



# ISCO NEWSLETTER

The Newsletter of the International Spill Response Community

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### International news

#### APNEWSBREAK: US OIL SPILL PLAN PREPARES FOR CUBA

March 15 - If a future oil spill in the Caribbean Sea threatens American shores, a new federal plan obtained by The Associated Press would hinge on cooperation from neighboring foreign governments. Now that Cuba is the neighbor drilling for oil, cooperation is hard to guarantee.

The International Offshore Response Plan draws on lessons from the Deepwater Horizon disaster in the Gulf of Mexico in 2010 and was created to stop offshore oil spills as close to their source as possible, even in foreign waters. The plan dated Jan. 30 has not been released publicly. The AP obtained a copy through a Freedom of Information Act request.

After crude oil stained Gulf Coast beaches, state and federal officials are eager to head off even the perception of oil spreading toward the coral reefs, beaches and fishing that generate tens of billions of tourist dollars for Florida alone.

The plan comes as Spanish oil company Repsol YPF conducts exploratory drilling in Cuban waters and the Bahamas considers similar development for next year. Complicating any oil spill response in the Florida Straits, though, is the half-century of tension between the U.S. and its communist neighbor 90 miles south of Florida.

Under the plan dated Jan. 30, the Coast Guard's Miami-based 7th District would take the lead in responding to a spill affecting U.S. waters, which includes Florida, Georgia, South Carolina, Puerto Rico and the U.S. Virgin Islands. The district's operations cover 15,000 miles of coastline and share borders with 34 foreign countries and territories.

Repsol's operations in Cuban waters are not subject to U.S. authority, but the company allowed U.S. officials to inspect its rig and review its own oil spill response plan.

If an oil spill began in Cuban waters, Cuba would be responsible for any spill cleanup and efforts to prevent damage to the U.S., but the Coast Guard would respond as close as possible.

Though a 50-year-old embargo bars most American companies from conducting business with Cuba and limits communication between the two governments, the Coast Guard and private response teams have licenses from the U.S. government to work with Cuba and its partners if a disaster arises.

The U.S. and Cuba have joined Mexico, the Bahamas and Jamaica since November in multilateral discussions about how the countries would notify each other about offshore drilling problems, said Capt. John Slaughter, chief of planning, readiness, and response for the 7th District. *The Associated Press*  
[Read more](#)

### ARCTIC COUNCIL GROUP WORKS ON SPILL RESPONSE PLAN

March 23 - Representatives of the eight nations in the Arctic Council gathered Thursday for continued discussions on a petroleum spill preparation and response plan in northern waters and a spokesman for the meeting host said it couldn't come too soon.

Shipping in the Arctic Ocean is growing faster than anticipated, said Alaska Lt. Gov. Mead Treadwell, and last summer the Bering Strait saw eight cargos of gas condensate from northern Russia moving to markets in Asia.

Treadwell said the state is quite confident in the spill preparations Shell Oil has made for proposed exploratory petroleum drilling in the Chukchi and Beaufort seas this summer off Alaska's northern coasts, but is not as confident about shipping by itinerant vessels.

"We feel a little bit naked about shipping, and I think this is a very important first step," he said. *Anchorage Daily News* [Read more](#)

## Major incident reports

### NEW ZEALAND: RENA UPDATE

March 23 - The amount of oil remaining on the wreck is estimated to be in the order of tens of tonnes. This oil is located in a number of different pockets throughout the wreck. Salvors will continue to strip oil from the wreck when they are able to access these pockets.

A total of 649 containers are now accounted for onshore. This comprises 575 containers removed from Rena by Svitzer salvors and 74 containers recovered from the sea and shoreline by Braemar Howells container recovery teams. *Maritime New Zealand* [Read more](#)

### ITALY: COSTA CONCORDIA

March 24 - Work to remove fuel from the wreck of the Italian cruise ship Costa Concordia has been completed, the Italian authorities announced.

The next stage of the salvage operation will involve cleaning up the sea bed and the area around the ship's hull before work begins to lift the wreck.

The removal of the Costa Concordia itself is expected to take up to a year. *BBC News* [Read more](#)

### BRAZIL: OFFSHORE OIL SPILL UPDATE

#### Charges filed against Chevron execs in Brazil

March 21 - Federal prosecutors filed criminal charges against 17 Chevron and Transocean company executives on Wednesday for an oil leak in the Atlantic, a move deemed outrageous by those targeted but applauded by environmentalists.

