants.</p> <p>Priroda develops a project of environmentally safe facilities in processing of oil contaminated wastes, petropolluted soils and grounds, allowing to return the lost oil into petroleum reservoir system of the oil company; and to clean a ground, according to the parameters mentioned in the rules of legislation organization in the country. The purpose is the decision of a problem in processing of oil contaminated wastes within a petroleum industry that every year becomes aggravated in connection with growth of production and transportation of petroleum. Stages of complex technology and new facilities for its realization are introduced in manufacture and protected by patents of the Russian Federation. The technology of processing of liquid oil waste and oil contaminated soils and grounds are widely used in Complex Facility in processing of oil contaminated wastes. The Complex Facility invented in PRIRODA Ltd. has a positive conclusion of ecological environmental agency in the Russian Federation.</p> <p>Complex Facilities in processing contaminated oil waste and petropolluted soils and grounds are successfully exploited in Republic Komi, Nenets autonomous region and Huntymansi autonomous region during several years. The annual volume of the processed oil contaminated wastes in cubic meters were: 2003 - 35094 м3; 2004 - 40903 м3; 2005 - 41684 м3 2006 - 40305 м3• 2007 - 40718 м3.</p>
20	<p>Cathrine Spikkerud, Senior Consultant, Akvaplan-niva, Norway</p>	<p>The value of in-depth and long-term cooperative efforts in oil spill response planning for sensitive areas</p> <p>The Lofoten and Vesterålen archipelago is one of the most sensitive and challenging areas for Norwegian oil spill response planning. In offshore and nearshore waters of the archipelago, some of the most prospective oil and gas areas are located. The area is politically challenging, with some stakeholders arguing that the areas offshore should not be opened for exploration. Oil spill response planning is thus an essential element in planning for exploration activities.</p> <p>For a period of several years, there has been extensive cooperation between local oil spill response authorities, operators and technical/environmental experts within this area. This form of cooperation over a long time period has allowed understanding of the challenges and solutions to oil spill response planning for this and comparable areas to mature, and to address key issues in more-depth. Several field studies have been carried out, among them recordings and documentation of contingency-relevant parameters in summer and winter conditions, at high and low tide etc., and have addressed the variations in combat options available. In 2008, the experience from five years of work was synthesised in a project involving a range of contributors, including the Norwegian Coast Guard. The outcome of this work is a range of digital datasets and documentation, freely available to the general public. A set of combat strategies has been developed, applicable for sensitive areas in general. Also a method for classifying areas according to a combination of features has been suggested, allowing the identification of areas of particularly high environmental sensitivity and challenging operational factors, denoted "keep clean" areas. The results of this synthesis is presented in this paper, focusing on the values of a long-term cooperation, providing</p>

		increased understanding of the challenges as well as specific technical information that will improve preparedness in the region
21	Professor H. M. Cekirge, Professor and Project Co-ordinator, Meke Marine Environmental Services, Mebusan Yokusu,, Turkey	<p>Contingency Planning and Risk Assessment for Coastal Facilities</p> <p>In spite of the recent developments on construction of the tankers and the new technologies used, the effects of oil spills caused by various accidents to the marine environment cannot be minimized. To minimize the damage; it's essential to have an effective, well-prepared and applicable contingency planning and risk assessment to coastal facilities such as ports, oil and gas terminals, offshore platforms etc.. Turkish Law 5312 requires contingency planning and risk assessment to Turkish coastal facilities. MEKE, an oil spill response company, was selected to design these plans for Turkish coastal installations.</p> <p>In this poster presentation; contingency planning of a coastal facility will be described. The plan has been prepared on the basis of tiered response concept and consists of sixteen major chapters including the following titles: Definition and Location of The Facility, Current Environmental Status of The Facility and Impact Area, Oil Spill Modelling, Spill Response Equipments and Personnel, Spill Response Organization, Logistics and Communication, Notification and Reporting, Public Relations Management, Communications for Notification and Services, Waste Management, Safety and Worker Protection, Rehabilitation, Equipment Safety and Maintenance, Training and Drills, Legal Framework, Annexes. Besides the above chapters an oil spill modeling has been conducted with the most handled material.</p> <p>ACTUAL REPORTS PREPARED FOR TURKISH COASTAL FACILITIES WILL BROUGHT TO THE CONFERENCE AND PRESENTED TO THE ATTENDEES</p>
22	James Thornborough, Vice President, Lamor Swire Environmental Solutions (Pte) Ltd, Dubai, UAE	<p>Seamless Tier123 Response</p> <p>The Tiered response philosophy espoused by IPIECA and its members is well understood as a concept but in practice the application falls short on performance. This paper explores the shortcomings and offers solutions to improve and reinforce the Tiered response model.</p> <p>The operators/ managers of hydrocarbon facilities have many emergency scenarios to plan and practice for, which include; Search & Rescue, Medical, Fire & Evacuation, Pandemic Response, Business Continuity. All of these plans require a robust Incident Management System to provide a platform for reliable response for operational success at the asset location. Oil spill response especially a Tier 2 or Tier 3 event presents the largest challenge to the Crisis Management & Emergency Response planning construct. To date Tier 2 response is proving the weakest link within the Tiered Response arsenal. Provided hydrocarbon operators follow industry best practice, meet the local law, and the law is enforced, Tier 1 response should always be available and competent. Similarly if hydrocarbon operators avail themselves of Tier 3 response, which is available now across a wide market, Tier 3 response will be guaranteed. It's the Tier 2 response, particularly in second or third world countries rich in oil and gas, which is being neglected both by Industry & Government.</p> <p>there are various Tier 2 solutions, which Industry can employ, which include; mutual aid, co-operatives managed by industry, outsourced response to an Oil Spill Response Organisation or a specialist Government arrangement e.g. NOFO. To better understand Tier 2 response, one must focus on the real need, which is an in-country combat capability for spills of national significance, which requires commitment both by the Government and the collective Industry.</p>
23	Jean Teo, Spill Response Specialist, Oil Spill Response Ltd,	<p>Logistical issues in Oil Spill Response</p> <p>Logistical problems have always been an issue in most major oil spill response (OSR) operations. Problems can arise all the way from custom clearance to waste disposal. Over the years, a lot of work has been done on raising preparedness level of oil</p>

