

# Oil Spill India

International Conference & Exhibition

## THE VOYAGE SO FAR



## Strategic Partners



## Industry Partners



## Attendee Organisations



## Exhibitors



# Oil Spill India

## THE VOYAGE SO FAR

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Oil Spill incidents including disasters in marine ecosystems & the increasing amount of uncertainty for similar incidents over the last 3 decades have time & again reminded us of the fragility of similar eco-sensitive areas in regional waters following any spill. Such incidents are extremely detrimental for not just the economy but also for the ecology of a nation.

The International Convention on Oil Pollution Preparedness Response and Cooperation (OPRC 90) Article 6, set down a requirement for all operators of offshore installations, drilling rigs, terminals and ports to have in place an oil spill response system that will include contingency plans, pre positioned response equipment, training and regular exercise, appropriate to perceived risk. Considering the need for the comprehensive response system for Oil Spill

Management in the maritime zones of India, the Committee of Secretaries to the

Government of India had approved the National Oil Spill Disaster Contingency Plan (NOS-DCP) in November'93. The Director General Coast Guard was designated as the Central Coordinating Authority (CCA) to implement the plan, and coordinate response activities in the event of oil spill at sea. The Ministry of Shipping, the Department of Ocean Development, the Ministry of Petroleum and Natural Gas, oil companies, Port authorities and Maritime States are also the stake-holders in the plan. However maintaining of pollution response systems by a singular government agency like Indian Coast Guard for a developing & vast country such as India was not cost effective. The most operationally efficient and economically viable solutions was pooling in of resources and integrating the capabilities of industry stakeholders for this national cause.

Understanding the need for an industry forum to deliberate, demonstrate & collaborate on the response systems for Oil Spill in the region, ITEN Media in association with the Indian Coast Guard & Oil and Natural Gas Corporation Ltd conceptualized OIL SPILL INDIA as an industry led international conference and exhibition in 2011. One of the central goals of the Oil Spill India (OSI) Conference was to partake at that critical juncture bringing together the global spill response industry & its stakeholders in the region for spill planning, prevention, response, and restoration, concurrently building an informative schedule of the raising Global Standards.

Since its inception in 2011, OSI has continually evolved, each edition of Oil Spill India has witnessed the world's most eminent experts including Policy Makers, CEO's of Oil Producers, Regulators, Responders & Technology Providers delivering Plenary & Keynote Addresses, Case Studies, Forecast Papers and breakthrough Research papers highlighting the raising global focus on oil spill management. The concurrent exhibition has over the years showcased global technology & equipment suppliers displaying the latest in equipment, technology, services & solutions for prevention & response of oil spill.

Over the past 5 years & 3 editions, the success of OSI has been a reflection of the efforts of its committee & supporters. As we approach the landmark 4th edition of this international conference & exhibition scheduled in 2016, on behalf of the advisory board of Oil Spill India it gives me immense pleasure to present this special report titled "Oil Spill India-The Voyage So Far", covering the forum's successful journey from its inception till date.

It is a gesture to extend our deepest gratitude to our formal supporters; Indian Coast Guard, Ministry of Earth Sciences, Government of India, Oil Industry Safety Directorate, Indian Private Ports & Terminals Association, ICC Shipping Association & Sponsors; ONGC, Cairn India, Indian Oil Corporation Ltd, Oil India, EIL, Innovation Norway, OSRL and many more who have continued their benefaction of the conference for the nation's cause. I would also like to thank our distinguished panel of speakers, delegates, exhibitors & visitors from across the globe that have been a part of OSI over the years. This report is also a testimonial of the exceptional value that Oil Spill India offers both as a traditional conference & a global networking forum.

Lastly, I would like to thank my industry colleagues who have been a part of the OSI advisory board over the years and the team at ITEN Media the organisers, without their dedication and support, this conference would not have been possible.

Yours Sincerely,

**Shri. A. K. Hazarika**  
Former CMD, ONGC  
& Conference Chairman, OSI

# Oil Spill India 2011

International Conference & Exhibition

29<sup>th</sup> September - 1<sup>st</sup> October. Holiday Inn Resort, Goa



# POST SHOW REPORT

**THEME:  
GLOBAL COLLABORATION FOR CLEANER SEAS**

## The Industry Rises to the Challenges of Oil Spill:

The inaugural Oil Spill India (OSI) 2011 an International Conference and Exhibition was organized from 29th September to 1<sup>st</sup> October 2011 at Holiday Inn Resort Goa by iTEN Media.

This event was of great importance as it proved to be one of the most significant to Oil Spill industry discussing the critical need for preparedness for the prevention and response to any kind of oil spill and also to have a unified approach to address the challenge. It also addressed the need for reviewing the oil spill policy of the country.

Inaugurating the event Mr. A K Hazarika CMD, ONGC & Conference Chairman, OSI 2011 stated that over 225 delegates from 18 countries & 25 exhibitors from 10 countries are participating in the event. He further stated that this is a unique conference and exhibition focussing on the sensitive subject of Oil spill. Emphasising the theme 'Global collaboration for cleaner seas' he mentioned that this theme indicates the intention to unite the global industry to work more sensibly & efficiently to fight the menace of oil spill.

As oil will grow to be the single largest source of energy by 2035 oil production will significantly increase from offshore, making it more vulnerable to spills. India is the sixth largest consumer of oil in the world and our domestic energy demands are met by imports. Being the major refining hub having huge oil tanker movements in the continent Indian coastline is more prone to oil spills he told.

Making a note of the Gulf of Mexico incident he told that the Oil and Gas operators have been forced to adopt more rigorous safety standards for offshore drilling and exploration. New products and technologies will be need of the hour to evaluate our preparedness to deal with such incidents of oil spill. Showing his concern towards the recent offshore accidents near the sensitive coastline of India he told that we will have to enhance our capabilities and preparedness to fight any eventuality of a larger magnitude.

In his inaugural speech IG VSR Murthy, TS, DDG (Ops & CS) Indian coast guard stated that public anxiety over spilled oils is not unique to India. Any incident of oil spill echoes the need for the stakeholders to gear up to handle the challenge of an oil spill. He mentioned that the industry sees the oil spill response as an ad-hoc measure rather than a long term investment to protect the marine environment. Stressing the requirement for the polluter to respond first in case of an oil spill he told that coast guard responds first and takes immediate steps to prevent the spill before the polluter takes up. Creating a fund to be utilized in case of an oil spill is an urgent requirement he averred.

Concluding his speech he told that Coast guard will take up the conclusions of the conference and putting an effective oil spill response system in India at the earliest.

Mr. Anoop Kumar Executive Director, ONGC & the Convenor OSI 2011 welcoming the dignitaries stated that there is a tremendous challenge in front of the technocrats in the E & P business to ensure safe operations of their facility without compromising the safety of man & machinery. He mentioned that the oil industry's view to do business has changed due to the costs involved in cleaning up of the spill at high seas.

Addressing the demanding needs of the Indian market an exhibition was co-organized with the conference of leading oil spill equipment & technology providers from around the world, was inaugurated by Mr. A K Hazarika CMD, ONGC & Conference Chairman, OSI 2011. The highlight of the exhibition was the UK & Norwegian pavilions. Many other exhibitors like Lamor, Optimare, Ecoceane had also participated in the show. Exhibitors showcased the latest in innovative technologies, services and solutions for the spill.

The show focussed on driving international attention to the region and encouraging growth of international companies within the region.



# **WELCOME ADDRESS 2011**

**THEME:**

**GLOBAL COLLABORATION FOR CLEANER SEAS**



I am happy to know that the ITEN Media is organizing Oil spill India conference and exhibition in association with ONGC and Petrotech society at Goa from 29th Sep to 01 Oct 2011.

Every day, millions of barrels of oil is transported through the seas to various destinations around the globe. Accidently releases of crude oil from tankers, offshore platforms, drilling rigs and wells polluted and destroyed marine ecological life.

I am sure that the Conference will bring together internationally renowned experts and technologists from around the world on Oil Spill Response and recovery and hold in-depth deliberations on issues relating to the Oil Spill.

We must continue to discuss, explore through these events and invest in new solutions for prevention and response measures to be effective.

I convey my best wished and compliments to the organizers, participants and other dignitaries connected to the conference and exhibition for the successful conduct of the event.

**Shri. Digambar Kamat**  
Chief Minister  
Goa



India is world's sixth largest energy market. Oil constitutes 33% share in India's primary energy consumption. GDP growth rate of 8 percent translates into energy demand growth rate of 5.2 percent. In India, crude oil exploration, production, transportation and refining have shown an increasing trend. With the focus on meeting the energy demand, we have onerous responsibility of taking care of the Environmental Concerns and the oil spill is the biggest challenge in the E&P industry. The international Convention on Oil Pollution Preparedness Response and Cooperation (OPRC 90) sets down a requirement to have in place an oil spill response system.

Understanding the need for a platform to demonstrate the skills developed & concerns faced by the industry, the first Oil Spill India (OSI 2011) international conference and Exhibition, with a theme 'Global Collaboration for Cleaner Seas', has been organised by iTEN Media in association with ONGC, Petrotech Society and supported by various Ministries of the Govt. of India. As Conference Steering Committee Chairman, OSI 2011, it is my pleasure to invite you to attend the International Conference and Exhibition "Oil Spill India 2011" from 29th September to 1st October at Holiday Inn Resort, Goa, India.

I am happy to note that this conference will bring together global experts & stakeholders from 101 organisations of 17 countries to discuss oil spill issues including cause and prevention, preparedness, response management and environmental issues. This forum encapsulates myriad dimensions including Technologies/Equipments, Preparedness, Restoration Planning, R&D, Training, Regulatory Policy and Case Studies.

Such an international platform has been set to function as a thought provoker, change-agent and enabler for networking opportunities between experts. While we provide the opportunity, it is your participation that will truly help us achieve our intended objectives.

Wishing all the success for the Conference & Exhibition.

**Shri. A. K. Hazarika**  
Chairman and Managing Director  
Oil and Natural Gas Corporation  
& Conference Chairman, OSI 2011



I am pleased to learn that the first 'Oil Spill India' Conference and Exhibition is being organised by iTEN Media in association with ONGC at Goa from 29 September to 01 October 2011.

I am certain that an event of this magnitude will be the best forum to discuss and address the challenges in oil-spill preventive measures, first response at sea, protection of the marine environment and conservation of natural resources.

I am confident that this gathering of 'oil-spill' experts from around the world and professionals from the oil industry, oil-spill response and recovery industry, will lead to a vibrant exchange of ideas to further the cause of clean seas.

As the Chairman of the National Oil Spill Disaster Contingency Plan (NOSDCP) Committee, I have maintained a view that the best way of resolving the complex coordination issues of oil spill response, is to create platforms for discussion on prevention and preparedness measures, whilst fostering people-to-people relationships. At the national level, this is achieved at the NOSDCP meetings conducted by the Coast Guard. The proactive initiative in conduct of 'OSI 2011', involving international experts is highly innovative, and I am sure that the conference will bring in new levels of environment protection awareness and professionalism in India.

I wish the organisers all the success.

**Shri. Anil Chopra**  
Vice Admiral  
Director General  
Indian Coast Guard

Oil Spill India (OSI) 2011 is a well thought out subject for a conference by the organizers and I would like to congratulate them on their efforts. The theme 'Global Collaboration for cleaner seas' shows the inclination to unite & fight the catastrophic damage the spills can create.

We all are aware that any Oil spill is a major disaster for any country but it also gives all of us an opportunity to come together to think on how our collective behavior has brought us to the brink of such a disaster history. We all can make a difference and we need to adopt a different attitude towards the natural world.

This conference will take a look at what role we all play, as individuals and as society, so that we can hopefully make better choices in the future. We all are aware that the problem cannot be solved overnight, but each one of us can take the first step.

Wishing the conference a great success.

**Dr. S. B. Agnihotri**  
Director General of Shipping & Ex-officio  
Additional Secretary to Govt. of India



Energy for India

I am delighted that the international conference and exhibition “Oil Spill India 2011” with the theme “Global Collaboration for Cleaner Seas” is being held in India. The increasing production and transportation of oil and petroleum products in and around India creates a greater need for the nation to be better prepared to respond to any oil spill incident. Cairn India is pleased to support this important event with particular appreciation of the organiser ITEN Media and the major sponsor, ONGC.

I am confident that this conference will provide a platform to nurture successful collaboration among the stakeholders such as the oil companies, regulatory authorities, local ports and shipping industry, local and global vendors of oil spill response equipment and service providers.

I earnestly hope that the conference will help our industry and the nation to build capacity by disseminating the global best practices and latest technologies on oil spill response and control through the presentations by renowned global experts.

I wish all success to the conference and exhibition.

**Shri. Rahul Dhir**  
Managing Director  
Cairn India Limited



I have the privilege to welcome you to OSI 2011 International Conference and Exhibition on oil spill issues being held during 29th September to 1st October at Holiday Inn, Goa. The event is organised by iTen Media in association with ONGC and Petrotech Society, and supported by Ministry of Shipping, Govt. of India, Ministry of Science & Technology, Govt. of India, Ministry of Earth Sciences, Govt. of India, Indian Private Ports & Terminals Association (IPPTA) and Interspill.

The theme of OSI 2011 ‘Global Collaboration for Cleaner Seas’ has been aptly chosen to address issues post Macondo Incident. We had after all, come through the global recession more or less unscathed. We were not complacent, but certainly relieved. Then things started to go wrong with a tragic blowout in the Gulf of Mexico. Very soon it was clear that despite the best efforts of all concerned, the spill was out of order. In an attempt to control the oil spill some 600,000 gallons of chemical dispersants have been used. More than 4 million feet of containment/sorbent boom was utilised. More than 650 vessels are responding on site, including skimmers, tugs, barges, and recovery vessels to assist in containment and cleanup efforts. After taking so much effort, spending billions of dollars, still 1183 & 351 numbers of birds and sea turtles were affected due the oil slick.

Against this backdrop, most oil companies are striving hard for the best oil spill contingency plan and resources for cleaner seas. OSI 2011 sets the stage for an immensely interesting debate in the forth coming conference.

We look forward to your participation as experts, commentators, managers and exhibitors to help the concerned global fraternity learn from each other’s experience.

Warm welcome on the behalf of OSI 2011.

**Shri. Anoop Kumar**  
Executive Director, ONGC  
and Convenor, Steering Committee, OSI 2011



Dear Colleagues,

I note with pleasure that Oil Spill India - 2011 is being organized at Goa from 29th September -1st October 2011. The theme “Global Collaboration for Cleaner Seas” is very topical and addresses a very significant issue that in the recent years have received a lot of international attention.

This is an international Conference-cum-Exhibition for Hydrocarbon Industry and I am sure most of the industry friends have made good use of this opportunity and chosen to participate in the first edition of Oil Spill India 2011.

We at Petrotech have immense pleasure in supporting such an event which will surely prove to be a potent platform for dissemination of knowledge, as experts from across the world will discuss the relevant issues concerning oil and gas industry today and articulate the vision for future.

I am sure there will be a very encouraging response from delegates world-over to showcase the latest technology and product lines in the exhibition. The confluence of some of the best minds in the business and participation of front line organisations will ensure that the Conference and Exhibition provide an unparalleled “sea of networking opportunity” for all.

I wish Oil Spill India – 2011 all the very best.

**Shri. Ashok Anand**  
Director General  
Petrotech Society



# BACKGROUND PAPER

**THEME:**

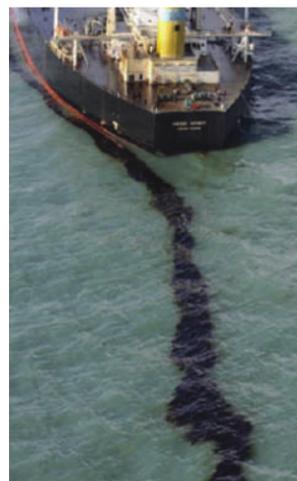
**GLOBAL COLLABORATION FOR CLEANER SEAS**

## PREAMBLE

Presence of significantly large amount or layers of crude or refined oil on soil or sea water is commonly known as Oil spill. It can be controlled by chemical dispersion, combustion, mechanical containment, and/or adsorption. Spills from tanks and pipelines can also occur away from water bodies, contaminating the soil, getting into sewer systems and threatening underground water sources.

Marine oil spills may result in oil pollution over large areas and present serious environmental hazards. The primary source of accidental oil input into seas is associated with oil transportation by tankers and pipelines, whereas the contribution of offshore drilling and production activities is comparatively less. Large and catastrophic spills have the potential to cause the most serious ecological risk - primarily for sea birds and mammals, results in long-term environmental disturbances in coastal zones and economic impact on coastal activities.

In recent years, this attention has created a global awareness of the risks of oil spills and the damage they do to the environment. However, oil is a necessity in our industrial society, and a major sustainer of our lifestyle. Most of the energy used today is for transportation that runs on oil and petroleum products. According to trends in energy usage, this is not likely to decrease much in the future. Industry uses oil and petroleum derivatives to manufacture such vital products as plastics, fertilizers, and chemical feedstocks, which will still be required in the future.



In fact, the production and consumption of oil and petroleum products are increasing worldwide and the threat of oil pollution is increasing accordingly. The movement of petroleum from the oil fields to the consumer involves a number of transfers between many different modes of transportation including tankers, pipelines, railcars, and tank trucks. Oil is stored at transfer points and at terminals and refineries along the route. Accidents can happen during any of these transportation steps or storage times.

Oil spills may occur in a number of ways, including the accidents and mishandling of oil pipes and tankers. The fate of spilt oil depends on a number of factors, such as the amount of oil spilled; its initial physical and chemical characteristics; the prevailing weather and sea conditions; and whether the oil remains at sea or comes ashore.

Once spilled at sea, the natural tendency for the oil will be to spread, break up and become dissipated over time. This dissipation is a result of a number of chemical and physical processes acting on the spilt oil.

In considering the fate of spilled oil at sea and potential clean-up and response techniques, the persistence of the oil in the environment should be taken into account.

A variety of models exist which may be used to aid in decision making processes and forecasting the likely locations the oil may strand. Models can be used at a contingency planning stage, allowing stakeholders to envisage a variety of scenarios and their likely outcome, as well as during a real-time spill to aid clean-up and response decisions.

The effect of oil spills can be far reaching, posing both an environmental and economic threat. Recreational activities, local industry, fisheries, and marine life are among the resources that can be adversely affected by oil spills.

The recovery of the environment after a spill depends on a variety of factors such as the type and amount of oil spilled; the biological and physical characteristics of the affected area; time of year and weather conditions, and notably the clean-up and response strategy used. Typical environmental impacts range from toxicity to smothering effects.

There are also many deterrents to oil spills, including government fines and the high cost of cleanup. The average cost of cleanup worldwide ranges from \$20 to \$200 per litre, depending on the type of oil and where it is spilled. Cleaning up oil on shorelines is usually the most expensive cleanup process.

The costs of an oil spill are both quantitative and qualitative. Quantitative costs include loss of the oil, repair of physical facilities, payment for cleaning up the spill and remediating the environment, penalties assessed by regulatory agencies, and money paid in insurance and legal claims. Qualitative costs of an oil spill include the loss of pristine habitat and communities, as well as unknown wildlife and human health effects from exposure to water and soil pollution.

Responsibility for the prevention of oil spills falls upon individuals as well as on governments and industries. Because the sources of oil waste in the ocean are generally careless, rather than accidental, truly effective prevention of oil spills involves everyone.



## CAUSES AND IMPACT OF OIL SPILLS

Most people think of marine oil spills when they visualize an oil spill, but the escape of oil into the natural environment is a problem on land as well. Since humans rely heavily on petroleum products such as plastic, fuel, and lubricating oil, oil spills are an unfortunate byproduct of the human way of life. A number of things cause oil spills, ranging from carelessness to deliberate dumping.

Many people are familiar with tanker accidents, since they are highly publicized and they release large volumes of oil into the ocean. In fact, only a small percentage of global oil spills are related to tanker accidents such as explosions, hull failure, running aground, and collisions. These oil spills tend to be very harmful because of the sheer volume of oil released at once, posing a serious threat to marine animals and seabirds. They are also used to attract attention to the larger issue of oil spills, in the hopes of reforming policies which are lax on petroleum regulation.

One of the most common causes of oil spills is actually runoff from the land. Release from onshore oil facilities and numerous land-based engines such as those used to run cars function on petroleum fuel and use petroleum based lubricants, dispose of things like used motor oil accumulates in the ground and ultimately end up in the ocean.

Oil spills can also be caused by natural seepage, especially in the ocean. As tectonic plates shift, they may release oil from reserves trapped deep beneath the ocean floor. Natural seepage can also be accelerated through human activity such as drilling. The routine loading and unloading of crude oil and other petroleum products also causes oil spills, as do deliberate acts such as dumping oil or setting oil wells on fire.

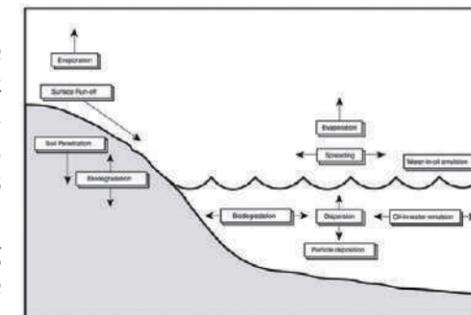
Extraction and storage of oil are also accompanied by seepage and spills. Offshore drilling routinely creates low level spills, and can sometimes cause a blowout. Storage tanks are a common source of oil spills as well. On land, storage tanks and pipes can be damaged by things like hurricanes, resulting in leaks of all sizes, and in the ocean, bunkering can lead to the release of large amounts of oil.

The petroleum industry undertakes measures such as the use of negative pressure pipes and storage containers to reduce the likelihood of oil spills. These measures protect both the environment and the profits of the oil company.

### OIL SPILL BEHAVIOUR

When oil is spilled in the ocean, it initially spreads in the water (primarily on the surface), depending on its relative density and composition. The oil slick formed may remain cohesive, or may break up in the case of rough seas. Waves, water currents, and wind force the oil slick to drift over large areas, impacting the open ocean, coastal areas, and marine and terrestrial habitats in the path of the drift.

Oil that contains volatile organic compounds partially evaporates, losing between 20 and 40 percent of its mass and becoming denser and more viscous (i.e., more resistant to flow). A small percentage of oil may dissolve in the water. The oil residue also can disperse almost invisibly in the water or form a thick mousse with the water. Part of the oil waste may sink with suspended particulate matter, and the remainder eventually congeals into sticky tar balls. Over time, oil waste weathers (deteriorates) and disintegrates by means of photolysis (decomposition by sunlight) and biodegradation (decomposition due to microorganisms). The rate of biodegradation depends on the availability of nutrients, oxygen, and microorganisms, as well as temperature.



### EFFECTS OF OIL ON PLANTS AND ANIMALS

Some toxic substances in an oil spill may evaporate quickly. Therefore, plant, animal, and human exposure to the most toxic substances are reduced with time, and are usually limited to the initial spill area. Although some organisms may be seriously injured or killed very soon after contact with the oil in a spill, non-lethal toxic effects can be more subtle and often longer lasting. For example, aquatic life on reefs and shorelines is at risk of being smothered by oil that washes ashore. It can also be poisoned slowly by long-term exposure to oil trapped in shallow water or on beaches.

### SENSITIVITY OF AQUATIC HABITATS

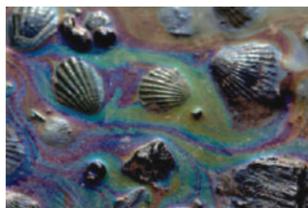
Aquatic environments are made up of complex interrelations between plant and animal species and their physical

environment. Harm to the physical environment will often lead to harm for one or more species in a food chain, which may lead to damage for other species further up the chain. Where an organism spends most of its time – in open water, near coastal areas, or on the shoreline – will determine the effects an oil spill is likely to have on that organism.

In open water, fish and whales have the ability to swim away from a spill by going deeper in the water or further out to sea, reducing the likelihood that they will be harmed by even a major spill. Aquatic animals that generally live closer to shore, such as turtles, seals, and dolphins, risk contamination by oil that washes onto beaches or by consuming oil-contaminated prey. In shallow waters, oil may harm sea grasses and kelp beds, which are used for food, shelter, and nesting sites by many different species.

Spilled oil and cleanup operations can threaten different types of aquatic habitats, with different results.