Prosecutors accused the executives of environmental crimes, of misleading Brazil's oil regulator about safety plans and of not providing accurate information in the wake of the spill.

At least 110,000 gallons (416,000 liters) of oil seeped through cracks on the ocean floor near a Chevron Corp. appraisal well off the Rio de Janeiro coast in November. The well drilled by Transocean Ltd. has since been sealed, but a small amount of seepage reappeared in recent days, raising concern the damage is not yet over.

The federal prosecutors' office in Rio de Janeiro said in an emailed statement that the two companies and 17 of its executives have been charged with "crimes against the environment." Executives could face up to 31 years in prison. A judge will decide if the case will go to trial, which would be a lengthy process given the number of defendants, the complexity of the case and the Brazilian legal system's room for numerous appeals. *The Associated Press* [Read more](#)

#### Chevron says Brazil's reaction to spill out of proportion

March 22 - The legal reaction to a [Chevron](#) Corp. (CVX) oil spill in Brazil in November is "out of proportion compared to the event," according to Rafael Jaen Williamson, the oil company's director of corporate affairs.

A Chevron-operated well spilled between 2,400 and 3,000 barrels of oil into the sea off the coast of Rio de Janeiro in November. Brazil on Wednesday filed criminal charges against Chevron and 17 individuals related to the spill.

The prosecutor, Eduardo Santos de Oliveira, accused the firms, 16 of their employees and a subcontractor of environmental crimes and damaging public property. Williamson said Chevron was not negligent in the case, and the company plans to defend itself. *Fox Business* [Read more](#)

## Major incident reports (continued)

### Key Brazil senator criticizes Chevron charges

March 22 - An influential senator from Brazilian President Dilma Rousseff's party criticized criminal charges against Chevron as "excessive" and "irresponsible" on Thursday, signaling that the government may be distancing itself from a case that threatens the future development of Brazil's massive offshore oil reserves.

The criminal charges filed Wednesday against U.S. oil company Chevron, drill-rig operator Transocean and 17 of their employees "create a climate of insecurity" that could damage badly needed investment, Senator Jorge Viana told Reuters in the capital Brasilia.

If the charges, which carry prison terms of up to 31 years, plus an \$11 billion civil suit against Chevron and Transocean in November, were fairly applied to other polluters, "the industry would shut down," said Viana. *Reuters* [Read more](#)

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### TANKER FIRE NEAR SAUDI COAST SPURS CRISIS PLAN

March 19 - Bahrain and other GCC countries have activated their contingency plans after a chemical tanker exploded and caught fire near Saudi Arabia's coastline.

Marine protection authorities are now concerned about possible leakage and environmental pollution.

Twenty-four seafarers, all of them from the Philippines, were rescued by the US Navy from the burning Stolt Valor and handed over to Philippine Embassy officials in Bahrain. But one is still missing.

The Liberian-registered tanker was on its way from Al Jubail port in Saudi Arabia to Bahrain and was carrying about 12,700 metric tonnes of methyl tertiary butyl ether (MTBE), a volatile flammable liquid chemical and petrol additive.

The tanker, owned by a Dutch company, is being salvaged by Netherlands-based Smit Salvage, said Bahrain-based Marine Emergency Mutual Aid Centre (Memac) director Capt Abdul Moniem Al Janahi. *Trade Arabia* [Read more](#)

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### INDIA: ONE DEAD, 6 INJURED IN EXPLOSION ON MERCHANT SHIP



*Police boat patrols near the chemical tanker 'Royal Diamond 7'. Photo: Vivek Bendre*

March 25 - An explosion on board the chemical tanker 'Royal Diamond 7' killed a South Korean crew member and injured six, including two foreigners and four Indians, on Saturday morning near the Mumbai coast.

The Directorate General of Shipping (DG Shipping) has ordered an inquiry into the matter as there was another explosion in the same storage area of the vessel just a week ago. There were no casualties or injuries then.

"When the crew and other labourers were cleaning the area near a gas pipeline carrying toluene liquid, the explosion took place.