	Singapore	<p>companies and government authorities. These include contingency planning, mutual aid agreements, in-house oil spill response equipment, trained personnel and regular exercises. As a response organization, Oil Spill Response and East Asia Response Limited (OSRL/EARL), focuses much attention on oil spill response preparedness, and regularly exercises the mobilization of Tier 3 OSR equipment into other countries. OSRL/EARL also endeavors to provide its responders with pre-arranged visas for some identified countries where immigration formalities are known to be problematic.</p> <p>Exercises can range from a tabletop discussion about how things would occur to a full-scale deployment of equipment and mobilization of staff involving trans-boundary movement of people and equipment. Common issues that arise include language translation of official documents, taxation implications, security clearance and dispersant approval. These bureaucratic hurdles can often extend or delay our response times. To overcome this, OSRL/EARL is actively involved in national and regional activities to encourage the removal of these hurdles. In this paper, a case study concerning a shipment of OSR equipment into China will be discussed to highlight the potential logistical issues that could occur in the event of an emergency when bringing equipment into another country. The exercise, which involved personnel and equipment from China, Russia, Korea and Japan, was carried out during the Olympic and Paralympic period in 2008, when security was especially tight</p>
24	Lucy Greenhill, Offshore Industries Advisor, Joint Nature Conservation Committee, United Kingdom	<p>Coastal and Marine Resource Atlas: a Tool for Maritime Contingency Planning and Response</p> <p>The Coastal and Marine Resource Atlas (CMRA) is a web-based interactive mapping system, containing UK-wide datasets of the coastal and marine environment. Its purpose is to provide access for professionals involved in oil spill contingency planning and response, to appropriate and accurate environmental information. The CMRA is a sub-topic within the MAGIC (Multi-Agency Geographic Information for the Countryside) (www.magic.gov.uk), managed by Natural England. The initial development of the Atlas was undertaken through collaboration between government departments, agencies and industry bodies, managed by the Maritime and Coastguard Agency (MCA)..</p> <p>The Atlas provides a reference tool for personnel involved in creating and reviewing oil spill contingency plans. It provides an immediate reference to supplement the user’s knowledge and provide a spatial reference for key environmental issues and enhance understanding of the interaction of multiple stressors. It can also be used as a basis for discussion by the Environment Groups set up as required by the National Contingency Plan, to provide advice on environmental and public health issues to the response units set up in a national response situation. CMRA also provides a secondary reference for on-going operational responses to marine pollution incidents.</p> <p>A steering group led by the JNCC is co-ordinating improvements of the CMRA, through interaction with industry, consultants, BERR and other interested parties. The Atlas is therefore dynamic and continuing development includes addition of new data layers and improvement of the representation of existing layers</p>
25	Marcela Lopes Calor, Marketing Manager, Alpina Briggs Defesa Ambiental SA, Brazil	<p>Emergency Response Training Programme for the Local Population in the Amazon</p> <p>Alpina Briggs created partnerships in the Amazon region for the protection of the environment through different training programmes in the area. The Volunteer Environment Agents Course encourages members of the local society, living around oil facilities, to learn how to act in case of oil spills. Without the help from the local population we would require a longer period of time before we could start any response operation. This was the main reason for Alpina Briggs to establish excellent relationships with the local population, creating this major public relations project, training auxiliary workers and generating jobs and income.</p> <p>The training programme consists of theory lessons, with talks presenting first response actions to oil spills, focusing on</p>

		<p>cleaning tasks and the protection of high risk areas. The theory lessons touch on basic knowledge on response and control of oil pollution, first actions and measures that have to be taken by agents. Trainers also teach volunteers how to use the emergency equipment. Local individuals who attended the training courses were satisfied with them as they know that they are collaborating with the preservation of the region where they live.</p> <p>Alpina Briggs Staff who teach the course have noticed that many people, before the training course, had no idea how they could act when facing a hazardous situation. Community members use to despair when faced with environment accidents and, instead of helping, actually disturbed the work of qualified professionals that were there to carry out the operation.</p>
<p>26</p>	<p>Robert Service, Manager Planning & Training, Maritime New Zealand, New Zealand</p>	<p>Working Together in the Antipodes, The New Zealand oil spill response partnership involving government and industry</p> <p>New Zealand is a relatively isolated country with almost total reliance on the maritime transport system for exports and imports. The vast majority of oil is imported. New Zealand's isolation and reliance on the marine environment have created a powerful incentive to ensure that there is a robust and dependable marine pollution response capability. The response system incorporates three tiers depending on the scale of the event and the response agency's ability to respond effectively. Each tier is required to prepare and maintain contingency plans and a response capability appropriate to the respective level of responsibility. The tiers are: Tier 1 - industry (ships, offshore rigs and platforms, and land-based oil transfer sites); Tier 2 - regional councils (local government); Tier 3 - Maritime New Zealand (central government)</p> <p>Oil spill preparedness activities undertaken by central and local government are funded by a levy on the oil and shipping industries, i.e. the risk creators. The levy is collected by Maritime New Zealand and administered as the Oil Pollution Fund. The activities paid for by the Fund include contingency planning, training and exercising, equipment purchase and maintenance, and the cost of cleaning up unsourced spills where the polluter is not able to be identified. The Oil Pollution Fund provides for a significant government response capability and so industry, including offshore oil and gas operations, are expected to provide a similar response capability to that required of shipping. In the event of any significant spill incident, a Tier 2 or Tier 3 response will be declared and either a local or central government On-Scene Commander will assume command. However, industry will always be required to assist in the response</p>
<p>27</p>	<p>Dr Kenneth Lee, Executive Director, Research Scientist, Fisheries and Oceans Canada, Canada</p>	<p>Chemical Oil Dispersion Efficacy in a Wave Tank under Regular Non-breaking Wave and Breaking Wave Conditions</p> <p>Testing dispersant effectiveness under conditions similar to that of the open environment is required for improvements in operational procedures and the formulation of regulatory guidelines. To this end, a novel wave tank facility was fabricated to study the dispersion of crude oil under regular non-breaking and irregular breaking wave conditions. This wave tank facility was designed for operation in a flow-through mode to simulate both wave- and current-driven hydrodynamic conditions and to provide a platform for the performance of toxicological studies under realistic exposure conditions.</p> <p>We report here an evaluation of the effectiveness of chemical dispersants (Corexit[®] EC9500A and SPC 1000 TM) on two crude oils (Medium South American [MESA] and Alaska North Slope [ANS]) under two different wave conditions (regular non-breaking and plunging breaking waves) in this wave tank. The dispersant effectiveness was assessed by time-series measurement of the water column dispersed oil droplet size distribution. Physical dispersion under regular waves consistently produced large oil droplets (volumetric mean diameter or VMD $\geq 300 \mu\text{m}$), whereas chemical dispersion under breaking waves created small droplets (VMD $\leq 50 \mu\text{m}$).</p> <p>The data can provide useful information for developing better operational guidelines for dispersant use and improved predictive models on dispersant effectiveness in the field.</p>