- *Coral reefs* are important nurseries for shrimp, fish, and other animals as well as recreational attractions for divers. Coral reefs and the aquatic organisms that live within and around them are at risk from exposure to the toxic substances within oil as well as smothering.
- *Exposed sandy, gravel, or cobble beaches* are usually cleaned by manual techniques. Although oil can soak into sand and gravel, few organisms live full-time in this habitat, so the risk to animal life or the food chain is less than in other habitats, such as tidal flats.
- *Sheltered beaches* have very little wave action to encourage natural dispersion. If timely cleanup efforts are not begun, oil may remain stranded on these beaches for years.
- *Tidal flats* are broad, low-tide zones, usually containing rich plant, animal, and bird communities. Deposited oil may seep into the muddy bottoms of these flats, creating potentially harmful effects on the ecology of the area.
- *Salt marshes* are found in sheltered waters in cold and temperate areas. They host a variety of plant, bird, and mammal life. Marsh vegetation, especially root systems, is easily damaged by fresh light oils.
- *Mangrove forests* are located in tropical regions and are home to a diversity of plant and animal life. Mangrove trees have long roots, called prop roots that stick out well above the water level and help to hold the mangrove tree in place. A coating of oil on these prop roots can be fatal to the mangrove tree, and because they grow so slowly, replacing a mangrove tree can take decades.
- *Marshes and swamps* with little water movement are likely to incur more severe impacts than flowing water. In calm water conditions, the affected habitat may take years to restore.
- Other standing water bodies, such as inland lakes and ponds, are home to a variety of birds, mammals, and fish. The human food chain can be affected by spills in these environments.
- River habitats may be less severely affected by spills than standing water bodies because of water movement. However, spills in these water bodies can affect plants, grasses, and mosses that grow in the environment. When rivers are used as drinking water sources, oil spills on rivers can pose direct threats to human health.
- An oil spill can harm birds and mammals in several ways: direct physical contact, toxic contamination, destruction of food sources and habitats, and reproductive problems.
- *Physical contact* – When fur or feathers come into contact with oil, they get matted down. This matting causes fur and feathers to lose their insulating properties, placing animals at risk of freezing to death. For birds, the risk of drowning increases, as the complex structure of their feathers that allows them to float or to fly becomes damaged.
- *Toxic contamination* – Some species are susceptible to the toxic effects of inhaled oil vapors. Oil vapors can cause damage to the animal's central nervous system, liver, and lungs. Animals are also at risk from ingesting oil, which can reduce the animal's ability to eat or digest its food by damaging cells in the intestinal tract.
- *Destruction of food resources and habitats* – Even species which are not directly in contact with oil can be harmed by a spill. Predators that consume contaminated prey can be exposed to oil through ingestion. Because oil contamination gives fish and other animals unpleasant tastes and smells, predators will sometimes refuse to eat their prey and will begin to starve. Sometimes a local population of prey organisms is destroyed, leaving no food resources for predators. Depending on the environmental conditions, the spilled oil may linger in the environment for long periods of time, adding to the detrimental effects. In calm water conditions, oil that interacts with rocks or sediments can remain in the environment indefinitely.
- *Reproductive problems* – Oil can be transferred from birds' plumage to the eggs they are hatching. Oil can smother eggs by sealing pores in the eggs and preventing gas exchange. Scientists have also observed developmental effects in bird embryos that were exposed to oil. Long-term reproductive problems have also been shown in some studies in animals that have been exposed to oil.



## OIL SPILLS MANAGEMENT

The health of the world's oceans is degrading as a result of human activities. Further, as the human population continues to grow and extend the range of its activities, as well as increase its demands for marine goods and services, the world's oceans and coasts will be increasingly stressed and the situation is more aggravated in countries like India where more than 40 percent of the population are living in the coastal areas and the level of awareness of marine environmental degradation amongst the populace is very minimal.

The oceans are a vast resource whose usefulness to the global society is continuing to be realized. Thus, it is in the best interest of humanity that they are exploited in a manner that is protective and sustainable, in order to preserve their health and guarantee their continuing viability. However, the complexity of ocean ecosystems combined with the equally complex socio-economic conditions that dictate human behavior make sustainable management and exploitation of marine resources and services a formidable challenge. Meeting this challenge begins with the proactive approach taken by the governmental agencies.

There are many issues arising from the recent Deepwater Horizon oil spill. The oil industry needs to work together with strategic groups and within the oil spill community to ensure that they are on the right footing for the future.

One of the key features of the spill was the coming together of many different organizations and agencies and a collaborative approach that saw resources being used from all around the world. A significant lesson learned was that cooperation is vitally important in major spills. In particular the need for ready access to resources from other response organizations and the importance of good industry standards is required.

### PREPARING FOR OIL SPILLS: CONTINGENCY PLANNING

Most of the oil spills are accidental, so no one can know when, where, or how they will occur. Spills can happen on land or in water, at any time of day or night, and in any weather condition. Preventing oil spills is the best strategy for avoiding potential damage to human health and the environment. However, once a spill occurs, the best approach for containing and controlling the spill is to respond quickly and in a well-organized manner. A response will be quick and organized if response measures have been planned ahead of time.

#### The Role of Contingency Plans

A Contingency Plan is a set of instructions that outlines the steps that should be taken before, during, and after an emergency. A contingency plan looks at all the possibilities of what could go wrong and, "contingent" upon actual events, has the contacts, resource lists, and strategies to assist in the response to the spill.

#### Elements of a Contingency Plan

At first glance, an oil spill contingency plan may appear complicated because it provides many details about the numerous steps required to prepare for and respond to spills. It also covers many different spill scenarios and addresses many different situations that may arise during or after a spill. Despite its complexity, a well-designed contingency plan should be easy to follow. Although they are different in many respects, contingency plans usually have four major elements in common: Hazard identification, Vulnerability analysis, Risk assessment and Response actions. Each of the four elements is described below:

**Hazard Identification:** It is impossible to know when an oil spill is going to happen and how much oil is likely to be spilled. However, it is possible to identify where oil is stored, the corridors through which it travels, and the industries that use large quantities of oil.

Different situations can affect the ability of response personnel to contain and clean up an oil spill, such as weather conditions, geographic isolation, and spill size. Private companies and local, state, and federal agencies design their contingency plans to address spills from many locations and under many different conditions. The following information is usually collected as part of the hazard identification:

- Types of oils frequently stored in or transported through that area
- Locations where oil is stored in large quantities and the mode of transportation used to move the oil, such as pipelines, trucks, railroads, or tankers
- Extreme weather conditions that might occur in the area during different times of the year
- The location of response equipment and personnel trained to use the equipment and respond to the spill

**Vulnerability Analysis:** The vulnerability analysis section of a contingency plan provides information about resources and communities that could be harmed in the event of a spill. This information helps personnel involved in cleaning up a spill make reasonable, well-informed choices about protecting public health and the environment. Vulnerability analysis information might include the following:

- Lists of public safety officials in the community
- Lists of facilities such as schools, nursing homes, hospitals, and prisons
- Lists of recreational areas, such as campgrounds
- Lists of special events and when they take place
- Identification of parts of the environment that are particularly susceptible to oil or water pollution

**Risk Assessment:** Contingency planners compare the hazard and the vulnerability in a particular location to see the kind of risk that is posed to a community. The plan then addresses those problems by determining how best to control the spill, how to prevent certain populations or environments from exposure to oil, and what can be done to repair the damage done by the spill.

**Response Actions:** Response actions are developed to address the risks that are identified in the risk assessment. A carefully designed contingency plan will describe major actions that need to be taken when a spill occurs. These actions should take place immediately following a spill so as to minimize hazards to human health and the environment. The following response actions should be included in a contingency plan:

- *Notifying all private companies or government agencies that are responsible for the cleanup effort*
- *Getting trained personnel and equipment to the site quickly*
- *Defining the size, position, and content of the spill; its direction and speed of movement; and its likelihood of affecting sensitive habitats*
- *Ensuring the safety of all response personnel and the public*
- *Stopping the flow of oil from the ship, truck, or storage facility, if possible, and preventing ignition*
- *Containing the spill to a limited area*
- *Removing the oil*
- *Disposing of the oil once it has been removed from the water or land*

Contingency planners are now using geographic information systems (GIS) to make contingency plans better and easier to use. GIS make electronic maps that can focus attention on the locations of things that are important to planners and oil spill responders. For example, planners can make maps that show the locations of sensitive environments, drinking water intakes, roads, oil storage and production facilities, pipelines, and boat launches. GIS can also provide detailed information about each of the items shown on a map, such as how large an oil storage facility or pipeline is, whether a road is paved, or the times of the year that sensitive species are in the area.

## OIL SPILL RISK ASSESSMENT

Millions of tonnes of crude oil is routinely transported by tankship around the world's oceans on a daily basis. Despite the introduction of stringent operating and safety regimes there remains the possibility of an incident occurring that could threaten the waters and shorelines of countries that are in the vicinity of these routes. Shipboard and international contingency plans assume a level of preparedness which may be limited in some of the countries that lay along these shipping lanes.

Although the probability of significant oil pollution incidents occurring whilst the vessel is on the high seas is minimal, they have occurred, some with considerable impact on the areas concerned.

Whilst the majority of countries have some form of mutual aid and agreements in place and a number have access to equipment stockpiles, there are still a significant number of areas where there is heavy reliance on local resources.

A study carried out by the International Tanker Owners Pollution Federation, found that there is considerable variation in the risk of major oil spills from tanker traffic around the world. Factors contributing to the risks include high traffic density, bad weather conditions and navigational obstacles, these, individually or in any combination could result in a grounding, collision, fire or explosion that could result in a major oil spill.

### Regional Response

There are a number of national, regional and international response organizations operating around the world, although most of them are area specific. The two most notable exceptions are Oil Spill Response Limited (OSRL) in the United Kingdom and East Asia Response Pty Ltd (EARL) in Singapore. Both these organizations operate transport aircraft and have a 24-h response; however, depending where the incident occurs, it could be 48–72 h before first arrival. This presupposes that the area concerned has an airport and infrastructure able to deal with the amount of heavy equipment

required for such operations.

Over the years the International Maritime Organization (IMO) and the United Nations Environmental Programme have been active in promoting regional agreements, aimed at the developing countries ability to deal with a major marine pollution emergency. The International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC Convention) in general terms requires governments and industry to work together to promote active regional agreements aimed at the developing countries ability to deal with a major marine pollution emergency, through development of its National Contingency Plan (NCP).

### The International Oil Pollution Compensation Funds (IOPC Funds)

The International Oil Pollution Compensation Funds (IOPC Funds) are part of an international regime of liability and compensation for oil pollution damage caused by oil spills from tankers. Under the regime the owner of a tanker is liable to pay compensation up to a certain limit for oil pollution damage following an escape of persistent oil from his ship. If that amount does not cover all the admissible claims, further compensation is available from the 1992 Fund if the damage occurs in a State which is a Member of that Fund. Additional compensation may also be available from the Supplementary Fund if the State is a Member of that Fund as well.

There are at present three IOPC Funds: the 1971 Fund, the 1992 Fund and the Supplementary Fund. These three intergovernmental organizations were established at different times (1978, 1996 and 2005 respectively), have different maximum amounts of compensation and have different Member States. The membership of the 1992 Fund is increasing. The Supplementary Fund was established to supplement the compensation available under the 1992 Civil Liability and Fund Conventions with an additional third tier of compensation. Membership of the Supplementary Fund is optional and any State which is a Member of the 1992 Fund may join. The membership of the Supplementary Fund is expected to increase fairly quickly. Due to a number of denunciations of the 1971 Fund Convention, this Convention ceased to be in force on 24 May 2002 and the 1971 Fund therefore no longer has any Member States. The 1971 Fund will continue to deal with a number of incidents which occurred in 1971 Fund Member States before that date. The three organizations have a joint Secretariat, based in London.

The IOPC Funds are financed by levies on certain types of oil carried by sea. The levies are paid by entities which receive oil after sea transport, and normally not by States.

Anyone who has suffered pollution damage in a Member State may make a claim against the IOPC Funds for compensation.

## RESPONSE OPTIONS

In very broad terms the response options open for consideration are open seas, near shore and shoreline response. Depending on a variety of factors such as weather, sensitive areas, type of oil, availability of equipment and personnel, it may not be possible to mount any of the accepted cleanup responses within the open sea or near shore zones and even if responses were attempted, accepting their limitations, we are faced with a shoreline cleanup.

On rare occasions it has been known for oil spills to occur in conditions that have taken the oil away from the shore where it has dispersed naturally. In such circumstances the only action required was to carefully monitor the slick to ensure that conditions remained favourable and kept the oil offshore.

Unfortunately, in the majority of cases, oil spills will threaten the shoreline. More often than not the high profile associated with such events compels organizations to be seen to be doing something, even if it is unproductive. Removing the pollutant from the sea and restoring the marine environment to its pre-spill condition is the optimum course of action.

### Mechanical Containment and Recovery of Oil

Two major steps involved in controlling oil spills are containment and recovery.

**Containment:** When an oil spill occurs on water, it is critical to contain the spill as quickly as possible in order to minimize danger and potential damage to persons, property, and natural resources. Containment equipment is used to restrict the spread of oil and to allow for its recovery, removal, or dispersal. The most common type of equipment used to control the spread of oil is floating barriers, called booms.

Containment booms are used to control the spread of oil to reduce the possibility of polluting shorelines and other resources, as well as to concentrate oil in thicker surface layers, making recovery easier. In addition, booms may be used to divert and channel oil slicks along desired paths, making them easier to remove from the surface of the water.

Although there is a great deal of variation in the design and construction of booms, all generally share four basic characteristics:

- An above-water "freeboard" to contain the oil and to help prevent waves from splashing oil over the top of the boom

- A flotation device
  - A below-water skirt to contain the oil and help reduce the amount of oil lost under the boom
  - A “longitudinal support,” usually a chain or cable running along the bottom of the skirt, that strengthens the boom against wind and wave action; may also serve as a weight or ballast to add stability and help keep the boom upright

Booms can be divided into several basic types. Fence booms have a high freeboard and a flat flotation device, making them least effective in rough water, where wave and wind action can cause the boom to twist. Round or “curtain” booms have a more circular flotation device and a continuous skirt. They perform well in rough water, but are more difficult to clean and store than fence booms. Non-rigid inflatable booms come in many shapes. They are easy to clean and store, and they perform well in rough seas. However, they tend to be expensive, more complicated to use, and puncture and deflate easily. All boom types are greatly affected by the conditions at sea; the higher the waves swell, the less effective booms become.

Booms can be fixed to a structure, such as a pier or a buoy, or towed behind or alongside one or more vessels. When stationary or moored, the boom is anchored below the water surface.

It is necessary for stationary booms to be monitored or tended due to changes produced by shifting tides, tidal currents, winds, or other factors that influence water depth and direction and force of motion. People must tend booms around the clock to monitor and adjust the equipment.

The forces exerted by currents, waves, and wind may impair the ability of a boom to hold oil. Loss of oil occurring when friction between the water and oil causes droplets of oil to separate from the slick and be pulled under the boom is called entrainment. Currents or tow speeds greater than three-quarters of a knot may cause entrainment. Wind and waves can force oil over the top of the boom’s freeboard or even flatten the boom into the water, causing it to release the contained oil. Mechanical problems and improper mooring can also cause a boom to fail.

While most booms perform well in gentle seas with smooth, long waves, rough and choppy water is likely to contribute to boom failure. In some circumstances, lengthening a boom’s skirt or freeboard can help to contain the oil. Because they have more resistance to natural forces such as wind, waves, and currents, oversized booms are more prone to failure or leakage than smaller ones. Generally, booms will not operate properly when waves are higher than one meter or currents are moving faster than one knot per hour. However, new technologies, such as submergence plane booms and entrainment inhibitors, are being developed that will allow booms to operate at higher speeds while retaining more oil.

The effectiveness of containment booms designed to reconcentrate the slick is governed by the weather and speed of response, it was estimated that during the Exxon Valdez incident that the slick had spread to cover an area of 12 sq. km in the first 12 h. If sufficient boom was available it would have been logistically impossible to deploy it in the time for it to work.

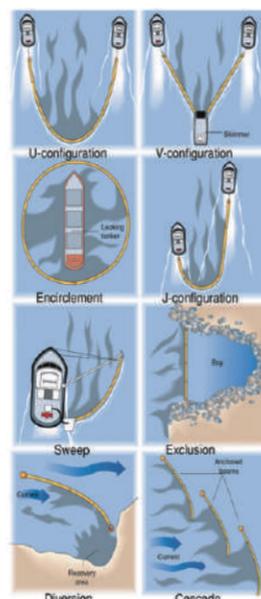
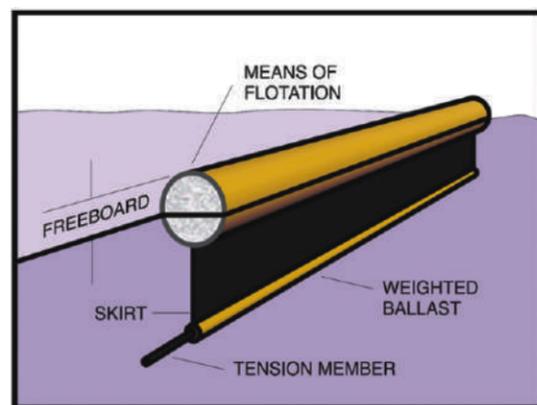
### Other Barriers: Improvised Booms

When a spill occurs and no containment equipment is available, barriers can be improvised from whatever materials are at hand. Although they are most often used as temporary measures to hold or divert oil until more sophisticated equipment arrives, improvised booms can be an effective way to deal with oil spills, particularly in calm water such as streams, slow-moving rivers, or sheltered bays and inlets.

Improvised booms are made from such common materials as wood, plastic pipe, inflated fire hoses, automobile tires, and empty oil drums. They can be as simple as a board placed across the surface of a slow-moving stream, or a berm built by bulldozers pushing a wall of sand out from the beach to divert oil from a sensitive section of shoreline.

### Recovery of Oil:

Once an oil spill has been contained, efforts to remove the oil from the water can begin. Three different types of equipment – booms, skimmers, and sorbents – are commonly used to recover oil from the surface.



Configurations for boom deployment.

### Booms

When used in recovering oil, booms are often supported by a horizontal arm extending directly off one or both sides of a vessel. Sailing through the heaviest sections of the spill at low speeds, a vessel scoops the oil and traps it between the angle of the boom and the vessel’s hull. In another variation, a boom is moored at the end points of a rigid arm extended from the vessel, forming a “U”- or “J”-shaped pocket in which oil can collect. In either case, the trapped oil can then be pumped out to holding tanks and returned to shore for proper disposal or recycling.

### Skimmers

A skimmer is a device for recovery of spilled oil from the water’s surface. Skimmers may be self-propelled and may be used from shore or operated from vessels. The efficiency of skimmers depends on weather conditions. In moderately rough or choppy water, skimmers tend to recover more water than oil. Three types of skimmers – weir, oleophilic, and suction – are described below. Each type offers advantages and drawbacks, depending on the type of oil being cleaned up, the conditions of the sea during cleanup efforts, and the presence of ice or debris in the water.

Weir skimmers use a dam or enclosure positioned at the oil/water interface. Oil floating on top of the water will spill over the dam and be trapped in a well inside, bringing with it as little water as possible. The trapped oil and water mixture can then be pumped out through a pipe or hose to a storage tank for recycling or disposal. These skimmers are prone to becoming jammed and clogged by floating debris.

Oleophilic (oil-attracting) skimmers use belts, disks, or continuous mop chains of oleophilic materials to blot the oil from the water surface. The oil is then squeezed out or scraped off into a recovery tank. Oleophilic skimmers have the advantage of flexibility, allowing them to be used effectively on spills of any thickness. Some types, such as chain or “rope-mop” skimmers, work well on water that is choked with debris or rough ice.

A suction skimmer operates like a household vacuum cleaner. Oil is sucked up through wide floating heads and pumped into storage tanks. Although suction skimmers are generally very efficient, they are vulnerable to becoming clogged by debris and require constant skilled observation. Suction skimmers operate best on smooth water where oil has collected against a boom or barrier.

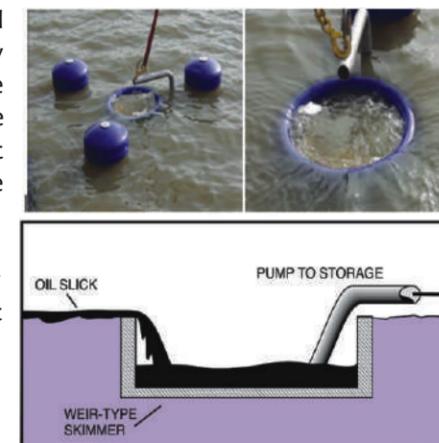
### Sorbents

Sorbents are materials that soak up liquids. They can be used to recover oil through the mechanisms of absorption, adsorption, or both. Absorbents allow oil to penetrate into pore spaces in the material they are made of, while adsorbents attract oil to their surfaces but do not allow it to penetrate into the material. To be useful in combating oil spills, sorbents need to be both oleophilic and hydrophobic (water-repellant). Although they may be used as the sole cleanup method in small spills, sorbents are most often used to remove final traces of oil, or in areas that cannot be reached by skimmers. Once sorbents have been used to recover oil, they must be removed from the water and properly disposed of on land or cleaned for re-use. Any oil that is removed from sorbent materials must also be properly disposed of or recycled.

Sorbents can be divided into three basic categories: natural organic, natural inorganic, and synthetic. Natural organic sorbents include peat moss, straw, hay, sawdust, ground corncobs, feathers, and other carbon-based products. They are relatively inexpensive and usually readily available. Organic sorbents can soak up from 3 to 15 times their weight in oil, but they do present some disadvantages. Some organic sorbents tend to soak up water as well as oil, causing them to sink. Many organic sorbents are loose particles, such as sawdust, and are difficult to collect after they are spread on the water. Adding flotation devices, such as empty drums attached to sorbent bales of hay, can help to overcome the sinking problem, and wrapping loose particles in mesh will aid in collection.

Natural inorganic sorbents include clay, perlite, vermiculite, glass, wool, sand, and volcanic ash. They can absorb from 4 to 20 times their weight in oil. Inorganic substances, like organic substances, are inexpensive and readily available in large quantities.

Synthetic sorbents include man-made materials that are similar to plastics, such as polyurethane, polyethylene, and nylon fibers. Most synthetic sorbents can absorb as much as 70 times their weight in oil, and some types can be cleaned and reused several times. Synthetic sorbents that cannot be cleaned after they are used can present difficulties because they must be stored temporarily until they can be disposed of properly.



### Alternative Countermeasures

Chemical and biological treatment of oil can be used in place of mechanical methods, especially in areas where untreated oil may reach shorelines and sensitive habitats where a cleanup becomes difficult and environmentally damaging. Alternative treatment typically involves adding chemical or biological agents to spilled oil and also includes in-situ burning. Two types of substances commonly used in responding to an oil spill are dispersing agents and biological agents.



### Dispersing Agents

Dispersing agents, also called dispersants, are chemicals that contain surfactants, or compounds that act to break liquid substances such as oil into small droplets. In an oil spill, these droplets disperse into the water column, where they are subjected to natural processes – such as wind, waves, and currents – that help to break them down further. This helps to clear oil from the water surface, making it less likely that the oil slick will reach the shoreline.

The effectiveness of a dispersant is determined by the composition of the oil it is being used to treat and the method and rate at which the dispersant is applied. Heavy crude oils do not disperse as well as light- to medium-weight oils. Dispersants are most effective when applied immediately following a spill, before the lightest components in the oil have evaporated.



Helicopters are often used to apply dispersants to large areas

Environmental factors, including water salinity and temperature, and conditions at sea influence the effectiveness of dispersants. Studies have shown that many dispersants work best at salinity levels close to that of normal seawater. While dispersants can work in cold water, they work best in warm water.

Some countries rely almost exclusively on dispersants to combat oil spills because frequently rough or choppy conditions at sea make mechanical containment and cleanup difficult. Dispersants used today are much less toxic than those used in the past, but few long-term environmental effects tests have been conducted after a dispersant application.

These problems are being overcome, however. New technologies that improve the application of dispersants are being designed. The effectiveness of

dispersants is being tested in laboratories and in actual spill situations, and the information collected is being used to help design more effective dispersants.

### Biological Agents

Biological agents are nutrients, enzymes, or microorganisms that increase the rate at which natural biodegradation occurs. Biodegradation is a process by which microorganisms such as bacteria, fungi, and yeasts break down complex compounds into simpler products to obtain energy and nutrients.

Biodegradation of oil is a natural process that slowly – over the course of weeks, months, or years – removes oil from the environment. However, rapid removal of spilled oil from shorelines and wetlands may be necessary in order to minimize potential environmental damage to these sensitive habitats.

Bioremediation technologies can help biodegradation processes work faster. Bioremediation refers to the act of adding materials to the environment, such as fertilizers or microorganisms, that will increase the rate at which natural biodegradation occurs. Furthermore, bioremediation is often used after all mechanical oil recovery methods have been used. Two bioremediation approaches have been used in the United States for oil spill cleanups – biostimulation and bioaugmentation.

Biostimulation is the method of adding nutrients such as phosphorus and nitrogen to a contaminated environment to stimulate the growth of the microorganisms that break down oil. Limited supplies of these necessary nutrients usually control the growth of native microorganism populations. When nutrients are added, the native microorganism population can grow rapidly, potentially increasing the rate of biodegradation.

Bioaugmentation is the addition of microorganisms to the existing native oil-degrading population. Sometimes species of bacteria that do not naturally exist in an area will be added to the native population. As with nutrient addition, the purpose of seeding is to increase the population of microorganisms that can biodegrade the spilled oil. This process is seldom needed, however, because hydrocarbon-degrading bacterial exist almost everywhere and non-indigenous species are often unable to compete successfully with native microorganisms.

During the Exxon Valdez oil spill cleanup and restoration activities, the use of bioremediation products was authorized, including biostimulation and bioaugmentation. Nutrient addition use was approved for approximately 100 miles of the Prince William Sound shoreline. Data collected through a monitoring protocol required by the State of Alaska indicated that nutrient addition accelerated the natural degradation of oil with no observed eutrophication or toxicity.