There was an accidental fire on-board the vessel on March 17 when it had discharged a consignment of 2000 tonnes of toluene imported by Aegis Chemicals Limited at New Pir Pau Pier of the Mumbai Port Trust. *The Hindu* [Read more](#)

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### AUSTRALIA: DIESEL LEAKING FROM STRICKEN TRAWLER

March 24 - Authorities are trying to contain a diesel slick stretching for hundreds of metres in Victoria's Port Phillip Bay after a trawler ran aground early this morning.

Water pollution experts say the boat's diesel spillage has not impacted Melbourne's beaches and the waters are safe for swimming. The vessel is currently submerged on the Point Nepean side of the entrance to Port Phillip Bay.

The trawler was carrying 30,000 litres of diesel and large quantities of hydraulic fluid and commercial lubricant. *ABC News* [Read more](#)



## Major incident reports (continued)

### UK: OIL SPILL FROM TAQA BRATANI'S TERN PLATFORM OFF SHETLAND

March 23 - Twenty-three tonnes of oil was discharged from the Tern platform, 100 miles from Lerwick, on Tuesday. It is not being treated as an ongoing incident as the spill is understood to have been dispersed by rough weather in the area.

The platform is operated by Taqa Bratani, a subsidiary of the Abu Dhabi National Energy Company.

The Department of Energy and Climate Change said the incident was being attributed to process problems rather than drilling and did not involve a deep-sea installation. *BBC News* [Read more](#)

## Regional and national news

### 11,000 NIGERIANS SUE SHELL IN LONDON COURTS

March 22 - Leigh Day have confirmed that they have filed papers at the High Court in London on Friday 23 March 2012 after negotiations with Shell over the payment of compensation for two massive oil spills broke down.

The legal action, on behalf of 11,000 members of the Bodo community, represents the first time Shell or any Oil Company has faced claims in the UK from a community from the developing world for environmental damage caused by its oil extraction operations. Lawyers now await a Court hearing in around a month's time to determine the timetable for the case and for Shell's response to the legal arguments presented by the legal team representing the community.

In August 2011 Shell admitted liability following two massive oil spills in the Niger Delta, which experts have advised amounted to about 500,000 barrels from a Shell pipeline in 2008. The oil devastated the environment surrounding the community of Bodo [1], in Gokana Local Government Area, Rivers State, Nigeria.

Leigh Day & Co represents the Bodo Community and is bringing the multi-million pound claim, coupled with a demand for clean up of the oil spills, against Shell Petroleum Development Company (Nigeria) Ltd in the High Court, in London. *Leigh Day & Co.* [Read more](#)

### USA: DOLPHINS IN BARATARIA BAY ARE SEVERELY ILL, NOAA SAYS

March 23 - Bottlenose dolphins in **Barataria** Bay are showing signs of severe ill health, according to NOAA marine mammal biologists and their local, state, federal and other research partners, NOAA announced today. Barataria Bay received heavy and prolonged exposure to oil during the 2010 **Gulf spill** after the **Deepwater Horizon rig exploded**.

The NOAA conclusion is based on the results of comprehensive physicals **given to 32 live dolphins from Barataria Bay** during the summer in 2011. Preliminary results show many of the dolphins were underweight, anemic, had low blood sugar and/or some symptoms of liver and lung disease. Nearly half also had abnormally low levels of the hormones that help with stress response, metabolism and immune function. *Nola.com* [Read more](#)

### USA: EXXON VALDEZ OIL TANKER SOLD FOR SCRAP

March 20 - 23 years after causing the worst tanker spill in U.S. history, the Exxon Valdez has been sold for scrap. This infamous ship and disaster eventually led to the new designs for oil carriers.

Renamed the Oriental Nicety, the vessel was sold for about \$16 million to Global Marketing Systems Inc., a Maryland-based cash buyer of ships for demolition, by Cosco. In 2007, it was transformed into an ore carrier and has had four different owners and names since the 1989 accident. *The Maritime Executive* [Read more](#)

### USA: NEW COUNTY 'HAZMAT' TRUCK A COMMAND CENTER

March 19 - The Coweta County Fire Department's newest addition to its fleet is far more than its lettering suggests.

From the outside, it looks like a typical large fire engine. The only difference being the large "HazMat" letters on the sides.