28	María Plaza Arroyo, , CEDEX, Spain	<p>Optimization of a Method to Measure the Effectiveness of Dispersants</p> <p>This Project is oriented to obtain a method with good reproducibility, and easy to execute and focused to measure the full capacity of the dispersant more than its behaviour under simulated “actual” situations, taking the protocol followed by the Environmental Protection Agency (EPA) from the USA, denominated “Swirling Flask Test” (SFT) as a starting point. After several analyses,</p> <p>it was observed that this method had lot of reproducibility problems. Different variables were modified like the type of agitation, or the shaking and settling time. It was observed that the type of agitation had influence in the reproducibility of the method, to obtain a good reproducibility it was better use a energetic manual agitation, also was observed the influence of the shaking and settling time on the dispersed fraction of oil. When the settling time was increased, the amount of oil dispersed tended to be constant for great stationary period.</p> <p>This new method is based in a vigorous manual shaking during 2 minutes in a separation funnel with Teflon stopcocks, to which previously is added a volume of 100ml of sea water and an aliquot of 100µl of a crude-dispersant pre-mixture of (1: 10) (v/v), followed by a 10 minutes of stationary period . After this period, an aliquot of 30 ml is added into a separation funnel of 100 ml and three extractions with three aliquot of 5 ml of DCM are realised, adjusted the final DCM volume for the combined extracts to 20ml with DCM. The amount of dispersed crude is analyzed by UV-Vis spectrophotometer at three analytical wavelengths, 340, 370 and 400nm.</p>
29	Silvia Giuliani, Senior Scientist, Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA), Italy	<p>Italian Working Group on Dispersants: the Ecotoxicological Approach</p> <p>In case of accidental oil spill at sea, operators can choose from several options for action to reduce the impact on marine ecosystems. The focus on products, especially dispersants, that can be utilized to respond to oil pollution has grown in recent years in light of encouraging studies concerning the reduction of toxicity and the increase of effectiveness of the new products available.</p> <p>In Italy the Ministry of the environment, which is the national authority responsible for the official approval of pollution response products, is reviewing the current legislation (D.D. 23.12.2002) with the support of a technical working group composed of researchers from public research institutes. The working group was set up to evaluate the current legislation on product testing regarding efficiency, biodegradability, and ecotoxicological aspects and to propose changes and amendments where deemed necessary. The Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA, Higher Institute for Environmental Protection and Research) is a member of such working group and is mainly involved in reviewing the ecotoxicological aspects, suggesting test species, end-points, matrices and evaluation procedures.</p> <p>Preliminary results of the review process will be reported and discussed.</p>
30	Dr Thomas Coolbaugh, Distinguished Engineering Associate, ExxonMobil Research & Engineering, United States	<p>The Global Oil Spill Dispersant Inventory: Where to find what is needed in case of a large spill?</p> <p>As events during the fourth quarter of 2007 served to point out, oil spills continue to occur through a variety of causes and in a number of different and difficult locations around the world. For effective oil spill response, it is important that spill response resources must be easily accessible and readily mobilized to support responders. In the case where oil spill dispersant application is needed, it is imperative that information on the location and quantities of specific dispersants be readily available.</p> <p>This paper will provide an overview of the larger global stockpiles of oil spill dispersants. It will also emphasize the value of keeping stockpile information up to date and the need for input from a variety of global governmental and industrial organizations to ensure that the information is accurate. This is of particular importance when considering the complexities</p>

		<p>associated with managing the variety of interfaces that dispersant approval and use entails. These interfaces cut across government, industry, and response organization lines. In recognition of this, an additional focus of the paper will be the exploration of the key components of broad stockpile sharing agreements.</p> <p>In addition to tables and figures which display the location and quantities of inventoried dispersant stockpiles, charts will also be presented that identify the largest inventories of specific dispersant products (e.g., in some cases, very few locations account for the bulk of available resources) and their contact information. Finally, the paper will include a brief discussion of an example dispersant call out protocol, i.e., a Decision Tree</p>
--	--	---