### In-Situ Burning

In-situ burning of oil involves the ignition and controlled combustion of oil. It can be used when oil is spilled on a water body or on land. In-situ burning is typically used in conjunction with mechanical recovery on open water. Fire resistant booms are often used to collect and concentrate the oil into a slick that is thick enough to burn.

Many factors influence the decision to use in-situ burning on inland or coastal waters. Elements affecting the use of burning include water temperature, wind direction and speed, wave amplitude, slick thickness, oil type, and the amount of oil weathering and emulsification that have occurred. Weathering is a measure of the amount of oil already having escaped to the atmosphere through evaporation. Emulsification is the process of oil mixing with water. Oil layer thickness, weathering, and emulsification are usually dependent upon the time period between the actual spill and the start of burn operations. For many spills, there is only a short “window of opportunity” during which in-situ burning is a viable option.

The major issues for in-situ burning of inland spills are proximity to human populations (burning must take place at least three miles away from population at risk), soil type, water level, erosion potential, vegetation species and condition, and wildlife species presence. Burning may actually allow oil to penetrate further into some soils and shoreline sediments.

Because it releases pollutants into the air, in-situ burning requires careful air quality monitoring. Devices are pre-deployed near populations to measure particulate levels. If air quality standards are exceeded, the burn will be terminated.

Because in-situ burning uses intense heat sources, it poses additional danger to response personnel. Igniting an oil slick requires a device that can deliver an intense heat source to the oil.

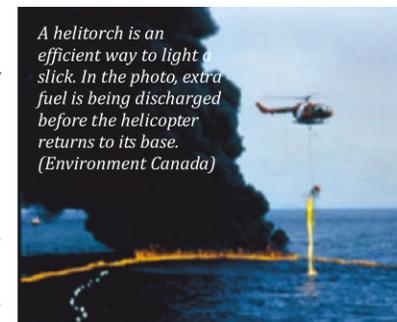
Vessel-deployed ignition devices are soaked with a volatile compound, lit, and allowed to drift into an oil slick. Hand-held ignition systems can be thrown into oil slicks but require personnel to be in close proximity to the burning oil. A recently developed ignition device called the “Helitorch,” delivers a falling stream of burning fuel from a helicopter, allowing personnel to maintain a safer distance from the burning slick and distribute ignition sources over a wider area.

Although it can be effective in some situations, in-situ burning is rarely used on marine spills because of widespread concern over atmospheric emissions and uncertainty about its impacts on human and environmental health. However, burning of inland spills is frequently used in a number of states. All burns produce significant amounts of particulate matter, dependent on the type of oil being burned. Burning oil delivers polycyclic aromatic hydrocarbons, volatile organic compounds, carbon dioxide, and carbon monoxide into the air in addition to other compounds at lower levels. In addition, when circumstances make it more difficult to ignite the oil, an accelerant such as gasoline may need to be added, possibly increasing the toxicity of the volatilizing particles. Lack of data regarding the environmental and human health effects of burning has also discouraged its use.

Despite its drawbacks, in-situ burning may be an efficient cleanup method under certain conditions where there are few negative effects on humans or the environment. These conditions include remote areas, areas with herbaceous or dormant vegetation, and water or land covered with snow or ice.



Recovered oil is burned at a spill in the U.S. Beaufort Sea. (Al Allen)



A helitorch is an efficient way to light a slick. In the photo, extra fuel is being discharged before the helicopter returns to its base. (Environment Canada)

### OIL SPILL CLEANUP COST

Obtaining detailed cost information for spills is generally difficult. Understandably many aspects of the clean-up operations and damage claims are confidential business agreements or settlements between claimants and those providing compensation. Detailed cost data are therefore not readily available.

Some cost data is published in the Annual Report of the International Oil Pollution Compensation Funds, but this only concerns spills in States that are party to the Fund Conventions. Because the IOPC Fund only becomes involved in paying compensation once the total value of claims has exceeded the tanker owner’s limit of liability under the Civil Liability Conventions, the IOPC data set tends to concern only the larger and more expensive spills. There is also a restricted geographical spread of IOPC Fund cases. American spill (United States is not party to the Fund Conventions) cost data is generally in the public domain and published on the internet, but such data is not representative of costs in other countries because of the uniqueness of the US response and damage assessment systems.

It is evident from the past incidents between spill cost and size of tanker. Part of the reason for this is that it is exceptionally rare for a vessel to spill all the oil it carried on board. The usual scenario is that part of the contents of one or more tanks is lost as a result of physical damage. This means that there is not a very clear link between vessel size and volume spilled in an incident. Indeed, some of the most troublesome spills have been caused by relatively small tankers. In these cases the most important factor has been the type of oil spilled.

Another part of the problem is the fact that the quantity of oil spilled is not closely related to the cost of the spill. There are so many different variables involved that it makes little sense, for example, to think of cost in terms of “average” clean-up costs per tonne of oil spilled. In fact, even within a limited geographic area, it is impossible to give a reliable average cost per tonne spilled because every oil spill is different with its own unique set of conditions.

One of the most expensive oil spills in history is the Exxon Valdez (Alaska, 1989). Cleanup alone cost in the region of US\$2.5 billion and total costs (including fines, penalties and claims settlements) have, at times been estimated at as much as US\$7 billion. The court cases continue, however, so the final costs are not yet known. The Amoco Cadiz (France, 1978) reportedly cost about US \$282 million, of which about half was for legal fees and accrued interest. The cost of cleaning up after the Sea Empress (UK, 1996) was US\$37 million, with total costs for the incident more than US\$60 million once all damage settlements were made.

More recently, the disastrous Deepwater Horizon oil spill (April, 2010) caused the principal developer, BP, to shell out huge amount of money for the clean-up. BP has been charged an extra \$400m on top of the \$40.9bn it had previously designated for the clean-up. The amount comes largely from assets that BP sold off after the incident. This has had a significant impact on its capacity – the total amount of oil produced by BP fell by 11% to 3.578m barrels a day.

BP has agreed a \$1bn early restoration programme for natural resource damage in the Gulf. The Coast Claims Facility has so far received 267,960 compensation claims from individuals, with over half still to be processed.



### Factors Affecting the Costs of Spills

The factors that affect cleanup cost are complex and interrelated. Each spill involves a unique set of circumstances that determine cleanup cost.

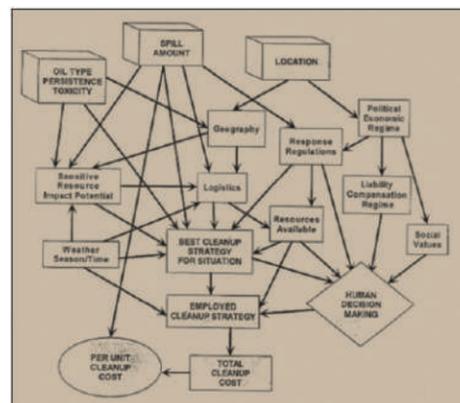
The costs associated with cleaning up an oil spill are strongly influenced by the circumstances surrounding the spill including: the type of product spilled; the location and timing of the spill; sensitive areas affected or threatened; liability limits in place; local and national laws; and cleanup strategy. The most important factors determining a per-unit amount (either per-gallon or per-tonne) cost are location and oil type, and possibly total spill amount. The complex interrelationships of these factors and the manner in which they are influenced by other factors is shown in the figure below

The following sections explore the various technical factors which play a role in determining the costs of cleanup and damage.

### Type of Oil

Oil type is one of the most important factors governing cleanup costs. In general, the more viscous, sticky and persistent the oil, the more difficult and costly the cleanup is likely to be, all other factors being equal. Spills of light refined products (e.g. gasoline and diesel) do not normally require a cleanup response. They may be toxic in the short term and require careful monitoring, but because of their high volatility, they do not persist on the sea surface for any significant time. Instead, due to rapid evaporation of the “light end” components and the speed with which they disperse and dissipate naturally, especially in rough seas, spills of light hydrocarbons do not result in long, expensive cleanup operations. At the other end of the spectrum are the highly persistent heavy crude oils and heavy fuel oils which are normally very viscous and have only a small proportion of volatile components. Because they do not break-up easily and often emulsify into persistent mats of oil, these oils have the potential to travel great distances from the original spill location and can cause widespread contamination of coastlines. They are difficult to clean up at sea, in coastal waters and on shorelines. As a consequence, cleanup is invariably long, resource- and manpower-intensive, and therefore, costly.

The nature of potential damage also varies according to the type of oil spilled. Light refined products may constitute a fire and explosion hazard which may require restricting access and the temporary closure of port areas or nearby industry. As mentioned above, light oils tend to be more toxic than heavier oils, which can lead to mortalities of marine plants and animals if there are sufficiently high concentrations in the water column. This is not always the case because the dilution of



such oils is relatively fast, but it may occur if there is strong wave action in shallow waters, where dilution is less important. Such oils may also cause the tainting of edible fish, shellfish and other marine products. All such effects will, however, usually be highly localized and short-lived because the toxic components are also the ones that evaporate most rapidly, and fish and shellfish rapidly lose the taint once clean water conditions return.

Heavy fuel oils and crude oils are generally of low toxicity and their main impact is usually through physical contamination. Birds and other wildlife may become coated, and tourist beaches, fishing gear, mariculture facilities and other structures can also be contaminated and require cleaning. In some circumstances heavier oils can sink if they interact with sediment particles, which can result in the prolonged contamination of the sea bed. Sunken oil can be a reservoir for the fouling of bottom fishing gear and may cause repeated re-oiling of cleaned beaches if the sunken oil is remobilised after storms. All these problems can result in large claims for clean up costs and economic loss.

Between the two extremes of gasoline and heavy fuel oil there are many intermediate crude oils and refined products that are transported by tankers and used in a variety of marine engines. The fate and effects of all these oils, as well as the requirement for cleanup, will vary greatly, which will also mean that cost varies greatly.

### Amount Spilled, Spill Location and Rate of Spillage

The amount of oil spilled is clearly an important factor in determining overall response costs and damages. For example, if all other factors are similar, a 10,000 tonne spill is likely to result in far wider zone of contamination and impact than a 100 tonne spill. However, the location of the spill is also important. For example, the three largest tanker spills of all time - Atlantic Empress off Tobago, West Indies in 1979, ABT Summer off Angola in 1991 and Castillo De Bellver off South Africa in 1983 resulted in minimal cleanup and damages because these spills happened well offshore and none of the spilled oil contaminated coastlines. In such circumstances the cost of the response would normally be limited to aerial surveillance to monitor slick movement and natural dissipation. This emphasizes the inappropriateness of simplistic comparisons between the costs of individual spills based on the single parameter of spill volume.



The rate of spillage can also be an important factor. For example, the cleanup operation required in response to a single large release of oil may be considerable but may be completed in a matter of weeks. However, the same quantity of oil lost over several months from a damaged vessel close to the coast may require a prolonged cleanup effort, with repeated cleaning of amenity areas and potentially more prolonged effects on fishery resources and tourism.

The physical characteristics of the spill site (e.g. prevailing winds and weather, tidal range, currents, water depth, coastal topography) also have a bearing on cost as they affect the feasibility and difficulty of mounting response operations at sea and ashore. The sensitivity of different shoreline types, the extent to which they self-clean, and the availability and cost of local labour and resources will influence the overall cost of an oil spill cleanup.

Socio-economic factors and resources at risk vary both within and between countries. Some areas will be of high national or even international importance for fishing, mariculture, tourism, other industries or conservation, whereas others will only rank as locally important. Seasonal differences will also occur in the sensitivity of these resources to oil pollution and therefore the economic impact of a spill. This in turn will help determine the requirement for and extent of the cleanup and thus its cost.

### Cleanup at Sea

As noted earlier, oil spills will sometimes dissipate naturally and not pose a threat to sensitive coastal resources. On other occasions there may be little that can be done due to bad weather or other particular circumstances. Under such circumstances, the decision to not attempt to respond may, nonetheless, be a difficult one, especially as it is likely to be viewed by the public, politicians and media as unacceptable. It is sometimes observed that an active response is therefore often adopted even when technical opinion is agreed that it is unlikely to have a significant benefit. Part of this may be a result of the fact that oil spilled on the surface of the sea spreads rapidly, thereby extending over an area that is too great to be countered by available techniques. Added to this are the limitations on containment and collection systems imposed by winds, waves and currents, and the problems posed for the effective use of chemical dispersants by high viscosity oils and the rapid formation of water-in-oil emulsions (“mousse”). At times, these technical realities frequently fail to deter those in charge from deploying numerous oil recovery ships or dispersant spraying vessels and aircraft in order to be “seen to be doing something”. In extreme cases an ineffective at-sea response may be continued for a long period, leading to high cleanup costs for little or no benefit. The actual cost-effectiveness of an at-sea response will depend upon many factors including the nature of the incident; the availability of trained personnel and required equipment and materials; the number of vessels, aircraft and specialized equipment employed; and, perhaps most importantly, the effectiveness of the pre-spill planning and the control of the actual operations.

## Shoreline Cleanup

Shoreline cleanup frequently relies on manual recovery methods and locally-available equipment. In terms of amount of oil collected relative to financial outlay it is often more cost effective than an at-sea response, which typically requires expensive equipment, vessels, aircraft and trained operators.

An important factor in the cost of shoreline cleanup is the extent to which cleaning is required to bring the contaminated area to a condition considered as acceptable. The first stage in most shoreline response along a heavily contaminated shoreline is the removal of bulk oil. This is hard work, yet is often relatively straightforward and can be accomplished quickly, depending on the type of shoreline (e.g. rock, sand, mud) and ease of access. The type and amount of oil involved, the time of year, prevailing weather conditions and other factors will also influence the ease with which thick accumulations of bulk oil can be removed.

As the cleanup operation progresses and the degree of contamination is continually reduced, ever more effort is required to effect further improvement. The operation becomes one of diminishing returns, with costs escalating rapidly as the amount of remaining oil becomes less and less. This is one of the key reasons that shoreline cleanup costs cannot be related directly to the degree of initial contamination: the level of effort to deal with a lightly contaminated area during the “secondary” and final cleaning may be very similar to that expended in the first place on the heavily oiled area. The overall costs therefore depend to a large extent on the degree of fine cleaning required for each location and the duration of work until the operation can finally be terminated.



## Management of Response Operations

Unfortunately, poor management and inadequate planning often result in the mistakes of previous spills being repeated time and time again. The result is damage to the environment and economic resources that could have been avoided and thus, excessive costs. The tendency to react to political, media and public perceptions and pressures, rather than basing decisions on technical realities, is a special problem that can also escalate the cost of any incident beyond what would be considered “reasonable” under the international compensation conventions.

## OIL SPILL MANAGEMENT IN INDIA

The Oil Pollution Preparedness, Response and Cooperation (OPRC) Convention, 1990 established by the International Maritime Organization (IMO) provides all states to establish measures for dealing with pollution incidents either nationally or in cooperation with other countries. Consequently, the Government of India directed Indian Coast Guard (ICG) to prepare a National Oil Spill Disaster Contingency Plan (NOSDCP).

The ICG was formed in 1977 for protection of maritime and other national interests in the Maritime Zones of India. The Coast Guard Act, 1978 specifies the charter of duties of the Coast Guard. The ICG assumed the responsibility of protecting the marine environment in the maritime zones constituting the territorial waters and Exclusive Economic Zone on 07 Mar 1986, when the responsibilities were transferred from the Ministry of Shipping.

The NOSDCP was approved by the Committee of Secretaries on 04 Nov 1993 and the ICG published and promulgated the NOSDCP for combating the oil spill at sea at the national level in Jul 1996. Since 2003, the NOSDCP has come under the purview of the National Disaster Management Authority, Ministry of Home Affairs under the **Marine Oil spill Management in India**.

The NOSDCP envisages the Director General Indian Coast Guard (DGICG) as the Central Coordinating Authority (CCA) for enforcing the provisions of the NOSDCP in the Maritime Zones of India, and delineates the duties and responsibility of each participating agency.

## National Oil Spill Disaster Contingency Plan

The Indian Coast Guard coordinates NOSDCP preparedness meeting annually and delegates from the Government departments, Ports, Oil industry, Oil explorations units and State Pollution Control Boards participates in the meeting. The NOSDCP meeting addresses various issues related to the preparedness of the State Governments, Ports and Oil handling agencies to establish the necessary pollution response capability to combat marine oil spill in their area of responsibility.

## Contingency Planning and Tier- I Response Capability

As per the directives of the Ministry of Shipping and Department of Oil Industry Safety Directorate (Ministry of Petroleum and Natural Gas), the Ports and the Oil Handling agencies are to establish oil pollution contingency plan and tier-I pollution response capacity to address oil spills upto 700 tons in their respective area of jurisdictions. The NOSDCP preparedness meetings, therefore, review the progress made by various stake holders in developing Tier-1 oil spill response in their area of responsibility and also discusses other issues related to coordination, training, exercise and best practices. The protection of marine environment against oil spill is a challenge confronting the country in the backdrop of growing trade through sea and increase in shipping traffic.

## OIL SPILL MODELLING AND MAPPING OF OIL SPILL RISK AREAS IN INDIA

Detection of oil spills and predicting its movement towards Indian shores and assessment of extent of damage is an important activity pre-requisite for management and oil spills and combating its ill effects. The Ministry of Earth Sciences has developed this expertise under the programme on ‘Oil Spill Modelling and Mapping of Oil Spill Risk Areas’.

The potential threat from operational or accidental oil spills from tankers and other oil related activities could lead to large scale destruction of marine life and property of the coastal region. Oil spills in marine waters can damage social and economic systems as well as the natural environment of surrounding seas which support valuable fishing grounds, coastal ecosystems, Protected Marine National Park areas, long recreational and tourist beaches. Protection of marine life, environmental resources and property, prevention of loss of resources against oil spills damages is a priority concern for oil spill management in India. The Western part of Indian Exclusive Economic Zone (EEZ), Lakshadweep and the Nicobar Islands lie close to one of the major oil tanker routes originating from the Gulf countries going to South East Asia. Nearly 500 million tones of crude oil are carried by about 3500 tankers along this route. Any major oil spill occurring in the Arabian Sea and Bay of Bengal will lead to large scale damage to marine environment. The country has several ecologically sensitive areas like Coral Reefs, mangroves and areas of unique biodiversity like turtle nesting grounds, etc. To protect these areas against oil spill damages, the country has a spill management programme since 1980. The important aspects include R&D in oil spill detection, management, combating and legal aspects.

Under this Oil Spill Modelling and Mapping of Oil Spill Risk Areas following are covered

- Development of oil spill trajectory model indicating the movement of oil spills from Western and Eastern EEZ to the coastal areas of the country.
- Development area/habitat specific oil spill models for high risk areas;
- Operationalising the model during oil spill incidents.

## Priority Areas That Need Protection

All the major ports along the Indian coastline, the locations of Single Point Moorings (SPMs), and exploration, locations of oil refineries, tanker movements, and areas pose risk of oil spills. The ecologically and environmentally sensitive areas namely mangrove, coral reef, lagoons and turtle nesting grounds; economically sensitive areas like tourist beaches and archeologically sensitive areas such as Forts, ancient monuments etc face various levels of oil spill threats.

## Oil Spill Trajectory Model

Integrated Coastal Marine Area Management Project Directorate (ICMAM-PD), Chennai, an R&D unit of the Ministry has developed this model which contains the following:

- Tracking of oil spills from offshore to coastal areas of India based on wind speed, wind velocity, sea current, etc.;
- The ICMAM-PD has also developed habitat specific oil spill model for Gulf of Kutch;
- Strategies that need to be adopted for high risk areas

The oil spill trajectory model for tracking oil spills has already been installed at Indian National Centre for Ocean Information Services (INCOIS), Hyderabad, an autonomous institute under this Ministry, which mans it on 24x7 basis along with interim tsunami warning system. In case of an oil spill, INCOIS will run this model and provide prediction along with recommendations to Coast Guard, Disaster Management Office and other senior functionaries in the Government.

## Benefits

- Timely deployment of booms to prevent movement of oil to sensitive coastal habitats (corals, mangroves, beaches, lagoons) and damage to marine life;
- Timely information to industries/power plants which have sea water intake system for cooling purposes, etc. so that their systems are not damaged.
- Estimation of loss of resources, which will help in claiming compensation.

## How Does the Model Work

**Step 1:** Detection of loss of oil by tankers/spotting of oil spill by Coast Guard Surveillance Ship/Indian Navy Passing Vessels/Maritime Rescue Center

**Step 2:** Information on location, quantity of oil spilled etc. passed on to INCOIS

**Step 3:** Model is run by INCOIS based on oil type, location, bathymetry (depth of water) live data of wind speed, wind direction, sea current, tide condition, etc.

**Step 4:** Likely path to be taken by oil spill and shoreline to be affected are predicted by Model;

**Step 5:** Online intimation sent to Coast Guard, concerned Port Authority, State Government, MHA, NDMA, State Pollution Control Board, etc.

The path and affected areas are further refined every three hours or as required based on latest data on wind speed & wind direction.

Position of oil spill will also be tracked based on satellite picture by INCOIS and/or by aerial survey by Coast Guard.

## WORLDWIDE SCENARIO

Public concern over marine oil spills has been clearly augmented since the 1967 Torrey Canyon supertanker accident off the UK coast, when 100,000 tonnes of spilled oil caused heavy pollution of the French and British shores with serious ecological and fisheries consequences. The highly publicized 1989 spill of the Exxon Valdez in Prince William Sound, Alaska caused unprecedented damage to the fragile Arctic system. Marshes and sediments in Prince William Sound retained oil for many years, affecting the development of fish embryos on the bottom. Since then, impressive technical, political, and legal experience in managing the problem has been gained in many countries and at the international level, mainly through a number of Conventions initiated by the International Maritime Organization (IMO). As a result of the Exxon Valdez oil spill, the U.S. passed legislation requiring all newly built tankers to have a double hull.

After ten years of Exxon Valdez oil spill, pockets of oil remained in the marshes, and mussels, clams, ducks and sea otters showed evidence of harm in some localized areas. Remedial actions after oil spills are controversial, and some of the cures (e.g. aggressive cleaning with large heavy equipment) may be worse than the original problem, as was seen in the attempted clean up after the Exxon Valdez oil spill.

### WORLD'S WORST OIL SPILLS

There are many ways to measure the severity of oil spills – from the volume spilled to the extent of environmental damage to the cost of clean-up and recovery. The following list describes the worst oil spills in history, judged by the amount of oil released into the environment.



#### 1. Gulf War Oil Spill

Date: January 19, 1991

Location: Persian Gulf, Kuwait

Oil Spilled: 380 million-520 million gallons

Ironically, the worst oil spill in human history wasn't the result of an accident. During the Gulf War, Iraqi forces, attempting to thwart a potential landing of American soldiers, opened the valves at an offshore oil terminal and dumped oil from several tankers. The oil they released created a 4-inch thick oil slick that covered 4000 square miles. To put it in

perspective, that's enough oil to cover the entire state of Rhode Island one foot deep in oil.



#### 2. Deepwater Horizon Oil Spill

Date: April 20 - July 15, 2011

Location: Gulf of Mexico

Oil Spilled: 205.8 million gallons

The Deepwater Horizon oil spill (also known as the Gulf of Mexico Oil Spill or the BP Oil Spill) is the largest marine oil spill in history, and was caused by an explosion on the Deepwater Horizon offshore oil platform about 50 miles southeast of the Mississippi River delta on April 20, 2010. Most of the 126 workers on the platform were safely evacuated. Eleven workers were presumed killed in the initial explosion. The Deepwater

Horizon sank in about 5,000 feet (1,500 m) of water on April 22, 2010. On April 23 the U.S. Coast Guard suspended the search for missing workers who are all presumed dead. After a series of failed efforts to plug the leak, BP said on July 15 that it had capped the well, stopping the flow of oil into the Gulf of Mexico for the first time in 86 days.



#### 3. Lakeview Gusher

Date: March 1910-September 1911

Location: Kern Country, California

Oil Spilled: 378 million gallons

The worst accidental oil spill in U.S. and world history occurred in 1910, when a crew drilling for oil beneath California scrubland tapped into a high-pressure reservoir 2,200 feet below the surface. The resulting gusher destroyed the wooden derrick and caused a

crater so large that no one could get close enough to make a serious attempt at stopping the geyser of oil that continued uncontrolled for approximately 18 months.



#### 4. Ixtoc 1 Oil Spill

Date: June 3, 1979 through March 23, 1980

Location: Bay of Campeche, Mexico

Oil Spilled: 140 million gallons

A blowout occurred at an offshore oil well that Pemex, a state-owned Mexican oil company, was drilling in the Bay of Campeche, off the coast of Ciudad del Carmen in Mexico. The oil caught fire, the drilling rig collapsed, and oil gushed out of the damaged well at a rate of 10,000 to 30,000 barrels a day for more than nine months before workers succeeded in capping the well and stopping the leak.



#### 5. Atlantic Empress / Aegean Captain Oil Spill

Date: July 19, 1979

Location: Off the coast of Trinidad and Tobago

Oil Spilled: 90 million gallons

On July 19, 1979, two oil tankers, the Atlantic Empress and the Aegean Captain, collided off the coast of Trinidad and Tobago during a tropical storm. The two ships, which were carrying about 500,000 tons (154 million gallons) of crude oil between them, caught fire on impact. Emergency crews extinguished the fire on the Aegean Captain and towed it to shore, but the fire on the Atlantic Empress continued to burn out of control. The damaged ship lost approximately 90 million gallons of oil – the record for a ship-related oil spill – before it exploded and sank on August 3, 1979.