In reality, it's far more than an emergency response vehicle. It's a literal command center for everything from hostage situations to chemical spills to prepping firefighters going into burning buildings. *Times Herald* [Read more](#)





### SPILL CONTROL ASSOCIATION OF AMERICA NAMES NEW DIRECTORS

Spill Control Association of America (SCAA), a professional association representing oil spill removal organizations (OSRO), spill managers/qualified individuals, consultants, equipment and material manufacturers, distributors, insurers, and educational and governmental organizations, announces the appointment of three new SCAA Directors and the renewal of a fourth Director for another two-year term. The appointments were announced at the Annual Meeting on March 8 in Alexandria.

The new Directors are Harry Bedrossian, SPC Brady; Michael Gallagher, CI Agent Solutions; and Devon Grennan, Global Diving & Salvage, Inc.

The Board of Directors extended John Parker, a sitting Director and a past SCAA President, an additional two-year term.

## Cormack's Column



In this issue of the ISCO Newsletter we are printing No. 69 in a series of articles contributed by Dr Douglas Cormack.

Dr Douglas Cormack is an Honorary Member of ISCO. As the former Chief Scientist at the British Government's Marine Pollution Control Unit and head of the UK's first government agency, the Warren Spring Laboratory, Douglas is a well known and highly respected figure in the spill response community. He is the Chairman and a founder member of the [International Spill Accreditation Association](#)

### CHAPTER 69: KNOWLEDGE OF REMOTE SENSING AND IDENTIFICATION SAMPLING

We have seen from articles 66-68, that remote sensing only complements sampling and comparative chemical analysis of slicks and the tank contents of suspect ships, to the extent that it connects the slick to the ship in the act of discharging; and that neither separately nor in combination can quantify the discharge as being in excess of stipulated discharge limits unless the stipulation is for zero discharge. On the other hand inadvertent discharges from a mal-functioning oil-water separating system are more likely to arise from breakthrough of the coalescing/filtering units than from the upstream gravity units, (articles 18-20) and thus to be relatively small, whereas deliberate discharges of waste oils are likely to be comparatively large, a distinction potentially within the combined capacity of the remote sensing units when results are interpreted as discussed in articles 66-68. Nonetheless, even such relatively large releases detected only after detachment from the offending ship, whether by remote sensing or other means, still require sampling and chemical comparison with the tank contents of suspect ships before any attribution is possible.

However, while the complex mixtures of components which are crude oils and oil products lend themselves to individual 'finger-printing', their concentrations vary with time of exposure as the volatiles evaporate and as the non-volatiles oxidise to varying extents, thus rendering their component mixtures increasingly different from their source compositions. Nonetheless, the associated difficulties have been addressed though only partially overcome in *Marine Pollution by Oil: Characterisation of Pollutants, Sampling, Analysis and Interpretation*, Applied Science Publishers for the Institute of Petroleum, London 1974. Generally speaking, the best that can be done without reference to tank sampling from the suspect ship is to characterise slick samples as those of a fresh crude oil, a weathered crude oil, a light or heavy fuel oil, or tank washings, this being sufficient for the needs of response planning should that be necessary regardless of source identification. For the latter, it is necessary to sample all oils onboard a suspect ship including its lubricants, though reference to the cargo manifest may reduce the required number of cargo samples. However, such sampling/analysis in casualty incidents, wards against other ships discharging waste oils under cover of the casualty releases.

As to floating pollutant, it is easier to collect water than pollutant. For relatively thick emulsion layers of say 0.2-0.4mm, a funnel permits collected water to be run off before transfer of the emulsion to the air-tight sample jar, while thin fresh oil layers of say 0.1mm are best collected by absorption pads which themselves are placed in the sample jars. Sampling from solid surfaces may be effected by scraping, swabbing with a solvent, hand-picking of tar balls, and transfer of oiled sand or oiled objects such as feathers to sample jars. Indeed oiled seabirds may be collected in plastic bags for this purpose and also for post-mortem examination, though chemical analysis has to take account of natural plumage oils. To prevent bacterial change, stored samples should be refrigerated or hydrochloric acid should be added in the ratio of 25ml (of 50% concentrate/50%distilled water) to 5 litres of sample and *pro rata*. For freshly released, relatively non-emulsified oils, it is recommended that 100ml be sampled while to take account of full emulsification 500ml is required. For over-side water discharges suspected of contravening oil discharge limits, 2.5-5.0 litre samples are recommended direct from the discharge outlet, though in zero-discharge Special Areas, smaller sample volumes may be sufficient if the larger are unobtainable. For tarry lumps and tar balls 20-50gm samples are adequate. As to sample containers, metal should be avoided because 'finger-printing' involves evaluation of nickel/vanadium ratios and trace metal contents, while plastic can also contaminate samples. Glass is best, and Kilner jar seals are acceptable with the result that those charged with sampling in the UK are supplied with 16 and 40 ounce jars, the latter packed in wooden transit boxes for recycled use.