<p>31</p>	<p>David Lindo Atichati, , CEDRE / UIB, France</p>	<p>Evaluation of the potential impact of an oil pollution in a Mediterranean island. Mitigation countermeasures and restoration plan</p> <p>The sinking of the cargo ship Don Pedro, on 11 July 2007, at only one mile off Ibiza’s port make us wonder about the potential impacts of such an event on a Mediterranean island. The Don Pedro incident resulted in a spill involving potentially 160 m3 of fuel oil and 72 m3 of diesel, the pollution of 8 km of coastline and the temporary closure of three Ibiza’s beaches. The Dado Grande rocks’ was accurately reported on national charts. The tanker hit the rocks in the early morning, which eventually caused a perforation under the water line and made the simple hull vessel sink in 43 metres depth.</p> <p>In two days, the spill had reached the shoreline. About 70% of the affected beaches consisted in fine grain sand beaches, It is in this period when the social impact appears: fears and speculations from which the general public will draw their own conclusions. The first few hours and the initial actions taken to combat the oil spill were crucial. Retaining the maximum amount of oil in the tanks of the vessel, setting up containment and sorbent booms, recovering oil with an oil pumping vessel and mobilising well trained, equipped and supporting teams at the appropriate moment, at sea and on land all, constitute the actions taken in Ibiza to reduce the impacts.</p> <p>This article intends to analyze the social impact of an eventual spill over the population of a Mediterranean island and its economic consequences. Also, the results of a number of spill simulations under different climatic and loading conditions, recreating what happened in July 2007, will show data of the shoreline time impact, the booms protection required, the oil behaviour and the pollutants concentration zones. Finally, the paper will focus on the differential factor of insularity and the difficulties this involves</p>
------------------	--	--

<p>32</p>	<p>Professor Fabrizio Cumo, , Sapienza University of Rome, Italy</p>	<p>Integrated oil spill risk management and response in coastal areas: a case study from Italy</p> <p>In the past three years, the Italian Ministry for Environment, Land and Sea has been working together with the Applied Physics Department of the Sapienza University of Rome on issues related to the analysis of, and possible response to, the potential risk of oil spill along the Italian coast, taking into account the threats posed by the tankers. The project’s first task has been the adaptation of the Environmental Sensitivity Index (ESI) mapping methodology to the Mediterranean context. The NOAA ESI maps, mainly designed to provide significant biological information with just few other key socio-economics outputs, have not been considered suitable for such a delicate and complex setting as it is the Mediterranean basin, characterized by a 10.000 years of uninterrupted civilizations.</p>
------------------	--	--

		<p>All being considered, the Nature Protection Directorate of the Italian Ministry for Environment, Land and Sea with the scientific support of the Applied Physic Department of Sapienza University of Rome, have drawn up a matricial system. The methodology applied and successfully tested in collaboration with the Italian Coast Guard in two different Italian protected areas has produced significant results, possibly aimed to the realization of a national contingency plan for Maritime Oil Spill, probably to be elaborated in the 2009-2011 biennium.</p> <p>The methodology described in this paper is intended for the standardization of each aspect considered in the matrices, in order to obtain a harmonized procedure easily applicable by different research groups in diverse Mediterranean sites, but specifically tailored for this very unique Basin</p>
33	<p>Greg Challenger, Principal Marine Scientist, Polaris Applied Sciences, United States</p>	<p>Evaluating response strategies in a temperate marsh in Howe Sound, British Columbia, Canada following a Spill of Bunker C Fuel Oil</p> <p>A spill of Bunker C fuel oil in Howe Sound, British Columbia, Canada in August 2006 affected approximately 4.2 hectares of Carex lyngbyei marsh habitat unique to the Pacific Northwest. A cleanup approach to reduce impacts from response actions was balanced with a desire by many constituents to remove all residual oil. Cleanup techniques that were used include flushing, cutting, raking, passive sorbent collection, natural recovery, and manual excavation (sediment removal). Evaluation of the habitat response relative to oiling conditions and treatments was undertaken over a two year period by examining vegetation indices in treatment and control areas and temporal changes in sediment concentrations of polycyclic aromatic hydrocarbons (PAHs). Tissue PAH body burdens were also examined over time.</p> <p>One year post-spill results suggest that the amount or degree of oiling on the dominant vegetation, Carex lyngbyei and Eleocharis palustris, had little or no apparent effect on recovery, or was insignificant in comparison to the impact of many types of treatment. Vegetation cutting alone had no positive or negative effect on vegetation recovery indices. Treatments which were aggressive in physically disturbing the sediments and root systems of the marsh (raking, scraping, sediment removal, long-term maintenance, and/or excessive trampling) retarded vegetation recovery in oiled and unoiled habitats and prolonged oil persistence in surface sediments in comparison to non aggressive treatment, vegetation cutting alone or natural recovery.</p> <p>Mechanical damage was the best predictor of PAH persistence in sediments, while PAH persistence in tissues of local organisms was short-term reflecting limited bioavailability of oil in compacted surface sediments.</p>
34	<p>Professor Irving Mendelssohn, , Louisiana State University, United States</p>	<p>Is in-situ burning an Appropriate Option for oil spill Remediation in Wetland ?</p> <p>The high degree of physical disturbance associated with conventional response options to oil spills in wetlands is driving the investigation of alternative cleanup methodologies. This presentation describes results from a series of field and meso-cosm experiments investigating the application of in-situ burning for the cleanup of oil spills in coastal wetlands. Field investigations demonstrate relatively rapid recovery of ecological structure and function over periods ranging from one to three years depending on specific spill and burn characteristics. Functional characteristics such as above- and below-ground primary productivity and organic matter decomposition recovered after 2-years.</p> <p>Meso-cosm experiments under realistic fire intensities showed that 2 cm of water above the soil surface was typically enough to prevent soil temperatures from exceeding 70 C, allowing for complete plant recovery. These results support the conclusion that burning, under the proper conditions, can be relied upon as an effective cleanup response to hydrocarbon spills in wetlands</p>