#### 6. Kolva River Oil Spill

Date: September 8, 1994

Location: Kolva River, Russia

Oil Spilled: 84 million gallons

A ruptured pipeline had been leaking for eight months, but the oil was contained by a dike. When the dike collapsed, millions of gallons of oil spilled into the Kolva River in the

Russian Arctic.



#### 7. Nowruz Oil Field Oil Spill

Date: February 10-September 18, 1983

Location: Persian Gulf, Iran

Oil Spilled: 80 million gallons

During the Iran-Iraq war, an oil tanker crashed into an offshore oil platform at the Nowruz Oil Field in the Persian Gulf. Fighting delayed efforts to stop the oil spill, which was dumping about 1,500 barrels of oil into the Persian Gulf each day. In March, Iraqi planes attacked the oil field, the damaged platform collapsed, and the oil slick caught fire. The Iranians finally managed to cap the well in September, an operation that claimed the lives of 11 people.



#### 8. Castillo de Bellver Oil Spill

Date: August 6, 1983

Location: Saldanha Bay, South Africa

Oil Spilled: 79 million gallons

The Castillo de Bellver oil tanker caught fire about 70 miles northwest of Cape Town, South Africa, then drifted before finally breaking apart 25 miles off the coast, presenting South Africa with its worst-ever marine environmental disaster. The stern sank in deep water with approximately 31 million gallons of oil still aboard. The bow section was towed far away from the coast by Altatech, a marine services company, then scuttled and sunk in a controlled manner to minimize pollution.



#### 9. Amoco Cadiz Oil Spill

Date: March 16-17, 1978

Location: Portsall, France

Oil Spilled: 69 million gallons

The oil supertanker Amoco Cadiz was caught in a violent winter storm that damaged its rudder, making it impossible for the crew to steer the ship. The captain sent out a distress signal and several ships responded, but nothing could stop the huge tanker from

running aground. On March 17, the ship broke in two and spilled its entire cargo – 69 million gallons of crude oil – into the English Channel.

#### 10. ABT Summer Oil Spill

Date: May 28, 1991

Location: approximately 700 nautical miles off the coast of Angola

Oil Spilled: 51-81 million gallons

The ABT Summer, an oil tanker carrying 260,000 tons of oil, was en route from Iran to Rotterdam when it exploded and caught fire on May 28, 1991. After three days, the ship finally sank about 1,300 kilometers (more than 800 miles) off the coast of Angola. Because the accident occurred so far offshore, it was assumed that high seas would disperse the oil spill naturally. As a result, not much was done to clean up the oil.

#### 11. M/T Haven Tanker Oil Spill

Date: April 11, 1991

Location: Genoa, Italy

Oil Spilled: 45 million gallons

On April 11, 1991, the M/T Haven was unloading a cargo of 230,000 tons of crude oil at the Multedo platform, about seven miles off the coast of Genoa, Italy. When something went wrong during a routine operation, the ship exploded and caught fire, killing six people and spilling oil into the Mediterranean Sea. Italian authorities attempted to tow the tanker closer to shore, to reduce the coastal area affected by the oil spill and to improve access to the wreck, but the ship broke in two and sank. For the next 12 years, the ship continued to pollute the Mediterranean coasts of Italy and France.

#### 12. Odyssey and Ocean Odyssey Oil Spills

Date: September / November, 1988

Location: Off the East Coast of Canada

Oil Spilled: About 43 million gallons per spill

Two oil spills that occurred hundreds of miles off the east coast of Canada in autumn 1988 are often mistaken for each other. In September 22, 1988, the Ocean Odyssey, an American-owned offshore drilling rig, exploded and dumped more than a million barrels (about 43 million gallons) of oil into the North Sea. The ultimate direct cause of the incident was a failure of the subsea wellhead equipment after a prolonged period of well control. One person was killed, 66 others were rescued.

Odyssey, a British-owned oil tanker, was an oil tanker in operation from 1971 to November 10, 1988, when an explosion occurred on board, causing the ship to break into two and begin sinking in the North Atlantic off the coast of Canada. As the ship sank 700 nautical miles (1,300 km) off the coast of Nova Scotia, a fire broke out on its stern section, causing the oil on board to catch fire and spilling about a million barrels of oil. All 27 crew members were missing and presumed dead.

By volume, the Exxon Valdez oil spill ranks around 35th, but it is considered an environmental disaster because the oil spill occurred in the pristine environment of Alaska's Prince William Sound and the oil fouled 1,100 miles of coastline.

## INDIAN SCENARIO

India, particularly the Arabian Sea is not new to oil spills what with a number of oil refineries along the coasts of Maharashtra and Gujarat. However, there have been few major spills in the region.

Recently, the collision of two large ships off the Mumbai coast and the resulting oil spill has come as a test of India's preparedness to handle shipping disasters. A strong oil spill response system is of paramount importance. Yet capacity-building efforts in major ports have not kept pace with the need.

It is precisely to meet such challenges that a National Oil Spill Disaster Contingency Plan (NOS-DCP) was drawn up in 1996. Based on this, all ports should by now possess functional spill response systems. The proceedings of the 14th NOS-DCP and Preparedness Meeting held in 2009 highlighted the slow progress in achieving full response capacity even at the basic level at Mumbai and JNPT ports.

India has ratified key environmental and shipping conventions, including the International Convention on Oil Pollution Preparedness, Response and Cooperation. The national coastline is about 7,500 km long and has, in the assessment of the Coast Guard (CG), 11 major and 20 minor ports that must be equipped to combat oil pollution. A few ships sink in Indian coastal waters every year; in 2007, as many as five vessels with a total of 658 tonnes of oil went down.



*MV Rak has sunken off the Mumbai coast. (PTI)*



### OIL SPILL OFF MUMBAI COAST

Ship collisions or grounding leading to oil spills has been a perennial occurrence. But this phenomenon appears to have got skewed in the recent past especially for Mumbai.

The government has identified Mumbai's coast as ecologically sensitive and drafted special conservation programs for the area.

Besides damaging coastal ecosystems such as mangroves, oil spills can affect the movement of ships at Mumbai's ports, which are some of the country's busiest and most strategically important.

### M. V. RAK oil spill

M. V. RAK which sank in the Arabian Sea on August 4, 2011, approximately 35 km off Mumbai's coast became the 23rd vessel to be involved in an accident during the past 29 years resulting in oil spill around the coast of Mumbai. In all, over 60,000 tonnes of oil has been known to have spilled by these 23 ships into the sea thus frequently ravaging the Mumbai coast and causing destruction to marine life and incalculable loss. The oil spill to hit Mumbai coast so far is half the total oil spilt around the entire Indian coast for the same period since 1982 viz. 113,000 tons as a result of 74 ship accidents. These are the statistics made available by the Indian Coast Guards, the designated first response agency to combat oil spills in the ocean.

When it sank, MV Rak had 60,000 metric tonnes of coal in its hold and 290 tonnes of fuel oil and 50 tonnes of diesel. It was on its way to Dahej port in Gujarat from Indonesia. The coast guard and the navy rescued its 30-member crew following a distress call from the vessel.

On Aug 7, 2011, oil started leaking from the sunken vessel at a rate of 1.5 to 2 tonnes an hour. The oil spread about seven nautical miles around the vessel. A Coastguard ship, Samudra Prahari, which was on patrol,



responded and used oil dispersant to neutralize the spilled oil.

More than 700kg of oil spill dispersant was sprayed over seven nautical miles from where the ship sank and the spill was noticed.

But alarm bells started ringing soon with environmentalists advising people to stay off fish for a while and authorities telling fishermen not to venture near the spillage area.

The oil does not get dissolved in seawater; rather it forms a thick layer over it. This affects marine biology and disrupts the marine food chain. Big fishes eat small ones coated with oil and fishermen catch big fishes for the market. The oil layer also cuts off the oxygen supply in water resulting in the death of marine animals.

### Spill from ONGC's Mumbai-Uran Trunk (MUT) Oil Pipeline

Around a mile long oil spill was detected from a ruptured pipeline some 80 km off the Mumbai coast on January 21, 2011. The spill was caused due to a leakage detected at ONGC's Mumbai-Uran Trunk (MUT) oil pipeline (which transports crude oil from the Mumbai High offshore fields) at 0845 hours.

Production at ONGC's Mumbai high, the nation's biggest oilfield, and Bassein oilfield was immediately stopped and the pipeline closed.

The oil flow was stopped at noon, but the spill was spread. The Coast Guard and Navy were immediately alerted and four ships, Dornier planes and Chetak Helicopters were dispatched to tackle the oil spill.

The Regional Contingency Plan (which is the existing emergency response measure) was activated immediately on detection of the leak.

National Oil Spill Disaster Contingency Plan was also activated by the Coast Guard to ensure minimum damage to environment.

ONGC mobilized the pipeline repair vessel including three Multi Support Vessels to the site to ascertain the extent of leakage for containment and repair. The initial assessment of extent of oil spill was about one mile long and around 45 metric tonne.

The oil supply and gas production from Mumbai High was diverted to the ICP-Heera Uran Trunk (HUT) pipeline. Connected oil and gas wells were closed for safety reasons. Output was resumed after three hours.

Mumbai high and Bassein fields together produce 247,000 barrels of oil per day. The loss of production was around 25,000 bopd on the day of the pipeline burst.

### MSC Chitra and MV Khalijia-III collision

An oil spill off the coast of India was caused when two Panamanian flagged cargo ships – MSC Chitra and MV Khalijia-III – collided off the Mumbai coast on August 7, 2010. MSC Chitra was carrying 1219 containers with over 2662 tons of fuel, 283 tons of diesel and 88040 tons of lubricant oil which started pouring into the Arabian Sea. The ship has spilled 500 tons of fuel and lubricants, with some 300 oil containers having rolled into the sea. There were no casualties due to the collision.

The government statement said analysis of water samples showed no contamination from hazardous chemicals like sodium hydroxide or pesticides. However, oil has been sighted ashore in Mumbai, affecting mangroves in some areas.

Nearly 1,100 pounds (500 kilograms) of fish samples in the area were contaminated with oil. The state authorities banned fishing in the area until August 15, 2010.

The spill caused serious environmental and economic concerns for Mumbai. The spill reached the Alibag and Uran areas, with potential risk to the mangrove belt in the region, as also the ancient Elephanta Caves. The island caves are a world heritage site with exquisite sculptures and architecture dating back to 6-7 centuries AD.

The fishing community in Maharashtra was been forced to stop work for three days translating into millions of Rupees in losses. The worst hit however, was the marginal fishermen who depend upon their daily catch along the coastline for survival. The 800,000 strong fishing community in Maharashtra is looking for compensation from the government for the losses incurred.

The Indian Coast Guard and the Mumbai Port Trust tried to salvage the situation with the help of anti-pollution dispersal spray systems. SMIT Salvage, a Netherland based emergency response and environmental care services industry was recruited by the Mumbai Port Trust to control the oil spill. The treacherous tidal conditions in the region made disaster management difficult.

## CONCLUSION

Oil spills will continue to happen as long as society depends on petroleum and its products. This is due to the potential for human error and equipment failure inherent in producing, transporting, and storing petroleum. While it is important to focus on ways to prevent oil spills, methods for controlling them and cleaning them up must also be developed. An integrated system of contingency plans and response options can speed up and improve response to an oil spill and significantly reduce the environmental impact and severity of the spill.

The purpose of contingency plans is to coordinate all aspects of the response to an oil spill. This includes stopping the flow of oil, containing the oil, and cleaning it up. The area covered by contingency plans could range from a single bulk oil terminal to an entire section of coastline. Oil spills, like forest fires and other environmental emergencies, are not predictable and can occur anytime and during any weather. Therefore, the key to effective response to an oil spill is to be prepared for the unexpected and to plan spill countermeasures that can be applied in the worst possible conditions.

Today, oil spill responders try to optimize net environmental benefits when considering how to deal with a spill. This simply means that the effects on the environment of whatever cleanup techniques are to be used are weighed against the damage to the site. In other words, the question is asked, will the cleanup process itself possibly cause more damage to the site than the oil would if it were left? Sometimes the decision is made not to clean up if an assessment shows that the cleanup itself will be intrusive. In the same way, the effects of the various cleanup techniques are also assessed and the least intrusive technique is chosen for a particular site.

Obviously, an important part of protecting the environment is ensuring that there are as few spills as possible. For this reason, both government and industry needs to work together to reduce the risk of oil spills, with the introduction of strict new legislation and stringent operating codes. Of late, the costs associated with oil spills and regulations governing offshore facilities and operations have encouraged the development of improved technology for spill prevention. Industry has invoked new operating and maintenance procedures to reduce accidents that lead to spills; but at the same time intensive training programs are required to be developed to reduce the potential for human error.

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# CONFERENCE PROGRAMME 2011

**THEME:**

**GLOBAL COLLABORATION FOR CLEANER SEAS**

**DAY 1- THURSDAY, 29TH SEPTEMBER 2011**

1100-1600 - REGISTRATION

1530-1600 - HIGH TEA

**1600 - 1730 Hours: Inaugural Session**

**Mr. A K Hazarika**, CMD, ONGC & Conference Chairman, OSI 2011 – Guest of Honour  
**Capt. M M Saggi**, Nautical Advisor, DG Shipping – Special Address  
**IG VSR Murthy**, DDG - Indian Coast Guard – Theme Address  
**Mr. H P Bhalla**, Director, Cairn India Ltd. – Special Address  
**Mr. Anoop Kumar**, Executive Director, ONGC & Convenor OSI 2011 – Welcome Address  
 Key note Address and Release of Souvenir / Show Catalogue  
**Mr. Abhishek Bhatnagar**, CEO, iTen Media - Vote of Thanks

**1730 - 1900 Hours - Plenary Session - Oil Spill India**

Session Chairman:

**Mr. Muralee Thummarukudy**, Programme Officer, Post Conflict and Disaster Management Branch, UNEP, Geneva

Speakers:

- 1.) **Mr. Richard H. Johnson**, Technical Director, ITOPI, UK  
Global Scenario Oil Spill
- 2.) **Mr. Thomas Liebert**, Head, External Relations & Conference Department, IOPC Funds, UK  
Global Scenario Oil Spill

1900 Hours - Exhibition Inauguration

1930 Hours onwards- Welcome Dinner (Sponsored by ONGC)

**DAY 2- FRIDAY, 30TH SEPTEMBER 2011****0900 - 1000 Hours - Session 1 'Perspective & Challenges in India'**

Session Chairman:

**Mr. Apurba Saha**, ED, ONGC

Speakers:

- 1.) **Capt. Deepak Kapoor**, Nautical Surveyor-cum-DDG (Tech), DG Shipping, Govt. of India  
Oil Spill Perspective & Threats from Shipping Industry
- 2.) **DIG V. D. Chafekar**, Officer In charge, Bureau of Naviks, Indian Coast Guard  
Oil Spill Perspective & Challenges faced
- 3.) **Mr. Neeraj Sinha**, Scientist 'F'/ Senior Director, Office of PSA – Government of India  
Historical Perspective & Challenges of Oil Spill in India

**1000 - 1115 Hours - Session 2 'Environment Protection'**

Session Chairman:

**Dr. P. B. Rastogi**, Director - IA Division, Ministry of Environment & Forest, Govt of India

Speakers:

- 1.) **Dr. R.S. Kankara**, Scientist-E, Ministry of Earth Sciences, ICMAM-Project Directorate, Govt of India  
Need for Science based Contingency Planning for Oil Spill Management in India
- 2.) **Dr. R. K. Suri**, Director, Ministry of Environment and Forests, Govt of India  
Regulatory Framework for Prevention and Control of Marine Oil Pollution
- 3.) **Dr. Y. B. Sontakke**, Incharge HSMD/ RO(HQ), Maharashtra Pollution Control Board, India  
Oil Spill Threats
- 4.) **Capt. Farhat Imam**, Chief Operating Officer, Resolve Marine Group Inc. USA  
Case Studies in Maritime Oil Spills: Lessons Learned

1115 - 1130 Hours - Tea Break

1130 - 1300 Hours - Session 3 'The Country Presentation'

Norway Country Presentation

1300 - 1400 Hours - Lunch

1400 - 1515 Hours - Session 4 'Industry Perspective - An Approach'

Session Chairman:

**Mr. A. K. Jain**, ED, Chief Offshore Logistics, ONGC, India

Speakers:

- 1.) **Dr. R. K. Raju**, General Manager - HSE, Reliance Industries Ltd, India  
Challenges in Oil Spill Contingency planning for the deep water development projects along east coast of India
- 2.) **Mr. Amitab Basu**, General Manager, ONGC, India  
Oil Spill response & preparedness for E&P Company
- 3.) **Mr. Hari Kumar**, Head HSE & Quality Assurance, Cairn India Limited, India  
Need for Public-Private cooperation in building Oil Spill Response Organisations (OSROs) in India

1515 - 1530 Hours - Tea Break

1530 - 1700 Hours - Session 5 'Oil Spill Response'

Session Chairman:

**IG SPS Basra**, Inspector General, Indian Coast Guard

Speakers:

- 1.) **Mr. Nicholas March**, Senior Consultant, Oil Spill Response Limited, UK  
Planning for the worst: Response inhibitors and the what if question?
- 2.) **Mr. Rufus Whiteford**, Sales Manager (India), Kelvin Huges, UK  
Oil Spill Detection by Radar and Infrared
- 3.) **Mr. Massimo Carmagnini**, Product Manager (Raddar), Consilium Marine and safety, Italy  
Oil Spill Detection Radar at Consilium
- 4.) **Mr. Donald L. Wilson**, CEO, Elastec / American Marine Inc., USA  
Controlled in Situ Burning of Oil as a Spill Response option
- 5.) **Dr. Nils Robbe**, CEO, OPTIMARE Sensorsysteme GmbH & Co. KG, Germany  
Remote Sensors and Mission System Technology for Optimized Operational Airborne Oil Spill Monitoring

1700 - 1735 Hours - Session 6 'Technology: Oil Spill recovery'

Session Chairman:

**Mr. Rune Bergstrom**, Department of Emergency Response for the Norwegian Coastal Administration\*

Speakers:

- 1.) **Mr. Bruce Kivisto**, General Manager, Chukar Waterjet, Inc., USA  
Water Jet Technology and Applications – Deepwater Subsea
- 2.) **Mr. Yoppy Tan**, Senior Preparedness Development Executive, Oil Spill Response Limited, Singapore  
Contingency Planning for Deepwater Spill Scenarios
- 3.) **Mr. Subhajit Sarkar**, Senior Business Analyst, Wipro Technologies  
360° Degree View on Economics

1900 Hours onwards - Networking Dinner

(Sponsored by Innovation Norway)

**DAY 3- SATURDAY 1ST OCTOBER 2011****0900 – 1030 hours - Session 7 ‘Oil Spill Recovery Organisation’**

Session Chairman:

**Capt. Sandeep Kalia**, Executive Director, Great Offshore Limited, India

Speakers:

- 1.) **Sir Mehernosh Shroff**, Chief Engineer, Seaworthy Shipping Oil Spill & HNS Response  
Planning & Practical Oil Spill & HNS Clean UP Ashore and Offshore: India, Far East: Complete  
Emergency to Clean up Solutions
- 2.) **Mrs. Geeva Varghese**, Consultant, Oil Spill Response Limited, Singapore  
Response Case Studies from Asia
- 3.) **Mr. Geraint Richards**, Vice President (Middle East & India), Lamor Corporation, Finland  
Practical Options for Offshore Oil Recovery
- 4.) **Capt. D. C. Sekhar**, Managing Director, Alpha Marine Emergency Response Services, India  
Capacity Building for Emergency Response

**1000 - 1030 Hours - Tea Break****1030 - 1200 Hours - Session 8 ‘Legal Issues and Claims’**

Session Chairman:

**Capt. M M Saggi**, Nautical Advisor, DG Shipping

Speakers:

- 1.) **Mrs. Vaneeta Patnaik**, Doctoral Research Scholar, Doctoral Research Scholar at International Max  
Planck Research School for Maritime Affairs, Hamburg, Germany  
Does Indian law affect Salvage operations in an Oil Spill – An overview
- 2.) **Mr. Donny Michael**, Director (Fisheries & Environment), Indian Coast Guard, India  
Legal Aspect in Oil Spill
- 3.) **Mr. John P. Menezes**, CEO, Menezes and Associates, India  
Sub Sea Pollution From Offshore Industry

**1200 - 1330 Hours - Session 9 ‘Interactive Session’**

Speakers:

- 1.) **Mr. Rakesh Srivastava**, IAS, Joint Secretary (Ports), Ministry of Shipping
- 2.) **Dr. Y B Sontakke**, Incharge HSMD/ RO(HQ), Maharashtra Pollution Control Board
- 3.) **Capt. M. M. Saggi**, Nautical Advisor, Government of India
- 4.) **Dr. S. K. Nanda**, IAS, Principal Secretary, Forest and Environment Department, Govt. of Gujarat
- 5.) **Mr. Dependra Pathak**, Director Exploration (I), Ministry of Petroleum & Natural Gas
- 6.) **Mr. U. D. Choubey**, Director General, SCOPE
- 7.) **Mr. Anoop Kumar**, Convenor, OSI 2011 & Executive Director, ONGC
- 8.) **DIG. Donny Michael**, Director (Fisheries & Environment), Indian Coast Guard
- 9.) **Mr. B P Baliga**, ED (HSE) Refineries, Indian Oil Corporation Ltd.

**1330 Hours - Close of conference & Networking Lunch**



**Mr. ARVINDER S BRARA**  
Chairman & Managing Director  
Mantec Consultants Pvt. Ltd.  
India



**Mr. MASSIMO CARMAGNINI**  
Product Manager RADAR,  
World expert of Maritime Radar Applications  
Consilium Marine and Safety  
Sweden



**DIG V. D. CHAFEKAR**  
MSc, MPhil  
Officer in Charge, Bureau of Naviks  
Indian Coast Guard  
India



**CAPT. FARHAT IMAM**  
Chief Operating Officer  
RESOLVE Marine Group



**Mr. NICHOLAS JAMES**  
Senior Consultant  
Oil Spill Response Limited  
United Kingdom



**DR. R. S. KANKARA**  
Scientist-E, MoES  
Project Directorate,  
NIOT Campus, Chennai, India



**Mr. SAFAR MOHAMMAD KHAN**  
Area Manager,  
West Region (Oil Spill Response)  
Green Apple Environmental Technologies  
India



**Mr. BRUCE KIVISTO**  
P.E., General Manager  
Chukar Waterjet, Inc.  
USA



**Mr. THOMAS LIEBERT**  
Head - External Relations and Conference Department  
International Oil Pollution Compensation Funds  
United Kingdom



**Mr. JOHN PRASAD MENEZES**  
FNI, FICS, MCMS  
Chief Executive Officer  
Menezes and Associates  
India



**Mr. AMITABH BASU**  
General Maner (P)  
ONGC, Mumbai



**DIG DONNY MICHAEL**  
Director (Fisheries & Environment),  
CGHQ, New Delhi  
Indian Coast Guard  
India



**Mr. DEEPAK R. MISHRA**  
Assistant Professor,  
Department of Geosciences and  
Northern Gulf Institute,  
Mississippi State University, USA



**Mr. CARLO MORUCCI**  
Business Development, Responsible Oil & Gas,  
Environment, Land Management, Security  
e-GEOS, Italy



**Mrs. VANEETA PATNAIK**  
Doctoral Research Scholar,  
International Max Planck Research  
Institute for Pvt. & Comparative Law,  
Hamburg



**DR. R. K. RAJU**  
General Manager - HSE  
Reliance Industries Ltd. (E&P),  
India



**Mr. GERAINT RICHARDS**  
Vice President - Middle East & India  
Lamor Corporation  
Finland



**DR. NILS ROBBE**  
Chief Executive Officer  
OPTIMARE Sensorsysteme GmbH & Co. KG  
Germany



**CAPT. M. M. SAGGI**  
Nautical Advisor  
Government of India



**CAPT. D. C. SEKHAR**  
Managing Director  
AlphaMERS Pvt. Ltd.  
India



**SIR MEHERNOSH SHROFF**  
Chief Engineer,  
Fellow of Inst. of Marine Engineers



**Mr. NEERAJ SINHA**  
Scientist 'F'/ Senior Director,  
Office of the Principal Scientific Adviser to  
The Government of India, New Delhi



**DR. Y. B. SONTAKKE**  
Maharashtra Pollution Control Board,  
Govt. of Maharashtra



**DR. R. K. SURI**  
Director, Ministry of Environment & Forests,  
Government of India, New Delhi, India



**Mr. YOPPY TAN**  
Senior Preparedness Dev. Executive  
Oil Spill Response Limited  
Singapore



**Mrs. GEEVA VARGHESE**  
Consultant  
Oil Spill Response Limited  
Singapore



**Mr. RUFUS WHITEFORD**  
Sales Manager India, Commercial Marine  
Kelvin Hughes Limited  
United Kingdom



**Mr. DONALD L. WILSON**  
Chief Executive Officer,  
ELASTEC / American Marine Inc.  
USA



**Mr. SUBHAJIT SARKAR**  
Senior Business Analyst. Wipro Technologies

## Inauguration ceremony



Oil Spill India 2011 was inaugurated by Mr. A.K. Hazarika, CMD, ONGC & Conference Chairman, OSI 2011 on 29<sup>th</sup> September 2011 at 1600 hrs.