Continuity of evidence requires that sample jars are closed with wire and a lead or wax seal or by adhesive labels stuck across the lid and jar-top and signed by the sealer. In Scotland, sampling is done in threes: one for submission to the Government Chemist or Police Laboratory, a second to be handed to the owner or master of the suspect ship for possible independent analysis and a

## Cormack's Column (continued)

third to be produced in court where the prosecution will be handled not by the Departmental Solicitor but by the local Procurator Fiscal. In Northern Ireland, though the Law is as for England and Wales, the Director of Public Prosecutions has asked that three sealed samples be provided as in Scotland. In all cases, the labelling/documentation requirement calls for description of sample with identification code or sample number,; date, time and place of sampling; name and organisation of the sampler; method of sampling; purpose of sampling; name of suspect source and information on suspected contamination if known; and particulars of any available photographs or other supporting evidence.

Over the years, recurring attention has been given to the possibility of tagging cargo and bunker oils for ease of subsequent identification and to the sampling of floating oils from dedicated surveillance/ response aircraft, though the global administrative task implied by such a scheme compares unfavourably with the alternative of relying on the delineation of Special Areas, though such delineation can itself be overdone given the tendency of all oils to disperse and degrade naturally to carbon dioxide and water.

1 *The Rational Trinity: Imagination, Belief and Knowledge*, D.Cormack, Bright Pen 2010 available at [www.authorsonline.co.uk](http://www.authorsonline.co.uk)

2 *Response to Oil and Chemical Marine Pollution*, D. Cormack, Applied Science Publishers, 1983.

3 *Response to Marine Oil Pollution - Review and Assessment*, Douglas Cormack, Kluwer Academic Publishers, 1999.

## Special series

### OIL SPILL REMOTE SENSING : CHAPTER 10



**A short series of articles on Oil Spill Remote Sensing contributed by Dr Merv Fingas of Spill Science, Edmonton, Alberta, Canada T6W 1J6 [fingasmerv@shaw.ca](mailto:fingasmerv@shaw.ca)**

Merv Fingas MSc PhD worked for more than 35 years in the field of oil spill technology at Environment Canada's Environmental Technology Center in Ottawa, Ontario. As head of the Emergencies Science Division at the Centre, he conducted and managed research and development projects. He is currently working independently in Alberta. Dr Fingas is the Member of ISCO Council for Canada.

This is the 10th of a series of articles which will go into the remote sensing of oil spills. This series will cover oil spill remote sensing step by step and will present the latest in knowledge on the topic.

#### Slick thickness determination

There is a need to measure oil slick thickness, this need has been expressed both within the oil spill response community and among academics in the field. There are presently no reliable methods, either in the laboratory or the field, for accurately measuring oil-on-water slick thickness. The ability to do so would significantly increase understanding of the dynamics of oil spreading and behaviour. Knowledge of slick thickness would make it possible to determine the effectiveness of certain oil spill countermeasures including dispersant application and in-situ burning. Indeed, the effectiveness of individual dispersants could be determined quantitatively if the oil remaining on the water surface after time and following dispersant application could be accurately measured.<sup>3</sup>