35	Dr Rashida Qari, Associate Professor, University of Karachi, Karachi, Pakistan, Pakistan	<p>The Influence of Oil Spill by Tasman Spirit on the Chemical Composition of Seaweeds around the Coast of Karachi</p> <p>The Karachi coastline, which is more than 100 km long, was already facing severe pollution due to combination of factors resulting from industrial, port, municipal, and fishing activities when, on 27th July 2003, the oil tanker “Tasman spirit” ran aground near the Karachi harbour with more than 67,532 t of crude oil on board. Oil pollution is a major threat to marine plants. The present study is based on pre and post Tasman spirit spill incidence on the chemical composition of seaweeds, five beaches Clifton, Korangi Creek, Manora, Sandspit and Buleji of Karachi coast were surveyed. A total of twenty species of seaweed belonging to eighteen genera pertaining to six green eight brown and six red were collected.</p> <p>The present data reveal high variability in major (Na, K, Ca and Mg) and minor (Cr, Mn, Fe, Co, Ni, Cu, Zn, Cd, Hg, and Pb) elements concentration in seaweed along the Karachi coast with in and between seaweed species, sampling beaches and collection time. Analysis of variance “ANOVA ” showed that there were highly significant variations between beaches in Na, K, Ca, Mg, Cr, Fe, Ni, Cu, Co and Hg but there were not significant variations for Mn and Zn.</p> <p>The present results for major and minor elements were very high as compare to prew Tasman spirit studies, it means the build up of metal concentrations in coastal areas may affect the growth and development of algae, leading to a decrease in the productivity of the region. The results obtained from the five beaches of Karachi coast (Clifton, Korangi Creek, Manora, Sandspit and Buleji) shows that oil Spill have a large effect on the chemical composition of seaweeds.</p>
36	Professor Robert Duran, , Equipe Environnement et Microbiologie, Université de Pau et des Pays de l’Adour, France	<p>Effect of bioturbation on the biodisponibility of organic pollutants and role of bacterial mechanisms in hydrocarbon degradation in coastal muddy areas (DHYVA project)</p> <p>Muddy areas play a key role for maintaining the integrity of estuarine and coastal ecosystems. By their localisation these areas are frequently injured by oil spills or accidental events. They also accumulate various pollutants arising from continental hydrosystems. Due to their composition (fine silt sediments), actual remediation techniques are not adapted leading to the accumulation of the pollutants constituting “pollutant reservoirs” that are threats for the ecosystem and the human health as well.</p> <p>Microorganisms play a key role in hydrocarbon degradation. However, most of our knowledge has been obtained by studies on model bacteria. In addition, bacterial cooperation within different microbial groups has been demonstrated for the degradation of complex hydrocarbon mixtures. Silt sediments are located at the oxic/anoxic interface where various bacterial metabolisms coexist and follow one another in function of the tides. Moreover, burrowing organisms can influence the bacterial metabolisms by allowing the oxygen penetration. It thus seems judicious to tackle the problem of the hydrocarbon degradation in a global way trying to understand how bacterial metabolisms interact in the degradation of the pollutants and to estimate the bioturbation effects on these activities. It is the principal objective of the project DHYVA with special interest for anaerobic degradation mechanisms whose knowledge is limited.</p> <p>The expected results of our work will provide new insights on biological mechanisms involved on the fate of hydrocarbons in the environment at the oxy/anox interface. In the long term, they should lead (i) to useful knowledge enabling a better management of the microbial resources in situ and (ii) to the establishment of new molecular tools for the evaluation of the impact of hydrocarbons on microorganisms.</p>
37	Dr Thibault Pénelon, Research and Development Engineer, INERIS,	<p>Behaviour of liquefied gas and liquid over water: An experimental approach at medium scale</p> <p>In case of maritime accident, gas or liquid substances could be released from the ship and generate important risks Hazardous phenomena may occur, like fire or explosion of the gas cloud, instantaneous vaporisation of liquefied gas still confined (BLEVE) or toxic effects due to evaporation of spreading pools. The increasing volume and number of marine tankers make this threat</p>

	France	<p>more acute.</p> <p>The research project GALERNE aims at improving the assessment of the actual risks and determining the most suitable means for intervention and protection of emergency teams when confronted to a marine accident involving chemical tankers transporting an evaporating dangerous substance or liquefied gas. The purpose of this paper is to present the test facility that has been implemented at INERIS, for the study of the behaviour of refrigerated liquefied gas and liquids spilled over or below a water surface. The experimental device consists of a 10x10 m pool of water 1 m deep, in which some liquid or liquefied gas can be spilled. Instrumented masts are immersed into the pool with temperature sensors at different depths and particularly close to the surface. Other instrumented masts are placed downwind of the pool, for measuring some properties of the dispersing cloud, like gas concentration, turbulence level and temperature. A device was built to simulate waves at the pool surface. Tests of release under water can also be implemented, to observe the way the water and the liquefied gas mix together and how the pool forms in this configuration: some freezing of water can be expected in calm water conditions? The experimental protocol and some preliminary results of the experimental trials will be presented, with a focus on refrigerated, liquefied gas.</p>
38	Dr Zhen-Gang Ji, Oceanographer, Minerals Management Service, United States	<p>Enhancement and Application of an Oil Spill Risk Analysis Model</p> <p>The Minerals Management Service (MMS), an agency of the U.S. Department of the Interior, maintains a leasing program for commercial oil and gas development on the outer continental shelf in United States territorial waters. The MMS performs oil spill risk analysis (OSRA) using, in part, a statistical model of hypothetical oil spill trajectories. The OSRA model is driven by analyzed sea surface winds and model-generated ocean surface currents. Instead of focusing on individual oil spill events, the OSRA examines oil spill risks over long periods of time, ranging from 5 years to decades. The OSRA model calculates thousands of oil spill trajectories over extended areas of U. S. continental shelf and tabulates the frequencies with which the simulated oil spills contact the geographic boundaries of designated natural resources within a specified number of days after the simulated spill events.</p> <p>The previous OSRA model was developed in the 1970s and early 1980s. Many things have been changed since then, including 1) the needs of our OSRA customers have changed and increased. The objectives of this study include: 1) Consistency: the updated OSRA should be able to produce results that are consistent with our previous analyses. This is very critical and essential. 2) Efficiency: the updated OSRA should be more efficient in terms of computational time. 3) More user-friendly. 4) Better products to meet the needs of customers. 5) Options for including new mechanisms. With the updated OSRA model, we have the capability to incorporate new processes that are important to oil spill risk analysis and/or are required by our customers.</p>
39	Michael C Boufadel PhD, PE, P.Hydro, Professor and Chair, Department of the Environment – hormozgan Office, Iran	<p>Factors Affecting the Lingering of the Exxon Valdez Oil at Prince William Sound</p> <p>The lingering of oil in some of the Prince William Sound beaches poses a scientific challenge, because various studies expected the oil to disappear almost 20 years after the spill. We conducted a tracer study on two transects of a beach that contained oil only in one transect. A lithium nitrate solution was applied onto the beach during a falling tide, and lithium was used as the conservative tracer analyzed by Atomic Adsorption. The results indicated that the residence time of the tracer in the oiled transect (36 hours) was considerably higher than that in the clean transect (about 8 hours). Our analyses indicated that high fresh groundwater flow moving seaward in the clean transect was the reason behind the small residence time, and it was due to geologic formation landward of the oiled transect that kept such a flow small. Noting that the source of nutrient is the sea for both transects, it seems that the hydraulics in the oiled transect caused a stoichiometric limitation, whereby the mass of</p>