## Inaugural session



The lamp lighting ceremony was followed by An Inaugural Session. In Inaugural session, Mr. Anoop Kumar, ED, ONGC & Convener OSI 2011 gave Welcome Address speech. Other Speakers of the session were Mr. A.K. Hazarika, CMD, ONGC & Conference Chairman, OSI 2011; Mr. H.P. Bhalla, Director, Cairn; IG VSR Murthy, DDG- Indian Coast Guard; Capt. MM Saggi, Nautical Advisor, DG Shipping; Mr. Abhishek Bhatnagar, CEO, iTEN Media gave the Vote of thanks.

Mr. A.K. Hazarika, CMD, ONGC & Conference Chairman, OSI 2011 Inaugurated the OSI 2011 International Exhibition.

## Sessions

### SESSION 1



On day 2, **Session 1** focused on the Perspective & Challenges in India. Speakers from Director General of Shipping, Indian Coast Guard and office of PSA gave their valuable viewpoint and shared the expertise. The session was chaired by Mr. Apurba Saha, ED, ONGC.

## Sessions

### SESSION 2



Session 2 started with the presentations from the eminent speakers from Ministry of Earth sciences, MoEF, MPCB, Resolve Marine Group Inc., USA. The Session was chaired by Dr. P. B. Rastogi, Director- IA Division, MoEF, GoI.

### SESSION 3



Session 3 was Country presentation session, in which 11 speakers from various Norwegian companies shared their experience & Technology.

### SESSION 4



Session 4 was on Industry perspective, where speakers from Reliance Industries Ltd., ONGC India and Cairn India Limited gave their presentations; session was chaired by Mr. A K Jain, ED, ONGC.

### SESSION 5



Session 5 was on Oil Spill Response, Chaired by IG SPS Basra, Indian Coast Guard. Speakers from OSRL, UK; Kelvin Hughes, UK; Consilium Marine & Safety, UK; Elastec/American Marine Inc., USA and Optimare shared their presentations.

## SESSION 6



Session 6 was on Technology related to Oil Spill Recovery, session chaired by Mr. Rune Bergstrom from Norwegian Coastal Administration. Speakers from Chukar Waterjet Inc., USA; OSRL, Singapore & Wipro Technologies shared their technology.

## SESSION 7



On Last day i.e., day 3, 7<sup>th</sup> Session started with the topic of Oil Spill Recovery Organisation. It was chaired by Capt. Sandeep Kalia Executive Director, Great Offshore Salvage Services Ltd. Speakers from Seaworthy Shipping, India; OSRL, Singapore; Lamor Corporation, Finland and Alpha marine Emergency Response Services gave their presentations.

## SESSION 8



Session 8 was focused on Legal Issues and claims, chaired by Capt. MM Saggi, Nautical Adviser, Govt. of India. Speakers from International Max Planck Research School for Maritime Affairs, Germany; Indian Coast Guard and Menezes and Associates shared their expertise.

## Interactive sessions

### SESSION 9



Session 9 was Interactive Session, where Capt. MM Saggi, Rakesh Srivastava, Dr. S K Nanda, DIG Donny Michael, Mr. Dendra Pathak, Mr. B.P. Baliga, Mr. Anoop Kumar, Mr. U. D. Choubey, Dr. Y.B. Sontakke participated and discussed the

## Networking dinner

Exhibition inauguration was followed by the Welcome Dinner at Fisherman's Wharf, Goa.



## Exhibition OSI 2011

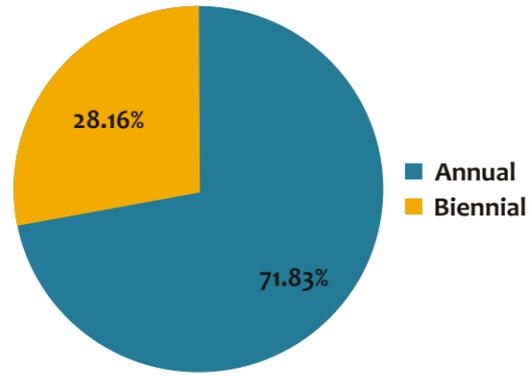
Exhibition was inaugurated by Mr. A K Hazarika, CMD, ONGC & Conference Chairman, OSI 2011. Exhibition showcased participation from 25 companies from 10 countries and 2 country pavilions from UK and Norway.

International brands like Lamor, Desmi-Ro Clean, Elastec/American Marine Inc., Optimare, Markleen, Green Apple Environmental Technologies, Ecoceane, ECOservice-NEFTEGAZ Ltd., Ayles Fernie International Ltd., Fastank, SEACOR Response, Vikoma International Limited, OPEC, Darcy Spillcare, 3M India, Aanderra Data Instruments, Aatash Norcontrol, Allmaritim, Aptomar, Frank Mohn, Fugro Oceanor, H Henriksen, Miros, Norlense participated and presented their latest technologies and advancements.

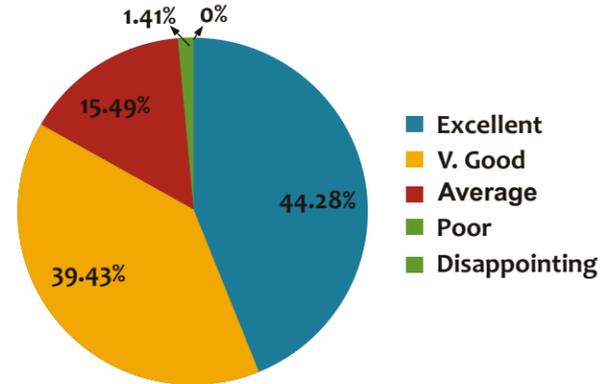
Exhibitors got opportunities to discuss the same with the delegates came from 18 countries worldwide.



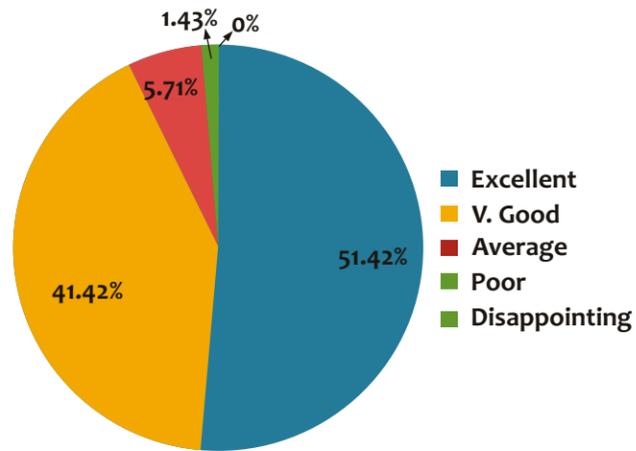
### Preferred Frequency of Conference



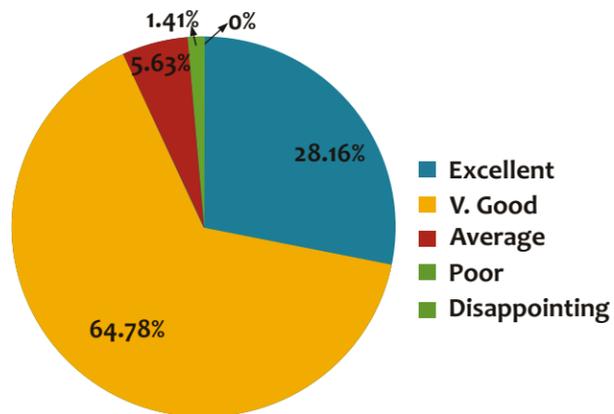
### Networking



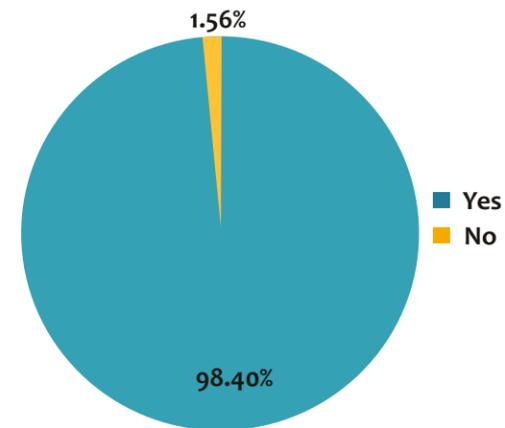
### Relevance of Conference Content



### Quality of Speakers



### Would like to attend again or not?



- 92.84% rated the content relevance as excellent / Very Good.
- 71.82% preferred the frequency of conference to be annual
- 98.4% said they would like to attend it next time as well.
- 92.94% rated the quality of speakers as excellent / Very Good
- 83.71% said that the networking opportunities were excellent / Very Good.

### Participation in OSI 2011

18	Countries
225	Delegates
25	Exhibitors



- ✦ To identify the response capacity of the region to marine oil spills that occur within or out of port limits.
- ✦ To identify the preparedness of the region to cover all types of oil spillages
- ✦ To set up a local spill response team depending on the size and nature of the spill and the resources at risk. This team will work in close co-ordination with the regional or national contingency plan.
- ✦ To set up a pre approved list of the company or agency responsible for the spill clean-up depending upon their capacity to handle the oil spill viz: Tier 1, 2 or 3. The payment to the approved vendor to be guaranteed by the administration.
- ✦ To set up an 'Action Group for Oil spill Response (AGOSR)' independent of any state control & have members from the local industry & the state authority to be responsible to first be available in case of an oil spill. This group should have its secretariat at the local level which will work in co-ordination with the state / regional authority such as Coast Guard.
- ✦ The aim for the action group is to choose spill management strategies at the local level, to first be available for a response, which are efficient to contain the damage to the environment.
- ✦ To have a set of basic / advanced equipments, vessels, dispersants etc. available at each major / minor district for immediate action.

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SPILL CONFERENCE & EXHIBITION

# Oil Spill India 2012

International Conference & Exhibition

13 -15 September 2012, Holiday Inn Resort, Goa



# POST SHOW REPORT

**Theme:**  
**Plan | Prevent | Protect**

## Oil Spill India conference discusses ways to prevent, control and contain oil spills

Coastal oil spills - or any oil spill, for that matter - have always meant indiscriminate environmental destruction and inordinate shipping industry woes around the world. Following the huge BP oil spill that affected the Gulf of Mexico and destroyed millions of marine species and flora and fauna, the Mumbai Arabian Sea region also saw oil spills that affected the environment. It also struck at the heart of the shipping industry, which was the biggest hit in the events. In its wake it was found necessary to look into the specifics of spill and to formulate for the country necessary methods to plan, prevent and protect our coastline from oil spills.

The second Oil Spill India Conference organized by iTen Media was held at the Holiday Inn Resort Goa, from Sept. 13-15, 2012 having theme PLAN-PREVENT-PROTECT. An impressive array of speakers from the oil industry and from overseas made their valuable contributions during the conference. It was a high-profile event, with Mr. Sudhir Vasudeva, Chairman & Managing Director (CMD) ONGC gracing the occasion as the Chief Guest along with Mr. A K Hazarika, Former CMD, ONGC & Conference Chairman, OSI 2012 and Mr. P Elango, CEO, Cairn India Ltd as the Guests of Honour.

Welcoming the guests Capt. Sandeep Kalia, Convenor OSI 2012 of the conference remarked that India has been lucky as no major oil spill has occurred in Indian waters till now, but with increasing maritime traffic in the coming years, things could change drastically. The hydrocarbon exploration arena and oil transportation are major causes of oil spills. He added that the second edition of this conference comes at a time when questions of maritime safety and the related issues of pollution caused by ships have been receiving considerable attention worldwide. Today, protection of the marine environment is the dominant consideration in most Salvage & Oil spill response operations. Salvor's mission is to "keep the pollutant in the ship".

Mr. Sudhir Vasudeva, Chairman and Managing Director of ONGC during his address stated that global economy has a voracious appetite for oil due to industrialization, urbanization and motorization. 30% of the energy basket will be occupied by oil till 2030 and beyond, 24% by coal and 23% by gas. The tanker movement in Indian waters has increased over the past decade. The chief guest highlighted that the country has to depend heavily on the import of crude oil to meet its domestic needs. Very large crude carriers (VLCC) can carry up to 2 million barrels of oil which are mostly headed for North America from the Persian Gulf. Human error, equipment breakdown, countries at war, natural disasters, terrorist activities can be major causes of oil spills.

The coast guard was designated as the central coordination agency for containing oil spills in Indian waters in 1986. However, many issues have yet to be resolved: i) the interface of the nodal agency with other agencies ii) regulation of tankers passing through Indian waters iii) the responsibility of cleaning of shores iv) regulation of shallow water, deep water and ultra deep water explorations in Indian waters.

Mr. Sudhir Vasudeva further added that the interest generated by OSI conference in this national cause is outstanding and also complemented the audience for representation in vast numbers. As the entire E&P fraternity is venturing from deep to deeper water to discover and produce more hydrocarbons the theme chosen for the conference, Plan - Prevent - Protect aptly reflects the concerns of the society with regards to Oil Pollution. India's premier oil exploration and production company, ONGC, has set a target of doubling India's domestic production by 2030 and overseas acquisitions by almost nine times. A good part of the investments will go into "unlocking domestic yet-to-find reserves" he added. What this means is, ONGC will step up exploration and with growth of such quantum there is an imperative need for extending our abilities to gear up for potential pollution threat, Tier 3 and beyond, recalling the Macondo incident in Gulf of Mexico he stated.

Mr. A.K. Hazarika, Former CMD, ONGC & Conference Chairman, OSI 2012 mentioned that onshore oil spills were being cleared with technology that had been developed in house and the company has signed MOU's with other operators for oil spill management. He also told that the Oil Spill response perspective plan and the capabilities available in the country along with mitigation strategies have been put in place by ONGC as well as Cairn. Mr. Hazarika also provided an insight into the current statistics of oil activities in the country, national contingency plan & emphasized that OISD is in place for safeguarding the Oil sector.

Mr. P Elango, CEO Cairn Energy India Ltd. stated that about a billion tons of oil was waiting to be tapped in India waters. Oil exploration especially in deep waters was being stepped up and this could lead to oil spills in the future unless proper measures were taken to prevent such incidents from occurring.

Mr. J.G. Chaturvedi from ONGC spoke on the future of oil spill response from offshore. He stated that most of the operations of ONGC were on the west coast of India, as the company has entered the east coast for exploration several issues needed to be addressed regarding oil spills. For instance who would take the first call in the eventuality of an oil spill? Should it be the coast guard or the state pollution control board? Where would the funds for managing an oil spill come from? Moreover there was lack of legislation for punishing the polluter. There was an urgent need for having a regional forum for managing oil spills. Each agency involved in managing an oil spill needed to have a contingency plan. A national regulatory authority for handling oil spills, authorized and empowered by an act of Parliament was sorely needed in India. A designated fund was also required for controlling oil spills and trained manpower was the need of the hour.

Mr. Hari Kumar of Cairn India observed that India has the capability to handle tier 2 spills. He told that there needs to be action taken in case of oil spills within 6 hours to avoid any catastrophic damage. With the "polluter pays" principle not been incorporated into Indian laws the Indian coastline and people living on the coastline very vulnerable to oil spills.

Mr. Yoppy Tan representing Oil Spill Response Ltd. emphasized that planning and practice was required to manage oil spills. Regular exercises needed to be conducted so that trained personnel were available in the eventuality of an oil spill. These mock exercises need not be costly but they had to be well planned and executed.

The session on the environmental impact of spills on the ecosystem—Damage Assessment and Restoration, had interesting speakers. Bernard Frebott of SAB spoke about the software applications and mobile applications that had been created for hazard management. He told that the indirect costs of the incident were 5—50 times higher than the direct costs. There is a need for understanding the material management of hazardous substances on board vessels. However environmental reporting should be timely & incident management at various levels should be the main focus he said.

Dr. Jagdish P. N. Giri stated that the environmental impact of the oil spill depended on the quantity of oil spilled, the quality of the oil and its toxicity. Spilled oil can damage the food chain in the marine environment and it affects coral reefs, mangroves and tidal flats. Oil spill modeling can be a useful device where the model must forecast the movement of the contaminant, the location, size and physical properties of the spilled oil, the nature of the tidal waves that are spreading the oil, how much oil is left on the surface of the sea after a period of time, the weathering process of spilled oil etc.

Dr. D. K. Adhikari spoke about the microbial management system of oil spills. There are various kinds of oil spills—on shore, offshore, surface spills, underwater spills. There are biological remedies for underwater spills, the simplest being the aerial sprinkling of microbes.

Dr. Ajay Deshpande noted that "polluter pays" principle is not there in Indian legislation relating to pollution. Environmental governance in India leaves much to be desired. An information based approach to controlling and tackling pollution is essential using the technology available. There is also a paradigm shift as pollution is being seen as a public health hazard.

Capt. Kapil Dev expatiated on the legal aspects of risk management, risk assessment and compensation. The 1992 CLC convention increased the compensation limit but the tonnage of the vessel was still the crucial deciding factor in awarding compensation.

Mr. Amitava Majumdar of Bose & Mitra & Co. stated that various conventions are there which enable the western countries to approach the ship insurer directly instead of the ship owner should the latter be untraceable or fail to make timely compensation to the aggrieved parties. The Bunker Convention has not yet been incorporated into Indian law. However, the Wreck removal Convention has been ratified by India. There is also the Limitation of Liability Convention of 1976. All these conventions need to be incorporated into Indian laws in a timely manner.

Mrs. Deepika Shah, a maritime lawyer spoke about the Oil Pollution Act (OPA) in the USA which deals with oil spills. There are only three exceptions to OPA viz. i) Act of God ii) Act of War and iii) Act of Third party. The other positive feature of OPA was its natural resource assessment. Accordingly, whether or not a resource affected by an oil spill has a commercial value, a monetary value should be put on a non-commercial resource like a mangrove forest for instance, in order to claim compensation for rehabilitating such natural resources. If a comparable law was passed by the Indian parliament, it would go a long way in ensuring that natural resources in India would receive due attention as well as funds for rehabilitation, should they be affected by oil spills.

Dr. R. K. Raju of Reliance Industries who had practical experience in dealing with oil spills made some interesting observations on the current scenario in India. With more than 250 million people living on India's coastline and more than 200 ports both major and minor, the probability of such mishaps occurring in the future was looming around the corner. In the past decade the number of ports has increased and oil and gas exploration has also been stepped up. The facilities on the west coast of India are 25-30 years old while those on the east coast are about 10 years old. The oil spill response depends on whether the oil spill is going towards the coast or away from the coast. As the ocean currents and winds may move in different directions, where an oil slick will land up eventually is anybody's guess. Although contingency plans have been formulated by various parties, they may not always be helpful in tackling an oil spill because of the large number of variables involved.

The general & unanimous comment that followed the two days of the conference was that the shipping companies, port trusts, government authorities, state pollution control boards, legal advisers, scientists and other experts should all be involved in the ongoing effort to protect India's coastline, its inhabitants and natural resources from and after effects of an oil spill. Although India has not witnessed a major oil spill like in the west but with aging oilfields and increasing maritime traffic in Indian waters the likelihood of accidents and oil spills cannot be ruled out. As the climatic conditions in the eastern offshore were more turbulent, all parties should be prepared for incidents off the east coast of India in the future.

India needs to become a signatory to two international conventions :i) International convention on Civil Liabilities for Bunker Oil Pollution Damage ii) Hazardous and Noxious Substances Convention. Both industry and the government have to invest in equipment and chemicals for cleaning up oil spills. The National Disaster Management Authority should include oil spills as one of the disasters in their action plan. It was also felt that regional cooperation for handling oil spills was crucial. For instance the Andamans were closer to Singapore than to the Indian mainland and help could be rushed faster from Singapore in case of an oil spill incident.

More than 250 delegates & 40 exhibitors made the Oil Spill India 2012 a huge success and participants left with a better idea of the challenges facing both the oil industry and authorities regarding the management of oil spills. It was hoped that this conference would provide the oil industry a much needed forum for expressing their views and getting the latest information about oil spill management.



# WELCOME ADDRESS 2012

**THEME:**  
**PLAN | PREVENT | PROTECT**



As we are aware that iTen Media, in association with ONGC and Interspill, is organising the second edition of Oil Spill India (OSI) : the International Conference & Exhibition in Goa from 13-15 September, 2012. To combat against any possible oil spillage, the most accepted formula worldwide is based on – 'Plan, Prevent and Protect'. Most aptly, this is what has been taken up as the Theme of this edition of OSI.

It is obvious that the instant event is not only going to become an incredible platform for the professionals to brainstorm and exchange ideas on the demanding needs of the petroleum industry which have been specially underlined by the Macondo incident in the Gulf of Mexico, it will also help to foster a new tie between producers, service providers as well as vendors dealing with the materials and services related to preventing and arresting possible oil spillage at various circumstances of on-land and offshore operations.

Considering the global dynamics of the petroleum industry, especially when our focus is shifting from safe and known territories of land and shallow water to deepwaters and ultra-deepwaters, it is imperative that professionals from all sections of the oil industry pay maximum attention to explore and include new areas of interest in the field of spill prevention, preparedness, response and restoration.

It is also heartening to learn that the Oil Spill India 2012 is also bringing out a brochure documenting our commitment towards protecting environment while we are striving for more and more energy.

Let me convey my warm greetings to all the participants and wish a very successful and professionally satisfying conferencing.

**Mr. Sudhir Vasudeva**  
Chairman & Managing Director  
ONGC



As Chairman of the Oil Spill India 2012 (OSI) and on behalf of the steering committee - it is my great pleasure to welcome you to this 2nd International Conference & Exhibition on Oil Spill Planning, Prevention, Response & Restoration Systems at Goa, India.

iTEN Media-the organizers' of OSI conference, Steering Committee Members & the conference sponsors share a common goal to improve the industry's ability in understanding and taking responsibility of maintaining the marine ecosystem & environment at large. One important aspect of this goal is to understand the impacts of spill and related stressors on the marine and coastal ecosystems and human populations, and applying that information to future response, mitigation, and restoration following spills. Aptly the 2012 conference theme of "Plan, Prevent & Protect" underlines the importance of these goals.

This year's event continues to build upon the immense success 1st edition of Oil Spill India conference held last year, the primary purpose of which was to share oil spill preparedness and response expertise, techniques and technologies from around the globe and implement those in the region.

The 2nd International Oil Spill India Conference will witness over 40 speakers including industry leaders, global experts & government regulators - presenting cutting edge technology, research and incident case studies to 300 plus delegates from over 20 countries. Concurrently 35 international exhibitors display the latest in technology and products covering the sector.

The 2012 OSI Program Committee has put together what I believe to be one of the best conferences in the series of international conferences. This program includes technical presentations & panel discussions from leading industry, government, and academia experts. I am sure you will find our opening panel of key leaders from the ONGC, CAIRN & Great Offshore Salvage to be very informative and thought provoking in setting the general tone of the conference. The unique social and networking opportunities have been designed to provide an encouraging, thought provoking and interactive experience for all during the event. Thank you for your participation in this prestigious event. I look forward to seeing many of you at the technical sessions, in the Exhibit Hall, or one of the social events.

**Mr. A. K. Hazarika**  
Former CMD, ONGC  
& Conference Chairman, OSI 2012



I am pleased to learn that the 2<sup>nd</sup> Oil Spill India 2012 conference & exhibition is being organized by iTen Media at Goa from 13<sup>th</sup> September to 15<sup>th</sup> September 2012 at Holiday Inn, Goa.

We all are aware that any Oil spill is a major disaster for any country but it also gives all of us an opportunity to come together to think on how our collective behavior has brought us to the brink of such a disaster history. We all can make a difference and we need to adopt a different attitude towards the natural world.

I am confident that this conference will provide a platform to nurture successful collaboration among the stakeholders such as the oil companies, regulatory authorities, local ports and shipping industry, local and global vendors of oil spill response equipment and service providers.

We look forward to your participation as experts, commentators, managers and exhibitors to help the concerned global fraternity learn from each other's experience.

Warm welcome on the behalf of OSI 2012.

**Mr. Anoop Kumar**

Executive Director, ONGC  
and Convenor, Steering Committee, OSI 2012



I am delighted to know that the International Conference and Exhibition 'Oil Spill India 2012' is being organized by iTEN Media at Goa from 13<sup>th</sup> to 15<sup>th</sup> September, 2012, with theme "Plan, Prevent, Protect". I hope 'OSI 2012' will bring together global industry experts, Government bodies and other stakeholders to deliberate in depth on oil spill issues and work towards better legislation and an effective oil spill management system. Oil India Limited is pleased to support this event.

I convey my best wishes to the organizers for their effort in hosting this conference and exhibition and wish all the success.

**Mr. S. Rath**  
Director (Operations)  
Oil India Limited



I am glad to note that iTEN Media is organising the second edition of Oil Spill India International Conference and Exhibition at Goa during 13th to 15th September 2012 focusing on the issue and challenges faced by the oil industry in India in the very important area of oil spill. As our scale of operational increase, our responsibilities also multiply. Such conferences and exhibitions add to our knowledge base and thereby serve the national cause in spurring growth that is environment friendly and sustainable.