#### Visual thickness indications

**Table 1 Relationship of Thickness to Appearance**

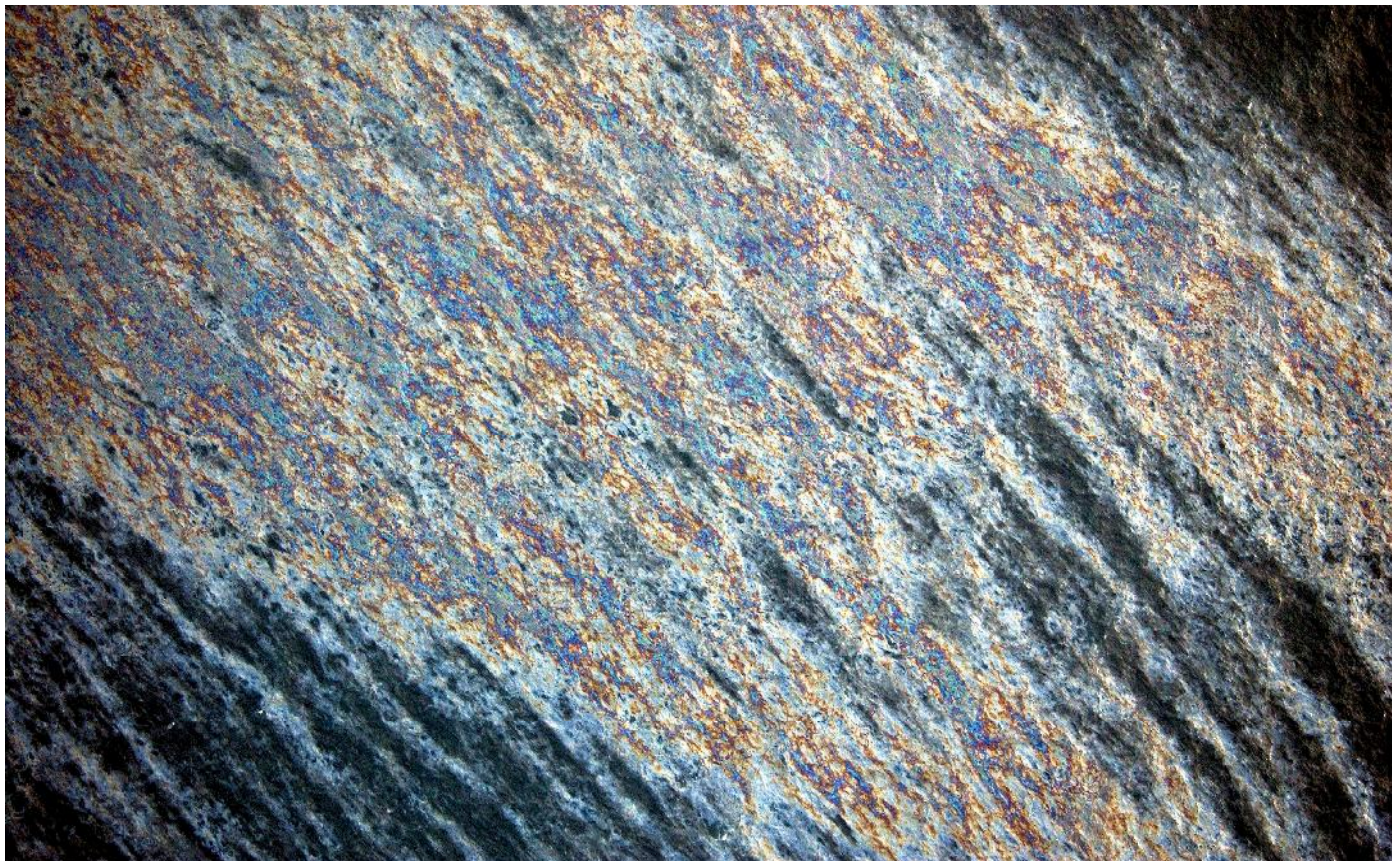
	Visibility Thresholds ( $\mu\text{m}$ )					
	minimum	silvery	rainbow	darkening colors	dull colors	Dark
Typical thickness	0.09	0.1	0.6*	0.9	2.7	8.5

*\*Note this is the only physics-based appearance factor*

A tool for working with oil spills has been the relationship between appearance and thickness. Careful study of the literature on this and comparing this to field experience shows that there is limited potential to scale thicknesses to visual appearance.<sup>3</sup> The only physics-based appearance occurs are thicknesses of about 0.7 to 2.5  $\mu\text{m}$  at which the rainbow colours appear as a result of multiple constructive and destructive interferences by light. Table 1 shows the summation of the best knowledge on this phenomenon. Figures 11 (below) shows a typical rainbow sheens for which we can estimate that the thickness is about 1  $\mu\text{m}$ . This is the only colour appearance that has a strict physical slick thickness associated with it.