		nutrient at the oil-water interface was depleted and that the flow was too small to replenish it.
40	Hans Cozijn, Senior Project Manager Offshore, MARIN, Netherlands	<p>DIFIS - Double Inverted Funnel for the Intervention on Ship wrecks</p> <p>DIFIS is a study looking to design and validate an EU reference method for a prompt and cost-effective intervention on ship wrecks, able to deal with oil leaking from wrecks even at very large water depths. The proposed system is a light and quickly deployable flexible structure looking to cover the wreck in the first instance, that should stay in place until all the tanks are emptied and the pollution threat is eliminated. The main items in the DIFIS system are its dome, riser tube and buffer bell. It relies on gravitational forces to channel the flux of spilt fuel towards the surface.</p> <p>The leaking fuel is collected by the fabric dome, or inverted funnel, which has been solidly anchored around and covers the wreck completely. The collected fuel is channeled, along with sea water, through a flexible riser tube (typical diameter: 1,5m – 2m) into a second inverted funnel, or buffer bell, closer to the sea's surface, at a depth of around 30m-50m, where it is not affected by rough weather. A shuttle tanker is used for periodical offloading of the collected fuel and transport to shore. The project is carried out by a consortium of 8 participants coordinated by the Maritime Research Institute Netherlands. It began by the end of 2005 and lasted 3 years. The scope of work has included: design of main parts of the system, deployment and recovery procedures, numerical simulations on internal flow analysis, deployment, hydrodynamic scale model tests, confirming system's behaviour in various weather conditions, and aspects related to the system deployment, The results are presented during this conference.</p>
41	Shokat Haidary, Marine Pollution Expert, Department of the environment - hormozgan office, Iran	<p>Case Study: An Overview of Oil Pollution & Heavy metal Contamination In The Rajaei Port Complex of Bandarabbas, Iran.</p> <p>The objective of the present study is to assess the pollution levels in the harbour of Rajaei, to discuss the origin of contaminants in the harbour. Shahid Rajaei port complex is an artificial harbour on the southwest coast of Bandarabbas, Iran. It is the most important port of Iran. Limited data are available on the concentration of heavy metals in sediments in the Port complex. The most comprehensive record is from a survey conducted more than 6 years ago. Transport & other human activities in and around this area have increased dramatically in the last 20 years. The purpose of this study was to determine the concentrations of heavy metals & oil pollution (TPH) in superficial bottom sediments of the harbour, to assess their potential biological effects and to identify their possible sources. In this paper we summarized the results of our studies of Shahid Rajaei port from 2006-2007: data and other available information on sediment quality were collected and reviewed. In order to examine the sediment pollution level, Sediment samples from 10 stations throughout the harbour were analyzed for heavy metals (Cd, Cu, Fe, Ni, Pb, and Zn) & TPH to assess the extent of contamination in the area.</p> <p>Comparison of the average heavy metal contents in the harbor sediment samples with the international standards & other done studies in the Persian Gulf showed that Port Rajaei sediments contained elevated concentrations of heavy metals & petroleum hydrocarbons. Concentrations of numbered pollutants in the sediments varied widely depending on the location.</p>
42	Igoho Zephir Charles, Adviser in the Prevention of Labour and Environment Related Risks, Department of	<p>Metrology of environmental exposure and cardiac strain in equipped operators of heavy fuel products depollutants</p> <p>43 healthy adult volunteers, wearing protective equipment and cleaning an artificial coast, underwent a cardiac strain measuring of activity in complement of a search for temperature constrain. A subjective evaluation of felt painfulness was correlated with the articular indicators of constraints carried by the weights of the raised loads, the frequency of movement and the articular amplitude. The environmental exposure was given thanks to the setting-up of hydrocarbon sensors. For the subjects presenting a physical good condition, depollution is regarded as painless at normal temperature. On the other</p>