**Mr. J. P. Ojha**

Executive Director (Operations)

Indian Oil Corporation Limited



Energy for India

To my mind, Indian E & P industry's foremost priority is to engage in continuous communication with all the stakeholders in our operating environment to educate, train and prepare them to deal with any emergency situation, especially on major oil spill scenarios which tend to have wider and longer impacts on the community and the marine environment. Doing it collectively would bring the credibility and will be more effective.

Indian E&P industry is growing rapidly with widening range of operations in onshore, offshore (shallow and deep) and cross country pipelines. We need to swiftly address highly complex but critical issues such as the emergency well capping resources, services and Tier-3 oil spill response capabilities.

We learn from each other's success and as well as mistakes. I am confident that the group of national and international luminaries, policy makers, technologists and scientists assembled here at the Oil Spill India Conference 2012 will share their wisdom and inspire the Indian Oil and Gas Industry to adapt the Global Best Practices.

We at Cairn, look forward to participating and supporting OSI 2012 conference and exhibition and wish huge success to the initiative.

**Mr. P. Elango**

Interim CEO

Cairn India Ltd.



Energy for India

Considering the global dynamics of the petroleum industry, especially when the focus of the entire upstream sector is shifting from safe and known territories of land and shallow water to deepwaters and ultra-deepwaters, it is imperative for professionals from all sections of the oil industry to pay maximum attention to the practice of safe exploration.

Oil Spill poses serious threats to environment, it damage the mere existence of all the living being. Impact of this spill can be so severe that if these measures are not implemented at the right time can be irreparable. Any oil spills, onshore or offshore needs to be analyzed seriously and mitigation methods should be applied to minimize the damages.

I wish all the success for the 2<sup>nd</sup> edition of Oil Spill India 2012.

**Mr. Hari Kumar**

Head - HSE and Quality Assurance

Cairn India Ltd.

# CONFERENCE PROGRAMME 2012

**THEME:**  
**PLAN | PREVENT | PROTECT**

**DAY 1- THURSDAY, 13TH SEPTEMBER, 2012**

1100-1600 - REGISTRATION

1530-1600 - HIGH TEA

**1600 - 1730 HOURS: INAUGURAL SESSION****Mr. Sudhir Vasudeva**, CMD, ONGC - Chief Guest**Mr. A K Hazarika**, Former CMD, ONGC & Conference Chairman, OSI 2012 - Special Address**Mr. P Elango**, CEO, Cairn India Limited

Release of Souvenir / Show Catalogue

**Capt. Sandeep Kalia**, ED, Great Offshore Salvage Services Ltd. & Convenor - OSI 2012 - Vote of Thanks**1735 - 1900 HOURS - PLENARY SESSION**

Session Chairman:

**Mr. P Elango**, CEO, Cairn India Limited

Speakers:

- 1.) **Capt. M M Saggi**, Nautical Advisor, Govt. Of India, DG Shipping  
Key Regional Issues in India for Development of Policies and Legislation for Oil spill Response
- 2.) **Mr. Andrew Tucker**, Senior Technical Adviser, ITOFF  
Oil Spill and Container Ships

**1900 HOURS - EXHIBITION INAUGURATION****1930 HOURS ONWARDS- WELCOME DINNER (SPONSORED BY ONGC)****DAY 2- FRIDAY, 14TH SEPTEMBER 2012****0900 - 1015 HOURS - SESSION 1 'Oil Spill Preparedness & Response – Planning and Implementation'**

Session Chairman:

**Mr. A K Hazarika**, Former CMD, ONGC & Conference Chairman, OSI 2012

Speakers:

- 1.) **Mr. J G Chaturvedi**, ED Chief New & Marginal Field Development, ONGC  
Future of Oil spill response from Offshore E&P activities – An approach
- 2.) **Mr. Yoppy Tan**, Senior Preparedness Development Executive, Oil Spill Response Limited  
Planning for National Oil Spill Response Exercise

**1015 - 1130 HOURS - SESSION 2 'Environmental Impact of Spills on Ecosystem – Damage Assessment and Restoration'**

Session Chairman:

**Mr. M. L. Jain**, ED, (GGM-HSE Designate), ONGC

Speakers:

- 1.) **Mr. Bernd Freibott**, Director, BD Sustainability Services Hub, SAP  
Sustainable Safety Management: Incident Management as a Cornerstone for a Successful Safety Culture
- 2.) **Mr. Jagdish P N Giri**, Chief Chemist, Oil & Natural Gas Corporation Limited, India  
Mapping and Modelling of Oil Spill in Context of Ecological and Environmental Impact Assessment on the Economics of Coastal Communities

1130 - 1200 HOURS - TEA BREAK

**1200 - 1300 HOURS - SESSION 3 'Coastal Area Management – Oil Spill Containment & Clean-up Activities'**

Session Chairman:

**Mr. Apurba Saha**, OSD (Offshore), ONGC

Speakers:

- 1.) **Mr. Arvinder S. Brara**, CMD, Mantec Consultants Pvt. Ltd.  
Pollution Control
- 2.) **Dr. Dilip K. Adhikari**, Chief Scientist, Head Biofuel Division & Head iotechnology Conversion Area  
Microbial Oil Spill Management in Sea
- 3.) **Dr. Ajay Deshpande**, Environment Advisor, Maharashtra State Road Transportation Corporation  
Trends of Innovative Environmental Governance and Policies in India with reference to Coastal Environment

1300 - 1400 HOURS - LUNCH

**1400 - 1500 HOURS - SESSION 4 'Addressing Legal & Insurance Issues'**

Session Chairman:

**Mr. J G Chaturvedi**, ED, Chief New & Marginal Field Devt., ONGC

Speakers:

- 1.) **Capt. Kapil Dev Bahl**, Managing Director, Murray Fenton (India) Surveyors Pvt. Ltd.  
Risk Assessment and Management
- 2.) **Mrs. Deepika Shyam**, Maritime Lawyer  
India's Need for Oil Spill Legislation

**1500 - 1600 HOURS - SESSION 5 'Challenges & preparedness for offshore Spill Response'**

Session Chairman:

**Mr. J P Ojha**, ED Operations, Indian Oil Corporation Limited

Speakers:

- 1.) **Dr. R K Raju**, General Manager (HSE), Petroleum - E&P, Reliance Industries Limited  
Vulnerability of Indian Coast Line to Oil Spills and Influence of Seasonal Factors in the Contingency Planning for Oil Spill Response
- 2.) **Mr. Hari Kumar**, Head – HSE & Quality Assurance, Cairn India Limited  
Need for Public-Private cooperation in building Oil Spill response Organizations (OSROs) in India

1600 HOURS - TEA BREAK

### 1630-1730 HOURS - SESSION 6 'Advances in Equipment and Technologies for Remote Sensing and Surveillance of Oil spills (I)'

Session Chairman:

**Mr. Roger Mabbott**, Director, UK Spill Association

Speakers:

- 1.) **Dr. Nils Robbe**, CEO, OPTIMARE Sensorsysteme GmbH & Co. KG  
Optimized Operational Airborne Oil Spill Remote Sensing: Current Status of Sensor and Mission System Technology
- 2.) **Mr. S. J. Prasad**, Scientist, ISG - National Center for Ocean Information Services, MoES, Gol  
Modelling the Fate of Spilled Oil in Indian Waters using GNOME
- 3.) **Mrs. Arti Chopra**, Spill Response Specialist, Oil Spill Response Limited  
Integration of Oil Spill Modelling Results, Satellite Surveillance in to One Common Operating Picture

### 1730-1830 HOURS - SESSION 7 'Advances in Equipment and Technologies for Remote Sensing and Surveillance of Oil spills (II)'

Session Chairman:

**Capt. M M Saggi**, Nautical Advisor, Govt. of India, DG Shipping

Speakers:

- 1.) **Mr. Krayukhina Maria**, ECO service-NEFTEGAZ" Ltd  
Block-modular Complex for Separation Oily Bilge Water
- 2.) **Mr. Michael Ryderb**, Sales Manager, Miros AS  
Introduction to Various Technologies for Remote Monitoring and Detection of Oil Spills
- 3.) **Mr. Fredrik Björkbäck**, Sales, Todo (Sweden)  
Open or Closed Transfer of Liquids and Gases – Dry-Break will Save the Environment and Money

### 1830 – 1930 hours - Session 8

'Country Presentation – UK Spill Association'

### 1930 hours - UK SPILL ASSOCIATION RECEPTION (By invitation)

## DAY 3- SATURDAY 15TH SEPTEMBER 2012

### 0900 – 1030 HOURS - SESSION 9 'Oil Spill Response: Efficacy and Effects'

Session Chairman

**Capt. Sandeep Kalia**, ED, Great Offshore Salvage Services Ltd. & Convenor, OSI 2012

Speakers:

- 1.) **Mr. Absjorn Klaussen**, Sales Manager, NorLense AS  
Oil Spill Emergency Prevention of Response
- 2.) **Mr. Melany Carter Groves**, Spill Response Specialist, Oil Spill Response Limited  
Changing Needs in Initial Oil Spill Responder Training and Exercises
- 3.) **Capt. D.C.Sekhar**, Director, Alpha MERS Pvt Ltd,  
Regulation Covering Discharge of 'Clean Water' from Spill Response Vessels

### 1030 - 1130 HOURS - SESSION 10 'Oil Spill Response Arrangements – Maritime and Port'

Session Chairman:

**Mr. D Mehrotra**, Dy. Chief Surveyor - cum - Sr. DDG (Tech), Directorate General of Shipping

Speakers:

- 1.) **Mr. Deepak Sachdeva**, COO, Vadinar Oil Terminal Limited  
Sensitivity Mapping of Coastline for Oil Spill Contingency Planning & Response
- 2.) **Mr. Pradeep Thatte**, Jt. Sr. Vice President - Crude Oil Terminal, Bharat Oman Refineries Ltd.  
Realistic Oil Spill Risk Assessment for Gulf of Kutch - The Need for fresh Thinking
- 3.) **Mr. Ankit Vaishnav**, Regional Head, QHSSE & Training, DP World, Subcontinent Region  
Oil Spill Response: A Container Terminal Operator's Perspective

### 1130 HOURS - TEA BREAK

### 1200-1300 HOURS - SESSION 11 'Interactive Session: Effective and Applicable Strategies for Oil Spill Prevention – Industry / Government Co-operation'

Panelist:

- 1.) **Capt. M M Saggi**, Nautical Advisor, Govt. Of India, DG Shipping
- 2.) **Dr. P B Rastogi**, Director - IA Division, MoEF
- 3.) **Dr. R K Raju**, General Manager, HSE, Petroleum - E&P, Reliance Industries Ltd.
- 4.) **Mr. Hari Kumar**, Head, HSE & Quality Assurance, Cairn India Limited
- 5.) **Mr. Anoop Kumar**, ED Head, HSE, ONGC
- 6.) **Dr. Avinash Chandra**, Former (First) Director General of Hydrocarbons, Govt. of India
- 7.) **Mr. D Mehrotra**, Dy. Chief Surveyor - cum - Sr. DDG (Tech), Directorate General of Shipping

Moderator:

**Capt. Sandeep Kalia**, ED, Great Offshore Salvage Services & Convenor OSI 2012

### 1300 HOURS - VOTE OF THANKS

### CLOSE OF CONFERENCE FOLLOWED BY LUNCH



**CAPT. SANDEEP KALIA**  
Executive Director  
Great Offshore Salvage Service Ltd.  
& Convener, OSI 2012



**ARTI CHOPRA**  
Spill Response Specialist  
Oil Spill Response Limited



**ARVINDER S BRARA**  
Chairman and Managing Director  
Mantec Consultants Pvt. Ltd



**ASBJORN KLAUSSEN**  
Sales Manager  
NorLense



**BERND FREIBOTT**  
Director,  
BD Sustainability Services Hub  
SAP



**CAPT. D. C. SEKHAR**  
Director  
Alpha MERS Pvt Ltd



**CAPT. DEEPAK SACHDEVA**  
Chief Operating Officer & ED,  
Vadinar Oil Terminal Limited



**MR. KAPIL DEV BAHL**  
Managing Director,  
Murray Fenton India Surveyors Pvt. Ltd.  
Director, BMT Consultants India Pvt. Ltd.



**CDR. ANKIT ASHWIN VAISHNAV (RETD.)**  
Regional Head  
QHSE & Training,  
DP World, Subcontinent Region



**Mrs. DEEPIKA SHYAM**  
Maritime Lawyer



**DR. AJAY DESHPANDE**  
Head  
Environmental Information Centre



**DR. DILIP K. ADHIKARI**  
Chief Scientist  
Head Biofuel Division &  
Head Biotechnology Conversion Area



**DR. NILS ROBBE**  
Chief Executive Officer  
OPTIMARE Sensorsysteme GmbH & Co. KG  
Germany



**DR. R.K. RAJU**  
General Manager - HSE  
Reliance Industries Ltd. (E&P),  
India



**DR. Y. B. SONTAKKE**  
Maharashtra Pollution Control Board,  
Govt. of Maharashtra



**Mr. FREDRIK BJÖRKBÄCK**  
Sales  
Todo AB (Sweden)



**Mr. MIKAEL RYDBERG**  
Sales Manager  
Miros AS



**Mr. S. J. PRASAD**  
Scientist, ISG  
INCOIS, Ministry of Earth Sciences, Govt. of India  
Hyderabad, Andhra Pradesh



**Mr. S. RATH**  
Director (Operations)  
Oil India Limited



**Mr. THATTE PRADEEPKUMAR R.**  
Jt. Sr Vice President  
Bharat Oman Refineries Ltd



**Mr. THOMAS LIEBERT**  
Head  
External Relations & Conference Dep.  
IOPC Funds, United Kingdom



**Mr. YOPPY TAN**  
Senior Preparedness Development Executive  
Oil Spill Response Limited



**DR. JAGDISH P. N. GIRI**  
Chief Chemist,  
Oil & Natural Gas Corporation Limited,  
India



**MELANY CARTER-GROVES & NICOLA JACKSON**  
Oil Spill Response Specialist  
Oil Spill Response LTD



**Mr. ANDREW TUCKER**  
Senior Technical Adviser  
The International Tankers  
Owners Pollution Federation (ITOPF)

## Inauguration ceremony



The lamp lighting ceremony was followed by An Inaugural Session.

## Inaugural session



Oil Spill India 2012 was inaugurated by Mr. Sudhir Vasudeva, CMD, ONGC and accompanied by Mr. A K. Hazarika, Former CMD, ONGC & Conference Chairman, OSI 2012, Capt. Sandeep Kalia, ED, Great Offshore Salvage Services Ltd. & Convenor- OSI 2012 & Mr. P. Elango, CEO-Cairn India Ltd. on 13<sup>th</sup> September 2012 at 1600 hrs.

Mr. A.K. Hazarika, Former CMD, ONGC & Conference Chairman, OSI 2012 Inaugurated the OSI 2012 International Exhibition.

## Sessions

### SESSION 1



On day 2, **Session 1** focused on the Perspective & Challenges in India. Speakers from Dy. DG Shipping, ONGC, Oil Spill Response Ltd. gave their valuable viewpoint and shared the expertise. The session was chaired by Mr. A. K. Hazarika, Former CMD, ONGC & Conference Chairman, OSI 2012

## Sessions

### SESSION 2



**Session 2** started with the presentations from the eminent speakers from SAP, ONGC. The Session was chaired by Mr. M L Jain, ED (GGM-HSC), ONGC

### SESSION 3



**Session 3** started with the presentations from the eminent speakers from Mantec Consultants Pvt. Ltd., Maharashtra State Road Transportation Corporation, Biofuel Division & Biotechnology Conversion Area. The Session was chaired by Mr. Apurba Saha, OSD (Offshore), ONGC

### SESSION 4



**Session 4** was on Addressing Legal & Insurance Issues, where speakers from Bose & Mitra & Co., Murray Fenton (India) Surveyors Pvt. Ltd., Maritime Lawyer gave their presentations; session was chaired by Mr. J G Chaturvedi, ED Chief New Marginal Field Devl, ONGC

### SESSION 5



**Session 5** was on Challenges & Preparedness for offshore Spill Response, where speakers from Reliance Industries Ltd., Cairn India Ltd., Oil spill Response Ltd., Singapore gave their presentations; session was chaired by Mr. J P Ojha, ED (Operations) IOCL

## SESSION 6



**Session 6** was on Advance in Equipment & Technologies for Remote Sensing & Surveillance of Oil Spill (I), where speakers from OPTIMARE Sensirsysteme GmbH & Co. KG, Indian National Center for Information Services, Oil Spill Response Ltd. gave their presentations; session was chaired by Mr. Roger Mabbott, Director, UK Spill Association.

## SESSION 7



**Session 7** was on Advance in Equipment & Technologies for Remote Sensing & Surveillance of Oil Spill (II), where speakers from NEFTEGAZ Ltd., MiorsAS, Todo (Sweden) gave their presentations; session was chaired by Capt. M M Saggi, Nautical Advisor, DG Shipping

## SESSION 8



**Session 8** was Country Presentation - UK Spill Association.

## SESSION 9



**Session 9** was on Oil Spill Response : Efficacy & Effects, where speakers from Oil Spill Response Ltd., NorLense AS & Alpha MERS Pvt. Ltd gave their presentations; session was chaired by Capt. Sandeep Kalia, ED, Great Offshore Salvage Services Ltd. & Convenor, OSI 2012.

## SESSION 10



**Session 10** was on Oil Spill Response Arrangements - Maritime & Port, where speakers from Vadinar Oil Terminal Ltd., Bharat Oman Refineries Ltd. & DP World, Subcontinent Region gave their presentations; session was chaired by Mr. D. Mehrotra, Dy. Chief Surveyor-cum-Sr. DDG (Tech), Directorate General of Shipping.

## SESSION 11



**Session 11** was Interactive Session, where speakers from Great Offshore Salvage Services, DG Shipping, Reliance Industries Ltd., Cairn India Ltd., ONGC, MoEF gave their presentations; session Moderator was Capt. Sandeep Kalia, ED, Great Offshore Salvage Services Ltd. & Convenor, OSI 2012

## Networking dinner

Exhibition inauguration was followed by the Welcome Dinner at Holiday Inn, Goa.



## Exhibition OSI 2012

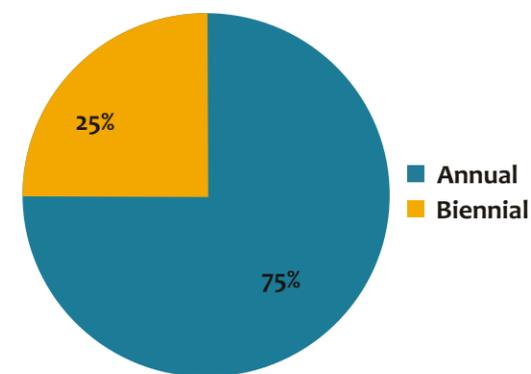
Exhibition was inaugurated by Mr. A K Hazarika, Former CMD, ONGC & Conference Chairman, OSI 2012. Exhibition showcased participation from 25 companies from 10 countries and 2 country pavilions from UK and Norway.

International brands like Aptomar AS, Ayles Fernie International Ltd., Chukar Waterjet Inc., Darcy Spillcare Manufacture, Ecoservice - Neftgaz, Ltd., Energy Plus Communications, Fosse Liquitrol Ltd., Frank Mohn AS, Gayatri Industrial Corporation, Indiamart.com, JRE Pvt. Ltd, Kelvin Hughes Ltd., Micros AS, Norlense AS, Oil India Ltd., Oil Spill Response Ltd., OPEC Ltd, Spill International, TODO AB, Woodfield Systems (India) Pvt. Ltd. participated and presented their latest technologies and advancements.

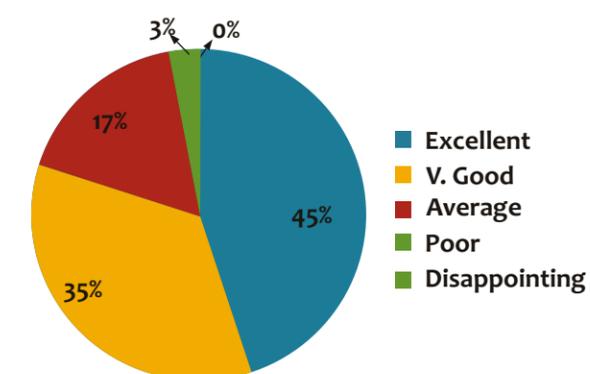
Exhibitors got opportunities to discuss the same with the delegates came from 18 countries worldwide.



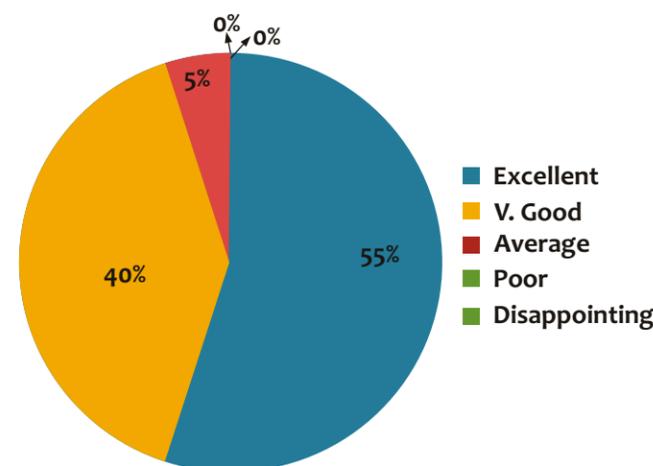
### Preferred Frequency of Conference



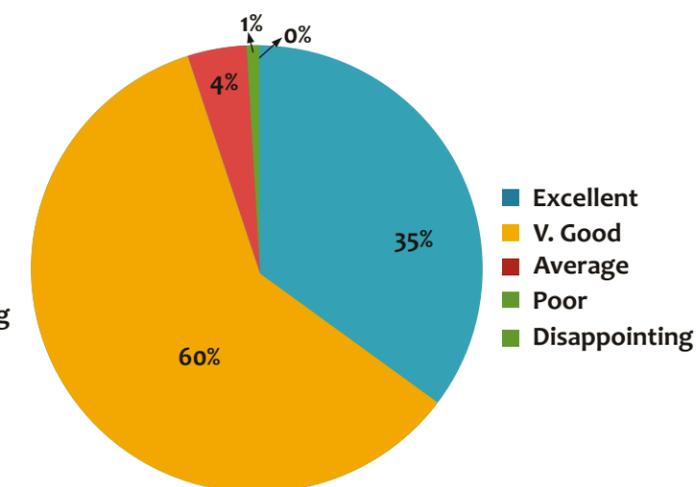
### Networking



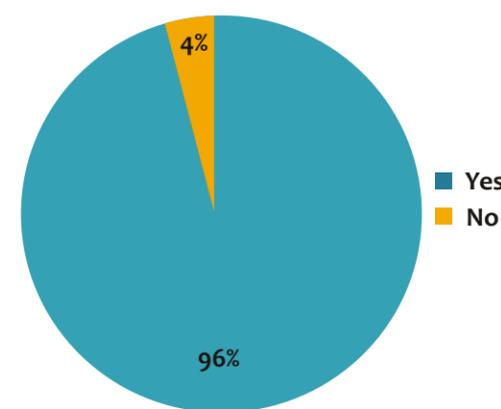
### Relevance of Conference Content



### Quality of Speakers



### Would like to attend again or not?



- 95% rated the content relevance as excellent / Very Good.
- 75% preferred the frequency of conference to be annual
- 96% said they would like to attend it next time as well.
- 95% rated the quality of speakers as excellent / Very Good
- 80% said that the networking opportunities were excellent / Very Good.

### Participation in OSI 2012

20	Countries
290	Delegates
35	Exhibitors



#### The major issues addressed during the conference were:

- ✦ regional cooperation
- ✦ need to have a nodal agency for handling oil spills
- ✦ regulatory issues and international conventions.
- ✦ the maintenance and sea worthiness of various types of vessels
- ✦ navigation errors and training of pilots
- ✦ fatigue factor during navigation
- ✦ monitoring of vessels by port trusts
- ✦ training needs
- ✦ contingency planning, mapping, modeling
- ✦ need for international salvors.

#### The following actions plan was recommended for dealing with oil spills in the future:

- ✦ need to develop an exclusive area on oil spill containment under the health, safety and environment
- ✦ departments of all companies to address oil spill issues
- ✦ need to forge an alliance with all agencies working in India to pool out resources at the time of crisis
- ✦ efforts to fill the knowledge gap on oil spills through awareness program & training
- ✦ managing of oil spills on high seas by satellite based monitoring & modeling
- ✦ active involvement of customs and state pollution control boards
- ✦ networking is essential for dealing with emergencies that may arise.

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RigsWorld

# Oil Spill India 2014

International Conference & Exhibition  
18-20 September, Holiday Inn Resort, Goa



## POST SHOW REPORT



**Theme:**  
**PRACTICE TO PERFECTION**

## Practice to Perfection

Established in 2011, Oil Spill India (OSI) - The International Conference & Exhibition on Oil Spill Prevention, Preparedness, Response & Restoration systems has over the years created a global forum for governments, regulators, industry, academia and response organizations to discuss, deliberate, share & learn the best of practices, technologies & experiences on oil spill management.

Each edition of Oil Spill India has witnessed the world's most eminent experts including Policy Makers, CEO's of Oil Producers, Regulators, Responders & Technology Providers delivering Plenary & Keynote Addresses, Case Studies, Forecast Papers and breakthrough Research papers highlighting the raising global focus on oil spill management.

One of the central goals of the Oil Spill India (OSI) Conference is to partake at this critical juncture in bringing a promising future for the global oil spill industry & its stakeholders. Since its inception in 2011, OSI has continually evolved & OSI 2014 was no exception in meeting the changing needs and interests of the community that it serves. Attended by over 300 delegates from the global spill industry the 3rd edition of Oil Spill India 2014 was organized from 18-20 September 2014 at the Holiday Inn Resort, Goa. The three-day international conference & exhibition was organized by iTEN Media and was jointly supported by the industry at large.

The diversity of over 60 international speakers, attendees & the exhibitors at OSI 2014 underlined just how important the oil spill subject has become the world over. OSI continues to showcase the latest in technological advances while also offering an unparalleled platform for industry and government leaders to discuss and debate the latest opportunities and challenges facing the industry. The event had a strong focus on building grass root networks across technically minded people.

The conference was inaugurated by lighting of the lamp ceremony by Capt K.P. Jaykumar, DDG, Directorate General of Shipping, Ministry of Shipping, Govt. of India; Capt K. Devdas, Sr. Vice President, Shipping Corporation of India; Mr. Suresh Mehra, GGM, Head Safety, ONGC along with the Chief Guest DIG A.A. Hebbbar, Director, Environment, Indian Coast Guard.

With the theme of "Practice to Perfection" the conference addressed the increasing incidents of the oil spill world over and highlighted the problems that oil spills cause to the marine environment and the water resources.

Mr. A.K. Hazarika, Former CMD, ONGC & Conference Chairman, OSI 2014 in his inaugural speech made an observation of recent Oil spills across the world. He further stated that oil spills like the one from Exxon Valdez to the Gulf of Mexico are not uncommon and many more oil spills have occurred in the world's oceans and other waterways in the past that went unnoticed.

Approximately 5.74 million tonnes of oil were lost as a result of tanker incidents from 1970 to 2013, according to International Tanker Owners Pollution Federation Limited, which collects data on oil spills from tankers and other sources. Analysts for the Oil Spill Intelligence Report have reported that spills ranging from small to large have occurred in the waters of 112 nations since 1960.

Citing an example of the Khaleeja and Chitra in Mumbai in 2010, he stressed the need of introducing robust spill policies and the necessary regulations for the Indian waters. He further highlighted that while increased sea borne trade might imply increased risk, it was encouraging to observe that downward trends in oil spills continue despite an overall increase in oil trading since the mid-1980s. However, not merely comparing figures; the size of the spill is certainly not the only factor of importance in terms of what environmental damage can be caused by a spill.

He concluded his speech by stressing that no matter how much we can do by ourselves on the national or international level whether it is research or development, it is never enough. Therefore the industry must join together in an action-oriented effort to the problems that looms large over our industry & the industry should collectively devote itself to the development in technology to address the issues related to oil spills.

Capt K.P. Jaykumar, from DG Shipping stated that with the modern day sailing oil spill has been subject of discussion all over the globe. Capt. Jaykumar stressed on various IMO conventions for the prevention of oil spill. Referring to various conventions, he advocated the continuous practice of preventive measures along with the national contingency Plan for Oil spill would help in ensuring oil spill free oceans.

Capt. K. Devadas, Sr. Vice President (T & OS), Shipping Corporation of India, stated that he would like to congratulate the organizers for choosing an apt theme "Practice to Perfection" for this conference that suits the business of most of the companies. "In today's times and as the old saying goes practice makes a man perfect may it be sports or professional lives.

All of us over here should pledge to practice safe working procedures to give a perfect finish to the work that we are being entrusted upon".

He further stated that it is generally understood that all businesses have a major role to play in preventing pollution and reducing releases of harmful emissions into the environment and this is particularly true of the shipping industry. The impact of pollution on fragile ecosystems is particularly severe in the marine environment, and to address this there are various international regulations related to environmental control, including comprehensive survey and certification requirements.

Elaborating it further he stated that approximately 706 million gallons of waste oil enter the ocean every year, with over half coming from land drainage and waste disposal.

Offshore drilling and production operations and spills or leaks from ships or tankers typically contribute less than 8 percent of the total. The remainder comes from routine maintenance of ships (nearly 20 percent), hydrocarbon particles from onshore air pollution (about 13 percent) and natural seepage from the sea floor (over 8 percent).

IMO is the principal United Nations agency charged with responsibility to regulate maritime safety, security and pollution prevention & the guidelines set by them should be strictly followed by all sea going marine craft, including drilling rigs he stressed.

He further stated that pollution prevention includes any activity geared towards eliminating or reducing ship-source oil and chemical spills, which includes the enactment and enforcement of relevant legislation and regulations. It is very important for each & every company to identify the risks that are within or related to the areas of their responsibility but also should have emergency management plans in place. An up-to-date knowledge of risks regarding ship-source spills, training, exercises and appropriate spill response equipment, are important aspects of being prepared to respond to ship-source oil and chemical spills. We as the state owned shipping company have prevention and response systems developed to address oil spills if they occur.

Stated that in his opinion we all should develop a regime so that the entities who would typically be involved in responding to a spill—such as ports, shipping companies, private spill response companies, local fire departments, and the Coast Guard, are aware of what role they would play. Effective system can be had if each stake holder understands their respective roles, have well and more informed decisions regarding training, exercises, and equipment investments. There is a need to have pollution prevention study, before any incident happens, that will determine a risk reduction index.

He concluded by saying that the most effective instrument in the marine environment protection is regional treaties. Almost all regional treaties include a general obligation for signatory states to prevent, reduce and control all forms of maritime pollution. However, the elaborated rules need to be enforced and complied with. A closer co-operation and sharing of informational resources within the international community is urgently required, especially in the cases of conventions and their amendments ratification.

Mr. Suresh Mehra, GGM, Head Safety, ONGC was very brief in his address. With an initial introduction of the topic and acknowledging the facts, he stressed the point that most of the companies should develop the system of self-assessment.

ONGC, one of the largest PSU's and as a responsible organization, has developed mechanism and measure on western and eastern shore to overcome such problems. However he was of the view that when it comes to preventing Oil Spill, India as a country is at infancy stage and there is lot more to be done.

Chief Guest of the function DIG A.A. Hebbar, Director Environment, Indian Coast Guard (ICG) in his address stated that one has to be critical and assess all the measures for ensuring prevention of incidents.

He also informed that ICG has made amendments to the National Oil Spill Disaster Contingency Plan (NOSDCP) & it is in process for adaptation. Once passed by the authorities will be of great help to the industry at large.

Post the address of the Chief Guest, the Inaugural Session dignitaries released the official show catalogue of the 3rd edition of OSI i.e. Oil Spill India 2014.

Mr. Abhishek Bhatnagar, CEO, iTEN Media proposed the Vote of thanks expressing his gratitude towards the Dignitaries and The Government of India for their active participation.

As oil exploration and its transportation worldwide continue to rise and different industry sectors leverage usage of oil for their own service, growth brings its own challenges. It was observed that closer relationships between operators and technology vendors can generate new efficiencies in industry value chain. For their part, operators must pay close attention to new dynamics in their customer relationships & high levels of trust will be vital if new opportunities are to be translated into winning propositions. The full benefits of better technology capabilities can be realized only through a supportive enabling environment that creates and safeguards incentives for collaboration & investment.

Delivering engaging, informative and technically focused presentations by a mix of national, regional & global experts in Spill Planning, Prevention, Response & Restoration technologies, helped achieve the objectives set out for the 2014 agenda of the conference.

The range and depth of presentations complemented by the latest in global technologies, equipment's & services being displayed by a host of exhibitors from the world over provided the audience a right mix of knowledge sharing & networking opportunity that OSI is recognized for.



# WELCOME ADDRESS 2014

**Theme:**  
**PRACTICE TO PERFECTION**



Spilled oil poses serious threats to Environment. Its aftereffect can seriously create problem that can damage the mere existence of all the living being. Impact of this spill can be so severe that if these measures are not implemented at the right time can be irreparable. Any oil spills, onshore or offshore needs to be analyzed seriously and mitigation methods should be applied to minimize the damages.

I am happy to know that the iTEN Media is organizing Oil Spill India conference and exhibition in association with Spill Association of India (SAI) at Goa from 18th to 20th Sept., 2014.

This conference will provide the best platforms that highlight the causes of oil spill, mitigation methods, regulations and guidelines, technological innovations in equipments & training needs to the people for damage control in time.

With the hope that all the experts in the field will come together and bring out the solutions required in the oil spill, I wish all the participants and other dignitaries success in their endeavor.

I also congratulate the organizers for coming up with this event, which would undoubtedly help address this concern effectively and wish them success.

**Mr. Manohar Parrikar**  
Hon'ble Chief Minister, GOA



iTen Media in association with Spill Association of India (SAI) is organizing Oil Spill India 2014 in Goa during 18-20 September 2014. To combat against any possible oil spillage, the most accepted formula worldwide is based on "Practice to Perfection". Most aptly, this is what has been taken up as the theme of this edition of Oil Spill India.

Considering the global dynamics of the petroleum industry, especially when the focus of the entire industry is shifting from safe and known territories of land and shallow water to deepwater and ultra-deep water, it is imperative that professionals from all sections of the oil industry pay maximum attention to explore and practice safe exploration.

OSI 2014 is not only going to be an incredible platform for the professionals to brainstorm and exchange ideas on the demanding needs of the Macondo incident in the Gulf of Mexico, but also will help to foster a new tie between producers, service providers as well as vendors dealing with materials and services related to preventing and arresting possible oil spillage circumstances of on-land and offshore operations.

It is also heartening to learn that the OSI 2014 is bringing out a brochure documenting commitment towards protecting environment while striving for more and more energy.

I wish Oil Spill India 2014 great success.

**Dr. Shailesh Nayak**  
Secretary  
Ministry of Earth Sciences  
Government of India



Directorate General of Hydrocarbons (DGH) wishes to convey its congratulations to Spill Association of India (SAI) for organizing “Oil Spill India 2014”- International Conference & Exhibition during 18-20 September 2014 at Goa. The theme of “Practice to Perfection” is very pertinent to the present day oil industry in India.

As a technical arm of the Ministry of Petroleum & Natural Gas, Government of India, DGH is monitoring various aspects of E&P sector in India and is of the firm belief that “Oil Spill Management” is an essential aspect of any petroleum operations by any operator in the oil and gas industry.

I, on my personal behalf, convey my best compliments to President, SAI and sincerely wish “Oil Spill India 2014” becomes a grand success contributing towards technology and knowledge upgradation while taking it forward through practice to perfection.

**Mr. B N Talukdar**  
Director General  
Directorate General of Hydrocarbons (DGH)

Welcome to Oil Spill India 2014 International Gateway India event from 18th to 20<sup>th</sup> September 2014 at Holiday Inn Resort, Goa. The theme of the Conference “Practice to Perfection” is very topical and addresses to a very significant issue on Oil Spill Concern and Management which has received a lot of international attention in the recent years.

The organizing committee is working very hard to make this year’s event of much better quality and experience for participants to remember as compared to the previous conferences.

This is an international Conference-cum-Exhibition for Hydrocarbon Industry and I am sure most of the industry friends have made good use of this opportunity and chosen to participate in the third edition of Oil Spill India 2014.

We have immense pleasure in organising such an event which will surely prove to be a potent platform for dissemination of knowledge and experience of experts from across the world who will not only discuss the relevant issues of Oil Spill concerning oil and gas industry today but also shall articulate the vision for future.

I am sure there will be a very encouraging response from delegates from world-over to showcase the latest technology and product lines in the exhibition. The confluence of some of the best minds in the business and participation of front line Organisations will ensure that the Conference and Exhibition provide an unparallel “Sea of networking opportunity” for all participants.

I wish Oil Spill India – 2014 all the very best for a grand success.

**Mr. A. K. Hazarika**  
Former CMD, ONGC  
& Conference Chairman, OSI 2014



The ever growing thirst for energy security is leading oil and gas industry to explore for resources in deep water frontiers and even the most inhospitable terrains in the world. As you are aware deep water drilling under HPHT regime is highly complex and poses a major risk unless properly planned and executed.

In case of any eventuality such a blow out or a major oil spill, the consequences could be severe on both the individuals and the marine environment as we have seen in the case of Macondo incident.

Hence this presentation looks into various facets of emergency preparedness and the level of integration of responses required from various functions and stakeholders.

The presentation also discusses various efforts being taken by the global E&P industry in pooling of resources and sharing best practices to handle major marine oil spills. Challenges faced by the Indian Oil and Gas industry and the opportunities for forging ahead with collective efforts in this context are also discussed.

**Mr. Hari Kumar**  
Director HSEQ & Security  
Cairn India Ltd.

I am happy to know that the iTEN Media is organizing Oil spill India conference and exhibition in association with Spill Association of India at Goa from 18th to 20th September 2014.

Every day, millions of barrels of oil are transported through the seas to various destinations around the globe. Accidently releases of crude oil from tankers, offshore platforms, drilling rigs and wells polluted and destroyed marine ecological life.

I am sure that the Conference will bring together internationally renowned experts and technologists from around the world on Oil Spill Response and recovery and hold in-depth deliberations on issues relating to the Oil Spill.

We must continue to discuss, explore through these events and invest in new solutions for prevention and response measures to be effective.

I convey my best wishes and compliments to the organizers, participants and other dignitaries connected to the conference and exhibition for the successful conduct of the event.

**Mr. Helge Tryti**  
Director  
Innovation Norway  
Commercial Counsellor, Royal Norwegian Embassy



I am delighted to learn that the International Conference and Exhibition 'Oil Spill India 2014' is being organized by iTen Media at Goa from 18th to 20th September, 2014, with the theme 'Practice to Perfection'. The timing and theme of this conference cum exhibition are both apt, considering the wide impact of hydrocarbon spills and the need for perfection in the practice of spill prevention and management. Oil India Limited is pleased to support this event.

We learn from each other's successes as well as failures, and I am confident 'OSI 2014' will bring together global industry experts, Government bodies, technocrats and other stakeholders to share their experience and deliberate in depth on Oil Spill issues and work towards better legislation and deliberate in depth on Oil Spill management system, and inspire the India Oil and Gas Industry to adopt the 'Practice to Perfection'.

I convey my best wishes to the organizers for their effort in hosting this conference & exhibition and wish the event every success.

**Mr. Satchidananda Rath**  
Director (Operations)  
Oil India Limited



As we are aware, iTen Media, in association with Spill Association of India (SAI), is organising the third edition of Oil Spill India (OSI), the International Conference & Exhibition in Goa, from 18-20 September 2014. To combat against any possible oil spillage, the most accepted formula worldwide is based on – "Practice to Perfection". Most aptly, this is what has been taken up as the Theme of this edition of Oil Spill India.

Considering the global dynamics of the petroleum industry, especially when the focus of the entire upstream sector is shifting from safe and known territories of land and shallow water to deepwaters and ultra-deepwaters, it is imperative for professionals from all sections of the oil industry to pay maximum attention to the practice of safe exploration. Perfection comes from practice and through practice only perfection can be achieved.

It is obvious that the instant event is not only going to become an incredible platform for the professionals to brainstorm and exchange ideas on the demanding needs of the petroleum industry, which have been specially underlined by the Macondo incident in the Gulf of Mexico, it will also help to foster new ties between producers, service providers as well as vendors dealing with materials and services related to preventing and arresting possible oil spillage during on-land and offshore operations. Such events will surely go a long way in preparing ourselves to face the challenges posed by the very nature of our industry.

It is also heartening to learn that, on this occasion, Oil Spill India 2014 is bringing out a brochure, documenting our commitment towards protecting the environment while we are striving for harnessing more and more energy.

Let me convey my warm greetings to all the participants and best wishes for a very successful and professionally satisfying 3 days of the conference.

**Mr. V.S. Okhde**  
Director (Pipelines)  
Indian Oil Corporation Limited



On behalf of iTEN Media, it is my privilege to extend you all a warm welcome to the 3rd International Conference on Oil Spill Prevention, Response & Restoration; Oil Spill India 2014 (OSI).

Over the past 4 years & 2 events, the success of OSI has been a reflection of the efforts of its committee & supporters. Continued benefaction from our formal supporters; Ministry of Earth Sciences, Government of India, Oil Industry Safety Directorate, Spill Association of India & Sponsors; ONGC, Cairn India, Indian Oil, Oil India, EIL, Innovation Norway, OSRL & Lamor is a testimonial of the exceptional value that Oil Spill India offers both as a traditional conference & a global networking forum.

Oil Spill India 2014's theme "Practice to Perfection" is a simple expression that highlights a value that is most important when preparing for prevention of incidents. With a host of prolific national & international speakers this year's conference would provide an engaging & interactive opportunity for local, regional and global representatives of the industry, government & community to discuss oil spill incidents, learning's & the latest in Spill Prevention, Response & Restoration systems.

In addition to the conference, Oil Spill India 2014 will also profile an expansive number of exhibitors showcasing state-of-the-art in technologies & equipment's.

I look forward to your successful participation & hope you enjoy visiting Goa - a land of amazing contrasts.

**"Kenna Chill, Kenna Thrill"**

**Abhishek Bhatnagar**  
CEO  
iTEN Media

The expression "Kenna" means "Sometimes" in Konkani, a language widely spoken in Goa & also dramatizes contrasts. In a way, "Kenna" invites you to explore the many sides of Goa... and yourself!

# CONFERENCE PROGRAMME 2014

**Theme:**  
**PRACTICE TO PERFECTION**

## DAY 1, THURSDAY , 18 SEPTEMBER 2014

## 1430 – 1600 HRS: REGISTRATION &amp; HIGH TEA

## 1600 - 1730 HRS: INAUGURAL SESSION

**Mr. A. K. Hazarika**, Former CMD, ONGC & Conference Chairman OSI 2014 - Welcome Address

**Dr. A. A. Hebbbar**, Director Environment, Indian Coast Guard

**Capt. K. P. Jayakumar**, Dy. Nautical Advisor [I/C], Directorate General of Shipping

**Capt. K. Devadas**, Director (T&OS), Shipping Corporation of India - Key Note Address

**Mr. Suresh Mehra**, GGM - Head Safety, ONGC

Release of OSI 2014 Show Catalogue

Vote of Thanks by **Mr. Abhishek Bhatnagar**, CEO, iTen Media

## 1735 - 1900 HRS: PLENARY SESSION

Session Chairman:

**Mr. Apurba Saha**, Director-Technical Integration & ExCo Member, Cairn India Limited

Speakers:

- 1.) **Mr. Asbjørn Klausen**, Sales Manager & Director, NorLense Russia, NOSCA Member  
Nosca, - the Norwegian OSR supplier industry and the development of compliancy to the strict environmental regulations from the Norwegian authorities
- 2.) **Mr. Hari Kumar**, Director HSSEQ, Cairn India Ltd.  
Oil Spill
- 3.) **Mr. Dinesh Kumar Arya**, Senior Trade & Investment Adviser- Energy, UKTI, British High Commission  
Oil Spill - UK Offer
- 4.) **Mr. Richard H. Johnson**, Technical Director, ITOPF  
Shipping and Pollution – Risks and Consequences in India

## 1900 HRS. ONWARDS: EXHIBITION HALL OPENING &amp; WELCOME RECEPTION

## 1930 HOURS ONWARDS- WELCOME DINNER (SPONSORED BY ONGC)

## DAY 2, FRIDAY , 19 SEPTEMBER 2014

## 0900 - 1015 HRS : SESSION 1 'Building a HSE Culture - Understanding Safety Procedure'

Session Chairman:

**Mr. A K Hazarika**, Former CMD, ONGC & Conference Chairman, OSI 2014

Speakers:

- 1.) **Mr. Bernd Freibott**, Head of Global Services Sustainability Consulting, SAP Deutschland SE & Co. KG  
The Roadmap towards a holistic safety culture based on an intergrated EHS solution landscape
- 2.) **Mr. Ghana Gogoi**, Dy. General Manager (CEMG-P), Oil India Limited  
New Regulations in Controlling Offshore Blowout and Government Regulations to curb Oil Spill.
- 3.) **Mr. Zishaan Muhammad Wajid Haindade**, Production Engineer, Oil India Limited  
Well Stimulation Operations Related Oil Spills and their safety hazards

## 1015 - 1115 HRS: SESSION 2 'Advancements in Surveillance Techniques &amp; Assessing Environmental Sensitivity'

Session Chairman:

**Capt. Prakash Correa**, V.P. Operations, Great Eastern Shipping Co. Ltd.

Speakers:

- 1.) **Dr. Polly Hill**, Consultant, Oil Spill Response Ltd.  
Long Term Planning: Ecological Evaluation Assessments & Environmental Sensitivity Mapping
- 2.) **Dr. Theo Hengstermann**, Business Development & Sales, Optimare Systems GmbH  
Airborne pollution surveillance of Spanish waters
- 3.) **Mr. Seyed Mojtaba Zarei**, Pollution Control Officer, Maritime Authority of Iran  
Comparing the concentration of PAHs in white shrimps, in north part of Persian Gulf, with Levels of Concerns (LOCs) established by FDA for Shrimps and Craps

## 1115 - 1130 HRS: TEA BREAK

## 1130 HRS - 1215 HRS: CASE STUDY

Session Chairman:

**Capt. Kuldeep Singh**, Director, Marine & Technical, US Gulf Operations, Gallagher Marine Systems, LLC

Speakers:

- 1.) **Mr. S. J. Prasad**, Project Scientist B, INCOIS  
Online oil spill advisory for Indian waters
- 2.) **Mr. H. V. Gurudutt**, Scientist D, Central Pollution Control Board  
Well & Pipeline Incidents Detection & intervention

## 1215 HRS - 1315 HRS: COUNTRY PRESENTATION NORWAY

Session Chairman:

**Mr. Hari Kumar**, Director HSSEQ, Cairn India Ltd.

Speakers:

- 1.) **Mr. Olafur Nesse**, International Key Account Manager, AllMaritim AS  
Tomorrow's oil spill response strategy and technology
- 2.) **Mr. Jan Qvale**, Sales Executive, Miros AS  
Developments in oil spill detection radar systems used in offshore environments
- 3.) **Mr. Azam Ali Khan**, Market Advisor - Oil & Gas, Innovation Norway  
Developments in oil spill detection radar systems used in offshore environments
- 4.) **Mr. Asbjørn Klausen**, Sales Manager & Director, Norlense Russia & NOSCA Member  
Innovations in OSR operational procedures to reduce risk for operating personnel and to speed up time of response.
- 5.) **Mr. Tor Magnus Okstad**, International Sales Manager, Aptomar AS  
Safety at your finger tips
- 6.) **Mr. Roald Wie**, Area Sales Manager, Frank Mohn AS  
TransRec the cost effective offshore spill recovery system

## 1315 - 1400 HRS: LUNCH

## 1400 - 1445 HRS: SESSION 3 'Environmental Effects of Oil Spill'

Session Chairman:

**Mr. Anoop Kumar**, Former Executive Director & Chief HSE, ONGC

Speakers:

- 1.) **Dr. R. S. Kankara**, Scientist-F, ICMAM-Project Directorate, Ministry of Earth Sciences, Govt. of India  
Oil Spill Sensitivity mapping for Effective Oil Spill Management

- 2.) **Dr. Sheela Nair**, Scientist 'E' 2, National Centre for Earth Science Studies, MoES, Govt. of India  
Oil Spill Trajectory Modelling Of Spill Off The Coast Of Kiltan In The Lakshadweep Group Of Islands
- 3.) **Dr. Indumathi M Nambi**, Head of Division, Environment & Water Resources, Department of Civil Engineering, IITMadras, Chennai  
Inland Petroleum Spills - Environmental Issues and Cleanup

#### 1445 - 1530 HOURS: SESSION 4 'Oil Spill Management - An Approach'

Session Chairman:

**Mr. A K Tyagi**, Former Executive Director (MM), IOCL

Speakers:

- 1.) **Mrs. Borislava Manolova**, International Sales Manager, Kongsberg Satellite Services  
"Mid Latitude Detention of Oil Spills from Space - A Multi-Mission Approach for India"
- 2.) **Mrs. Konstanze Reichert**, Business Development - Asia Pacific, OceanWaves  
Supporting oil spill recovery efforts by using marine X-band radar imaging and tracking capabilities
- 3.) **Mr. Yodi Satya**, Operations Manager, OSCT Indonesia  
Combating Oil Spill in Indonesia

#### 1530 - 1545 HRS: TEA BREAK

#### 1545 - 1715 Hrs: Session 5 'Mitigation Methodologies for Oil Spills'

Session Chairman:

**Capt. Sandeep Kalia**, Vice President, ICC Shipping Association

Speakers:

- 1.) **Dr. Srikanth Mutnuri**, Associate Professor, Department of Biological Sciences, BITS - Pilani, Goa Campus  
Bioremediation as a possible solution for oil spills
- 2.) **Mr. Shaik Ameer Basha**, Production Engineer, Oil India Limited  
Production without Pollution
- 3.) **Mr. Bidyut Pawan Das & Mr. Udai A. Dutta**, Dy. Superintending Engineer & Senior Production Engineer, Production Oil, Oil India Limited  
A Case Study of Application of 'OILZAPPER' In The Upper Assam Oil Fields of Oil India Limited
- 4.) **Prof. Prabhakar Clement**, Groome Endowed Professor of Environmental Engineering, Auburn University, Alabama, USA  
"Lessons learned from monitoring shoreline contamination along Alabama's beaches in the USA after the 2010 Deepwater Horizon oil spill - A case study"
- 5.) **Mr. Ravindra Ravuri & Mrs. Lisa Callaghan**, Manager & Regional Manager, DNV GL  
Minimising Oil Spills through the use of real-time CPM Leak Detection Category

#### 1715 HRS - 1800 HRS: YOUTH SESSION - UNDERSTANDING OIL SPILL

Session Chairman:

**Mr. Apurba Saha**, Director, Technical Integration & ExCo Member, Cairn India Ltd.

Speakers:

- 1.) **Mr. Aditya Harsh**, Student, RGIPT  
Waste Utilization in tackling oil spillage
- 2.) **Mr. Vidit Mohan**, Student, RGIPT  
Development of technique to detect oil spill using LISS III and google earth images

#### DAY 3, SATURDAY , 20 SEPTEMBER 2014

#### 0830 - 1000 HRS : SESSION 6 'Oil spill challenges faced by Ports, Shipping & legal organizations - Way forward'

Session Chairman:

**Mr. Anand Kumar**, Director, Petrotech

Speakers:

- 1.) **Mr. Ashwin Shanker**, Partner, Law Chambers of George A Rebello  
Failure of the Oil pollution regime in India
- 2.) **Capt. Anil Kishore Singh**, COO, Adani Hazira Port Pvt. Ltd & Adani Petronet (Dahej) Port Pvt. Ltd.  
OIL Spill Response - Indian Port's Perspective
- 3.) **Mr. Dipak Sonawane**, Surveyor, Indian Register of Shipping  
Oil Spill Risk Analysis of Port to Develop Scenarios for Contingency Planning

#### 1000 - 1045 HRS: SESSION 07 'Analysing Future Risk - Importance of Govt. & Private Partnership'

Session Chairman:

**Capt. Sandeep Kalia**, Vice President, ICC Shipping Association

Speakers:

- 1.) **Dr. Y. B. Sontakke**, Joint Director (Water Pollution Control), Maharashtra Pollution Control Board  
The Role of Maharashtra Pollution Control Board (SPCBs) during Oil Spill
- 2.) **Mr. Geraint Richards**, Managing Director, Lamor Middle East LLC  
Oil Spill Response Readiness

#### 1045 - 1100 HRS: TEA BREAK

#### 1100 - 1230 HRS: SESSION 08 'Panel discussion: Working on a New Model - Contingency Planning Guidelines for Spill'

Panelist:

- 1.) **Mr. A. K. Hazarika**, Former CMD, ONGC & Conference Chairman, OSI 2014
- 2.) **Mr. Tarsen Singh**, Director, Exploration & Production, OISD
- 3.) **Mr. Apurba Saha**, Director, Technical Integration & ExCo Member, Cairn India Ltd.
- 4.) **Mr. Hari Kumar**, Director, HSSE Q, Cairn India Ltd.
- 5.) **Mr. Anoop Kumar**, Former ED & Chief HSE, ONGC.
- 6.) **Mr. Neeraj Sinha**, Scientist 'F'/ Senior Director, Office of the Principal Scientific Advisor to the Govt.