	Environmental and Professional Pathologies, Brest Hospital and University Centre, France	<p>hand, for sedentary subjects, stressed and exposed to difficult weather conditions, depollution can be regarded as painful or extremely painful.</p> <p>The studied sample was subjected to articular physical constraints and a considerable cardiac strain. The environmental exposure is slight when it is a matter of cleaning heavy fuel products. The subjects who practise these activities tolerate better the required efforts when they are healthy and trained young adult people under non painful weather conditions</p>
43	Chris Chase, Manager, Oil Products Division, InterOCean Systems, Inc., United States	<p>Development and Utilization of advanced oil slick detection technology system</p> <p>This paper discusses the development and utilization of new sensor technology for real-time oil spill detection and alert. This sensor provides industrial entities on shore and the marine industry with a reliable new environmental protection tool and cost benefit mechanism for early containment and in some cases prevention of accidental oil pollution releases. By utilizing an automated spill detection system, hydrocarbon releases are detected in real-time. Early warning and automated response capabilities allow early containment of pollution, thereby reducing the oil volume spilled. This adds up to lowered risk and significant cost savings related to loss prevention, lower cleanup / mitigation expense, as well as reduced harm to the environment, wildlife, public waterways and commercial assets. This technology provides an effective new weapon in the pollution prevention arsenal, offering key personnel a critical compliance tool in adhering to regulations stipulating spill prevention, planning, reporting and response.</p> <p>The paper details: [1] Development of a reliable, economical, optical, non-contact, filter fluorometer-type, hydrocarbon pollution detection sensor system [2] Performance results drawn from an array of performance tests as well as numerous real world user applications and deployments [3] Examples of numerous users' existing applications and installations for which this innovative technology is shown to offer a valuable new system solution [4] Lessons learned for optimal implementation and use of this Best Available Technology</p>
44	Ersan Basar, Lecturer, KTU Faculty of Marine Sciences, Turkey	<p>Simulations of Oil spill from tanker accident at the junction points in the Marmara Sea</p> <p>Marmara Sea, separating the continents of Europe and Asia, is connected to the Black Sea by the Istanbul Strait (Bosporus) and to the Aegean Sea by the Canakkale Strait (Dardanelles). The maritime traffic on the Strait and the Sea of Marmara have increased the risk of the maritime accidents and since 1948 the number of ship accidents have been recorded as around 700. In the first stage present work, the risky region of Marmara Sea is chosen for simulation studies. It is assumed that 1000 tonnes of medium crude oil may be spilled in the aftermath of a tanker accident. The oil spill is then determined with respect to time and space by considering 2 different wind directions and scale. The simulation code GNOMETM is utilized to generate the oil spill scenarios. In the second stage of the work, weathering calculations for spilled oil was done by using ADIOS2. In these analyses oil budget, viscosity and airborne benzene were estimated.</p> <p>Results of second stage showed that spill did not reach the coast; therefore actions have to be taken at offshore. Weathering calculations showed that more than 40 % of oil evaporates between 0 and 12 hours.</p>
45	Giovanni Coppini, Technologist, Istituto Nazionale di Geofisica e Vulcanologia, Italy	<p>Risk Assessment of Operational Oil Releases in the Adriatic Sea, in the Tyrrhenian Sea and in the Sicily Channel</p> <p>In an effort to quantify and assess the risk from operational oil tanker discharges for the marine and coastal areas of the Adriatic Sea, the Tyrrhenian Sea and the Sicily channel, this work integrates data from the Mediterranean Forecasting System (MFS) and from the Adriatic Forecasting System (AFS) to the fate and transport oil spill model called MEDSLIK. Simulations of oil releases are performed for the year 2003 for the Adriatic and for the year 2005 for the Tyrrhenian Sea and Sicily Channel</p>

		<p>with realistic oceanographic currents, to explore the time and space variability of the oil spill hazard resulting from the oil dispersal.</p> <p>The study also performs a pilot risk assessment for three aquaculture activities zones along the coastal strip of Emilia-Romagna (north-western Adriatic) and the fish catch of anchovy population (<i>Engraulis encrasicolus</i>, L.) in the northern-central part of the Adriatic Sea. Results on the risk assessment for the aquaculture resources prove a high variance throughout the year for each studied zone, but also high variance of the risk per zone for the same month of reference. As for the fish catch, it is found that the maximum hazard is concentrated in the southern part of the region. Hazard maps built for the Tyrrhenian Sea and for the Sicily Channel show a high spatial and temporal variability. In the Tyrrhenian Sea, hazard results higher in the Ligurian Sea, in the eastern part of the Corsica Island, also the North-West part of the Sicily channel results to be at high risk. MFS and AFS forecasting system coupled with MEDSLIK oil spill model show to be valid systems to evaluate how the temporal and spatial variability of the ocean circulation influence the dispersion of oil at sea</p>
46	<p>Joe Ryan, Research and Development Strategic Advisor, Rutter Technologies Inc., Canada</p>	<p>Oil Slick Detection using Microwave Marine Radar</p> <p>It is well known that microwave radar can be effective in the detection of oil on the surface of the ocean. Detection is accomplished by observing the absence of sea clutter return in the radar image in areas where oil is present. The sea clutter return is suppressed by the dampening of the wind driven capillary waves by the oil. While this mechanism has been understood for some time and used in airborne SLAR and SAR radar, its use with shipboard radar has not been widespread, due to specific technical limitations.</p> <p>An advanced radar processor has been developed that shows great promise: the Sigma S6 radar signal processor was designed to enhance the detection of very small targets from moving vessels in the presence of sea and rain clutter. The processing used in the Sigma S6 is designed to enhance signal to noise and signal to clutter ratio, but it also works very well to enhance the clutter to noise ratio as required for oil slick detection. This is accomplished using pulse to pulse and scan to scan processing. The Sigma S6 is capable of performing a real-time moving window average of 256 consecutive radar scans with full vessel motion compensation. This results in a well defined area of the oil slick where there is no or very little sea clutter return.</p> <p>In the spring of 2008 two sea trials were conducted to investigate the ability of the Sigma S6 radar processor system to detect oil slicks of various sizes and types in a range of sea conditions. The trials were conducted off the coast of Norway onboard the Norwegian coast guard vessel KV Harstad. Real-time oil slick detection was observed using both X and S band radars at ranges of 1 to 2 nm. This paper will provide a summary of the trial results and subsequent analysis.</p>
47	<p>Dr Wei An, Engineer, China Offshore Environmental Services Ltd., China</p>	<p>The Oil Spill Forecast and Alarm System In China Offshore</p> <p>The OSFAS oil spill forecast and alarm system has been presented to predict the trajectory of oil spilt over the Chinese offshore waters, which is fundamental to the planning of a successful response. Based upon years of research into oil spill performance coupled with modelling experience, OSFAS represents a truly new concept and advanced technology employed for predicting oil spill behaviour and trajectory so far in China. The particle tracking model inside, with fully understanding of the physical and chemical mechanism of oil emulsion in process of weathering, clearly increases authenticity substantially than current employed oil track systems. The spill model is based on a three-dimensional hydrodynamic model of the Chinese offshore that has been tested and calibrated to a high degree of accuracy. The fate of the oil encompasses the processes of evaporation, emulsification, dispersion by wave action into the water column, beaching on the coasts (and possible re-entry into the water body) and mechanical spreading. Otherwise, OSFAS also includes comprehensive database and decision</p>