Moderator:

**Capt. Sandeep Kalia**, Vice President, ICC Shipping Association

#### 1230 HRS: VOTE OF THANKS

#### CLOSE OF CONFERENCE FOLLOWED BY LUNCH



**CAPT. L. K. PANDA**  
Nautical Advisor to the GoI,  
Directorate General of Shipping



**MR. ARUN KUMAR GUPTA**  
Chairman & Managing Director  
The Shipping Corporation of India Ltd. (SCI)



**MR. ASBJØRN KLAUSSEN**  
Sales Manager & Director  
NorLense Russia & NOSCA Member



**MR. ADITYA HARSH**  
B.Tech 4th Year, Petroleum Engineering  
Rajiv Gandhi Institute of Petroleum  
Technology, Rae Bareilly, U.P



**MRS. BORISLAVA MANOLOVA**  
International Sales Manager  
Kongsberg Satellite Services (KSAT)



**MR. BERND FREIBOTT, BERND**  
Head of Global Services Sustainability  
Consulting, SAP Deutschland SE & Co. KG



**MR. BIDYUT PAWAN DAS**  
Dy. Suptdg. Production Engineer  
Oil India Limited



**MR. ASHWIN SHANKER**  
Partner  
Law Chambers of George A Rebello



**CAPT. ANIL KISHORE SINGH**  
Chief Operating Officer (COO)  
Adani Dahej & Hazira Port



**CAPT. KULDEEP SINGH**  
Director Marine & Technical  
Gallagher Marine Systems LLC., U.S.A.



**CAPT. K. P. JAYAKUMAR**  
Dy. Nautical Adviser to the Govt. of India  
Directorate General of Shipping



**DR. SRIKANTH MUTNURI**  
Associate Professor,  
Department of Biological Sciences  
Birla Institute of Technology & Science,  
Pilani, Goa Campus



**DR. POLLY HILL**  
Consultant  
Oil Spill Response Ltd



**DR. THEO HENGSTERMANN**  
Business Development & Sales  
Optimare Systems GmbH



**MR. DIPAK RAMCHANDRA SONAWANE**  
Surveyor  
Indian Register of Shipping



**MR. DINESH KUMAR ARYA**  
Senior Trade & Inv. Adviser - Energy  
UK Trade & Investment



**DR. Y. B. SONTAKKE,**  
M.S. (ENV.) PH.D. D.I.S.  
Joint Director (Water Pollution Control)  
Maharashtra Pollution Control Board



**DR. R S KANKARA**  
Scientist-F  
ICMAM-Project Directorate  
Ministry of Earth Sciences, Govt. of India



**MR. GHANA GOGOI**  
Dy. General Manager (CEMG-P)  
Oil India Limited



**MR. GERAINT RICHARDS**  
Managing Director  
Lamor Middle East LLC



**MR. H. V. GURUDUTT**  
Scientist D  
Central Pollution Control Board



**MR. HIRAK DUTTA**  
Executive Director  
Oil Industry Safety Directorate  
Ministry of Petroleum & Natural Gas



**MRS. INDUMATHI M NAMBI PH.D.**  
Associate Professor and Head  
Environmental and Water Resources Division  
Department of Civil Engineering IIT Madras



**MR. JAN QVALE**  
Sales Executive  
Miros AS



**MRS. KONSTANZE REICHERT**  
Business Development - Asia Pacific  
OceanWaveS



**MRS. LISA CALLAGHAN**  
Regional Manager, India  
DNVGL



**MRS. L. SHEELA NAIR**  
Scientist E 2  
National Centre For Earth Science Studies  
Ministry of Earth Science, Govt. of India



**MR. OLAFUR NESSE**  
International Key Account Manager  
AllMaritim AS



**MR. PRABHAKAR CLEMENT,**  
PH.D., P.E., F.ASCE  
Groome Endowed Professor of  
Environmental Engineering  
Auburn University, Alabama, USA



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## Inauguration ceremony



The lamp lighting ceremony was followed by An Inaugural Session. Oil Spill India 2014 was inaugurated by Mr. A.K. Hazarika (Former CMD, ONGC & Conference Chairman, OSI 2014) with DIG A A Hebbar (Indian Coast Guard), Capt. K Devadas (Shipping Corporation), Capt. K P Jayakumar (DG Shipping), Suresh Mehra (ONGC), on 18<sup>th</sup> September 2014 at 1600 hrs.

## Inaugural session



In Inaugural session, welcome address by Mr. A K Hazarika (Former CMD, ONGC & Conference Chairman, OSI 2014) with DIG A A Hebbar (Indian Coast Guard), Capt. K Devadas (Shipping Corporation), Capt. K P Jayakumar (DG Shipping), Suresh Mehra (ONGC)

Followed by the plenary session, Mr. A K Hazarika (Former CMD, ONGC & Conference Chairman, OSI 2014) Inaugurated the OSI 2014 International Exhibition.

## Sessions

### PLENARY SESSION



Session focused on the Environmental Regulations, speakers from Norlense, Crain India, UKTI, Gallger Marine Systmes LLC, & ITOFF. The Session was chaired by Mr. Apurba Saha, Director Technical Integration & ExCo Member, Crain India Ltd.

## Sessions

### SESSION 1



On day 2, **Session 1** focused on the Building a HSE Culture - Understanding Safety Procedure, Speakers from SAP Deutschland SE & Co. KG, Oil India Limited gave their valuable viewpoint and shared the expertise. The session was chaired by Mr. A. K. Hazarika, Former CMD, ONGC & Conference Chairman, OSI 2014

### SESSION 2



**Session 2** focused on the Advancements in Surveillance Techniques & Assessing Environment Sensitivity, speakers from Oil Spill Response Ltd, Optimare Systems GmbH, Maritime Authority of Iran. The Session was chaired by Capt. Prakash Correa, V.P Operations, Great Eastern Shipping Co. Ltd.

### COUNTRY PRESENTATION NORWAY



**Session** was Country Presentation Norway, speakers from AllMaritim AS, Miros AS, Innovation Norway, Aptomar, Norlense, Frank Mohn. The Session was chaired by Mr. Hari Kumar, Director HSSEQ, Crain India.

### SESSION 3



**Session 3** focused on the Environmental Effects of Oil Spill, speakers from Ministry of Earth Science, Govt. of India, IIT Madras. The Session was chaired by Mr. Anoop Kumar, Former ED & Chief HSE, ONGC.

## Sessions

### SESSION 4



**Session 4** focused on the Oil Spill Management - An Approach, speakers from Kongsberg Satellite Services, Ocean Waves, OSCT Indonesia. Session was chaired by Mr. A. K. Tyagi, Former ED (MM), IOCL.

### SESSION 5



**Session 5** focused on Mitigation Methodologies for Oil Spills, speakers from BITS - Pilani, Goa, Oil India Limited, Auburn University, Alabama, USA, & DNV GL. Session was chaired by Capt. Sandeep Kalia, V.P, ICC Shipping Association.

### YOUTH SESSION



**Session** focused on Youth Section - Understanding Oil Spill, Speakers form Rajiv Gandhi Institute of Petroleum Technology, Rae Bareli, Uttar Pradesh. Session was chaired by Mr. Apurba Saha, Director Technical Integretion & ExCo Member, Cairn India.

### SESSION 6



**Session 6** focused on the Oil Spill Challenges faced by Ports, Shipping & legal Organizations - Way forward, speakers from Law Chambers of George A Rebello, Adani Hazira Port Pvt. Ltd. & Indian Register of Shipping. The Session was chaired by Mr. Anand Kumar, Director, Petrotech.

## Sessions

### SESSION 7



**Session 7** focused on the Analysing Future Risk - Importance of Govt. & Private Partnership, speakers from Maharashtra Pollution Control Board, Lamor Middle East LLC. The Session was chaired by Capt. Sandeep Kalia, Vice President, ICC Shipping Association.

### SESSION 8



**Session 8** was Panel discussion, where Mr. A. K. Hazarika, Mr. Tarsem Singh, Mr. Apurba Saha, Mr. Hari Kumar, Mr. Anoop Kumar, Mr. Neeraj Sinha & Capt. Sandeep Kalia participated and discussed the issue.

## Networking dinner

Exhibition inauguration was followed by the Welcome Dinner at Holiday Inn, Goa.

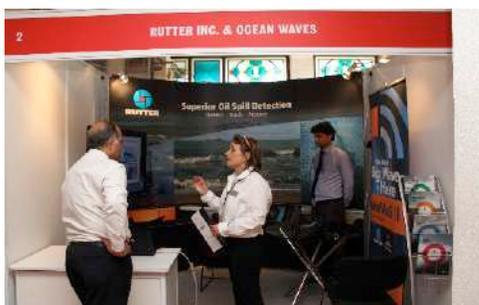


## Exhibition OSI 2014

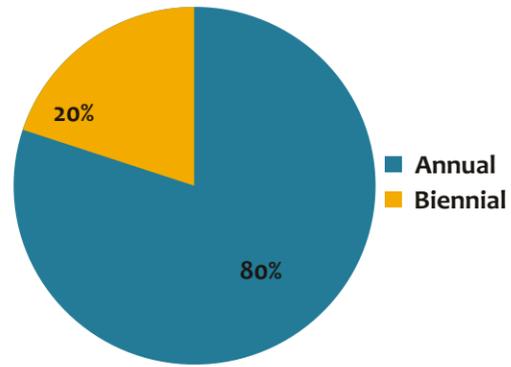
Exhibition was inaugurated by Mr. A K Hazarika, Former CMD, ONGC & Conference Chairman, OSI 2014. Exhibition showcased participation from 25 companies from 10 countries and 2 country pavilions from UK and Norway.

International brands like Miros AS, AllMaritim AS, Aptomar AS, Boerger Pumps Asia Pte Ltd, Maharashtra Maritime Board, NorLense, NAVTEK, Indian Private Ports & Terminals Association, Rutter Inc., Unisafe Services/ Multienviro, Unicare Emergency Equipment Pvt. Ltd., Kongsberg NorControl Surveillance Pvt. Ltd., Frank Mohn AS, ABN Equipments & Systems Pvt. Ltd., Destination MICE participated and presented their latest technologies and advancements.

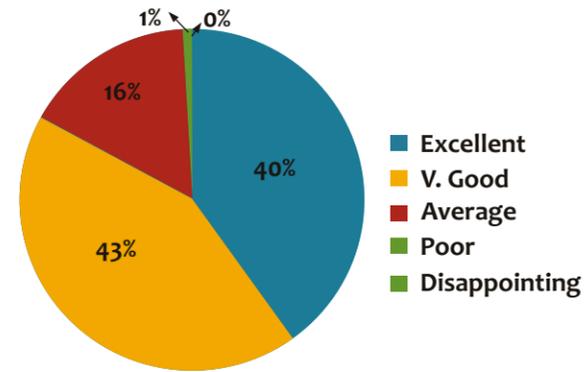
Exhibitors got opportunities to discuss the same with the delegates came from 18 countries worldwide.



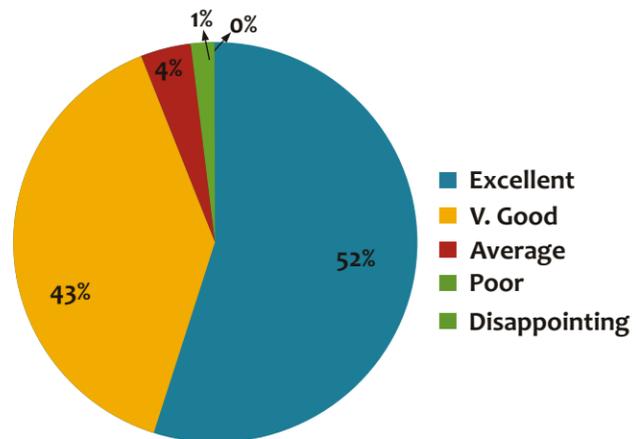
### Preferred Frequency of Conference



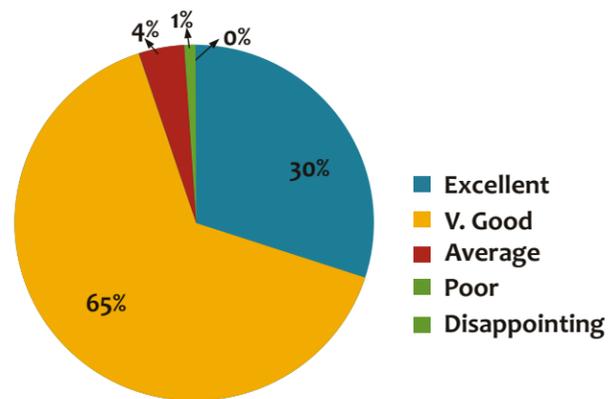
### Networking



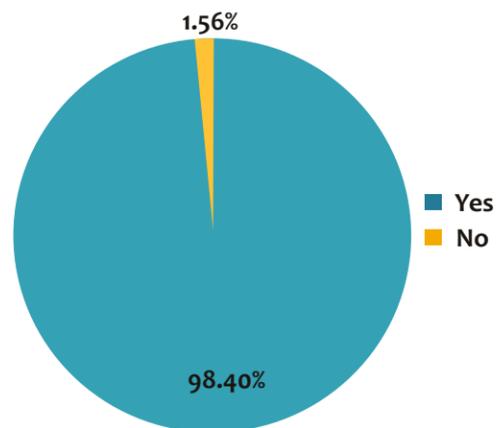
### Relevance of Conference Content



### Quality of Speakers



### Would like to attend again or not?



### Participation in OSI 2014

25	Countries
325	Delegates
40	Exhibitors

- 95% rated the content relevance as excellent / Very Good.
- 80% preferred the frequency of conference to be annual.
- 98.4% said they would like to attend it next time as well.
- 95% rated the quality of speakers as excellent / Very Good.
- 80% said that the networking opportunities were excellent / Very Good.



- ✦ The need for a comprehensive revision to the existing National Disaster Contingency Plan as per international standards.
- ✦ The need for development of an Online Oil Spill Advisory system that provides the trajectory of an oil spill. In the event of oil spill, the direction and movement of the oil will be predicted in advance in by the system and would be disseminated to the relevant authorities. The clean up and control measures will be planned and carried out accordingly.
- ✦ Need for complete mapping of environmental sensitivities in coastal zones. Environmental Sensitivity Index (ESI) maps provide a concise summary of coastal resources that are at risk if an oil spill occurs nearby. When an oil spill occurs, ESI maps can help responders meet one of the main response objectives: reducing the environmental consequences of the spill and the cleanup efforts. Additionally, planners can use ESI maps—before a spill happens—to identify vulnerable locations, establish protection priorities, and identify cleanup strategies.
- ✦ Develop Capabilities for deployment of Aerial Dispersant Spray System. Aerial dispersants are a powerful tool in the fight against marine pollution; they can provide a significant impact on a spill in reducing overall levels of pollution and possible levels of shoreline impact. It is a major response tool that is used throughout the world and continues to gain acceptance even in those countries that previously were completely opposed to it.
- ✦ Facilitating the regional oil spill contingency plans under the auspices of the South Asia Cooperative Environment Program of the United Nations including development of national plans for immediate coastal neighbors.
- ✦ Finally the need to set up an Industry Association that represents the interests of the companies, organisations & individuals engaged in the Spill Planning, Prevention, Preparedness & Response of On Land & Offshore Oil/Chemical/HNS spills, marine casualty, marine pollution, wreck removal, cargo recovery, towage and related activities in protection of the Environment. Championing their development through constant learning, networking & collaboration with Industry, stakeholders & regulators.

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**Shri. K. R. Sachar**  
Great Offshore Limited  
"Spill in any form; be it from Oil, HNS, Hazardous substances etc. is one of the major threats for the marine environment. The consequences of Spills adversely affect harbours, beaches, wild life, fisheries, tourism and society at large."

I am very pleased to be associated with Oil Spill India under the aegis of iTen Media as they are doing a wonderful job in addressing the serious impacts of spills. My best wishes to OSI 2016 and hope it will be a grand event with think tanks from across the globe, meeting under one roof.."



**Shri. Dinesh Vaidya**  
Reliance Industries Limited  
"We don't want an environmental disaster to become a human disaster." Barkley Lloyd (Alaska Clean Seas)."



**Capt. Derrick F Vaz**  
Phoenix Shipbuilders, Ship repairs & Dry Dock Engineering  
"Oil Spill India 2016....India's commitment to Statutory compliance, a reality in the offing."



**Mr. Surendra Jagtap**  
Essar Projects (India) Limited  
"Oil spill control is still neophyte topic among various Disaster Management Programs worldwide. When you fully understand the situation, it is worse than you think. If you drill, there's going to be a spill. Thus we need to create Oil Spill awareness and persistence efforts in preventing, minimizing, and effective recovery and clean-up operations through such events."



**John P. Menezes**  
Menezes and Associates  
"Congratulations to you and your team for putting up such a well organized event. The venue, the speakers, entertainment etc was well planned and executed."



**Geraint Richards**  
Lamor Corporation Ab  
"I feel the event was a great success and look forward to supporting the next one."



**Dr. R. S. Kankara**  
Ministry of Earth Sciences  
"The quality of conference was excellent."



**Dr. P.B. Rastogi**  
Ministry of Environment & Forests  
"It was a well organized International Conference on the Oil Spills covering all aspects related to the subject and most probably updated all concerned on the subject. Wish you all the best for future endeavour."



**Thomas Liebert**  
IOPC Funds  
"Thanks again for the invitation to OSI 2011 and congratulations for succeeding in organizing such a well attended event."



**Subhajit Sarkar**  
Wipro Technologies  
"I congratulate you all at ITEN media for conducting the event very successfully. It was a great pleasure to speak and network with very important dignitaries and stakeholders at this arena."



**Capt. Farhat Imam**  
RESOLVE Marine Group, Inc  
"I was pleased with his experience at Oil Spill India. Thank you for the opportunity to participate."



**R K Talukdar**  
ONGC  
"Thanks to iTEN for organizing such an eye-opening Conference on the Oil Spill Hazard."



**Dr. Y.B. Sontakke**  
MPCB  
"I am really thankful for your courtesy and nice organization of event"





**A. K. Hazarika**

Former CMD, ONGC

&amp; Conference Chairman, OSI 2016

**OIL SPILL INDIA 2016**4<sup>th</sup> International Conference & Exhibition

August 2016, Mumbai, India



Dear Industry Colleagues,

In the wake of the recent Sundarbans Oil Spill incident, we are yet again reminded of the fragility of similar eco-sensitive areas in the waters following any oil spill & the increasing amount of uncertainty for similar incidents. Fortunately since the last Oil Spill India Conference in September 2014 at Goa, the quantum of work been done & the progress made on actionable points by various stakeholders of the industry led by Indian Coast Guards (ICG) has been noteworthy.

We are riding a new wave of expansive research, innovation and renewed dedication to advancing effectiveness in oil spill response capabilities. Leading the wave of change is the Indian Coast Guard through numerous measures including: the recently released & comprehensively revised National Oil Spill Disaster Contingency Plan 2015 (NOS-DCP), which meets international standards; An Online Oil Spill Advisory system-a system that places India amongst a select list of countries that have indigenously developed capabilities for prediction of trajectory of oil spills; Mapping of environmental sensitivities in coastal zones, deployment of Aerial Dispersant Spray System & finally facilitating the regional oil spill contingency plans under the auspices of the South Asia Cooperative Environment Program of the United Nations including development of national plans for Maldives and Sri Lanka.

One of the key objectives of the Oil Spill India (OSI) Conference is to remain abreast of the global developments & standards, brainstorm on the strategies, techniques, models used for prevention, mitigation and response for the benefit of the industry & its stakeholders. Since its inception in 2011, OSI has continually evolved & OSI 2016 will be no exception in meeting the changing needs and interests of the community that it serves. Themed - "Commitment, Synergy, Excellence", "Commitment" for Environmental Sustainability, Oil Spill Preparedness & Prevention, the need for "Synergy" in Spill Response & "Excellence" in Restoration efforts.

It is with great pleasure that the undersigned, on behalf of the Advisory Board, invite you to participate in the 4th edition of Oil Spill India Conference (OSI), to be held during August 2016 in Mumbai.

Whether you are a Technologist, Researcher, Scientist or Engineer wishing to share new innovations, models, techniques or applications of spill methodology, Regulator or Administrator, engaged in E&P exploration, oilfield production, exporter or carrier of Oil or Hazardous substances, associated with Shipyard, Port, Shipping line, Offshore or Logistics services provider, Coast Guard, Navy, Flag/Port state, Classification society, P&I / H&M clubs, Maritime Law, Salvage, Spill response or equipment manufacturers, OEMs, Training institute or Trade association, pursuing CSR initiative in corporate or private sector or a citizen who is involved / concerned about Environment & impact of pollution and want to share your experience or draw insights from the experts, Oil Spill India provides you with a unique opportunity & platform.

Please join us in this noble cause. Your participation is integral in achieving the objectives of this conference and the effectiveness of the international oil spill community.

Yours Sincerely,

**A. K. Hazarika**  
Former CMD, ONGC  
& Conference Chairman, OSI 2016

Strategic Partners



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Attendee Organisations



Exhibitors



# Oil Spill India 2016

4th International Conference & Exhibition

August 2016, Mumbai, India

Theme: Commitment, Synergy, Excellence



[www.oilspillindia.org](http://www.oilspillindia.org)

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A professionally owned and managed enterprise, the team at iTEN has over 60 years of cumulative experience & successful track record in organizing over 150 international events across 20 industry verticals like defense, automotive, electronics & communication, energy, engineering, manufacturing, infrastructure, building & construction, IT & telecom, jewellery, media & entertainment, mining & metals, safety & security etc.

Geared with strong fundamental & professional experience gained with world leading organizations, iTEN today partners governments, trade associations & investment promotion agencies delivering industry leading trade shows & conferences including globally acclaimed events like Petrotech, Global Refining & Petrochemicals Congress (GRPC) and Oil Spill India !!



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