		<p>support function. Jointly developed between COES and the First Institute of Oceanography SOA, this article outlines some fundamental principles of incorporating complementary scientific and information system skills based on knowledge of expertise. Author wishes the tiered responders internationally are encouraged to assist each other for environmental sustainability, and share their modeling experiences collaboratively.</p>
48	<p>Anna Dyring, PhD, Project Manager, Swedish Space Corporation, Sweden</p>	<p>Finland invests in new maritime surveillance systems for protecting the Baltic Sea marine environment</p> <p>Finland is strengthening its capacity for maritime surveillance and environmental protection of the Baltic Sea as the Finnish Border Guard (FBG) is deploying new maritime environment monitoring systems on their Dornier 228 aircraft. The selected new system is MSS 6000 from Swedish Space Corporation (SSC) with capacity for oil spill long-range detection and mapping, ship traffic monitoring, integrated HELCOM reporting and high-speed satellite communications. The first FBG aircraft with MSS 6000 is planned to be fully operational by June 2009 and a second aircraft is being upgraded before the end of 2009. Being an experienced and active participant in the Helsinki Commission (HELCOM) and in the European Maritime Safety Agency (EMSA), Finland is one of the prominent figures in maritime environment protection, working continually on improving its maritime environment programmes. The operational requirements on the new systems were defined by FBG in collaboration with the Finnish Environment Institute (SYKE). In addition to traditional techniques for oil spill prevention, i.e., side-looking airborne radar (SLAR), IR/UV line scanner and high-resolution cameras, the renewed systems are to fulfil extensive requirements on state-of-the-art techniques for today's complex maritime operations and for co-ordinated interaction between organisations.</p> <p>MSS 6000 surveillance data will be transferable in flight by means of high-speed satellite communication systems operating the Inmarsat Swift Broadband and Swift64 services. The article describes the ongoing activities for strengthened maritime environment monitoring in Finland. Particular focus will be set on how surveillance data from the aircraft are validated and the distribution and further processing and usage of these data in the organisations, e.g., within the HELCOM regulatory framework</p>
49	<p>Marisa Fernandez Canamerom, Coordinadora del Area de Control y Gestion del Medio y los Recursos Marinos, CETMAR, Spain</p>	<p>DRIFTER: HNS, oil and inert pollution - Trajectory modelling and monitoring</p> <p>The success in the management of a marine pollution accident that involves a spill depends on several factors such as the ability to detect the spills, the capabilities to follow the movement of the slicks, and the capabilities to forecast the drift of pollutant over time. Different approaches and technologies can be applied for those purposes that will support the decision making process in terms of equipment deployment and protection of sensitive areas. Although the effectiveness of technologies that contribute to a better localization and follow up of slicks has been demonstrated during recent spill events, limitations and gaps still remain and deserve additional efforts.</p> <p>DRIFTER is a project framed in AMPERA Eranet (VI FP) that addresses those gaps. The outcomes of the project are of high applicability and include guidelines for drifters and dyes application, wind and wave coefficients, operational models, good practices protocols for communication and data exchange, new algorithms for segmentation, characterization and discrimination of oil spills, spectral studies of the different pollutants and information on the most adequate bands for their detection. DRIFTER approaches and results are presented and described here. They are expected to contribute to response and business continuity in both HNS and oil spill emergencies at sea</p>
50	<p>Nasser Keivan Rad, Marine Environment Senior Expert,</p>	<p>Reducing the human risks and increasing the efficiency of oil spill response operations at sea</p> <p>Oil spill response, either mechanical or chemical, involves hazards to the operational personnel. Undesirable working conditions of the oil spill response operation increase the stress and result in early fatigue of the personnel. This article is</p>

<p>Department of Safety and Marine Environment, Ports and Maritime Organization, Iran</p>	<p>aimed to identify and analyze the main hazards encountered by the personnel during the response operations of the oil spill clean-up using mechanical method. Identifying these hazards and taking them into consideration not only increases the efficiency of the response operation, but also saves the personnel from possible damages. Noise, air pollution, sun, and wind are among the concerned factors.</p> <p>A high noise level interferes with the communications between operational teams as well as with the on-scene commander. Working with booms and skimmer, especially heavy booms, can lead to muscular or skeletal damages in the personnel.</p> <p>Presence of wind or current in the marine environment interferes with can greatly interfere with the deploying of response equipment. Safety of the work environment is an important factor in reducing possible damages to the personnel involved in clean-up operation. Several barriers around the equipment on the deck, like lashing cable and hook, endanger the safety of the personnel and the crew involved in the operation and can cause severe damages to them.</p> <p>An increase in the sea force will exponentially increase the effect of all these conditions. This article puts forward the necessary guidelines to reduce or completely omit such treats during oil spill response</p>
---	--