Lehr argues that the visual indications of slick thickness are so poor as to not allow for any slick thickness estimation.<sup>31</sup> In particular he notes that the Bonn agreement thickness code provides insufficient proof for greater thicknesses as it purports to. Lehr suggests that the solution to this is simply to use two thickness regimes, sheen and thicker oil and not to estimate slick volumes from this.





**Figure 11** A picture of a rainbow sheen. This is the only spill thickness that has a singular physical explanation. (Photograph from Environment Canada)

#### **Slick thickness relationships in remote sensors**

A number of investigators tried to correlate slick thickness with appearance in various remote sensing instruments. Hollinger and Mennella conducted a series of eight controlled oil spills off Virginia to investigate the use of microwave radiometry to delineate oil spills.<sup>32</sup> They used 19.4 and 69.8 GHz radiometers on the spills. Measurements using sorbents were used to calibrate the radiometer. It was noted that the sheens typically had a thickness of 2 to 4  $\mu\text{m}$ . It was found that 90% of the oil was in 10% of the slick area and that the microwave threshold was about 0.1 mm (100  $\mu\text{m}$ ).

A series of experiments was carried out in 1979 to evaluate infrared (IR) and side-looking airborne radar (SLAR) for oil spill detection.<sup>3</sup> The imagery was correlated against visual and sorbent measurements, which were used to derive a thickness estimate. It was concluded that the infrared threshold was between 25 and 50  $\mu\text{m}$  and for SLAR 100 nm.

The United Kingdom conducted Isowake Experiments in 1982.<sup>3, 33</sup> On the basis of estimations and calculations it was concluded that the lowest detectable slick thickness for IR was between 10 and 50  $\mu\text{m}$ .

Brown et al. conducted experiments to measure the visibility of oil slicks. The observers and an ultraviolet (UV) and visible camera were mounted in a crane basket 30 m over the slick.<sup>3</sup> It was found that the detection ability decreased by over 50% for most oils and for the cameras when the angle was changed from 90 to 55 degrees from the horizontal (equivalent incidence angle of 0 to 35 degrees). Detectability degraded to 70% and sometimes to nil as the viewing angle was decreased past 55 through 35 degrees. Brown et al. conducted several experiments to ascertain the relationship between thickness of slicks and the density (or intensity) of the infrared image.<sup>3</sup> The thicknesses varied between 1 to 10 mm and thicknesses were measured using an underwater acoustic system. No relationship between slick thickness and infrared brightness was found.

#### **Specific thickness sensors**

The suppression of the water Raman peak in laser fluorosensor data has not been fully exploited or tested. This technique may work for thin slicks, but not necessarily for thick ones, at least not with a single excitation frequency. Attempts have been made to calibrate the thickness appearance of infrared imagery, but also without success. It is suspected that the temperatures of the slick as seen in the IR are highly dependent on oil type, sun angle, and weather conditions. If so, it may not be possible to use IR as a calibrated tool for measuring thickness. As accurate ground-truth methods do not exist, it is very difficult to calibrate existing equipment.<sup>3</sup> The use of sorbent techniques to measure surface thickness yields highly variable results.<sup>3</sup> As noted in the section on microwave radiometers, the signal strength measured by these instruments can imply one of several thicknesses. This methodology does not appear to have potential, other than for measuring relative oil thickness. One method to avoid this problem is to use multi frequencies and with careful calibration.

## Special series (continued)

A variety of electrical, optical, and acoustic techniques for measuring oil thickness has been investigated.<sup>3</sup> Two promising techniques were pursued in a series of laboratory measurements. In the first technique, known as 'thermal mapping', a laser is used to heat a region of oil and the resultant temperature profiles created over a small region near this heating are examined using an infrared camera.<sup>3</sup> The temperature profiles created are dependent on the oil thickness. A more promising technique involves laser acoustics.<sup>3</sup> The Laser Ultrasonic Remote Sensing of Oil Thickness (LURSOT) sensor consists of three lasers, one of which is coupled to an interferometer to accurately measure oil thickness.<sup>3</sup> The sensing process is initiated with a thermal pulse created in the oil layer by the absorption of a powerful CO<sub>2</sub> laser pulse. Rapid thermal expansion of the oil occurs near the surface where the laser beam was absorbed, which causes a step-like rise of the sample surface as well as an acoustic pulse of high frequency and large bandwidth (~ 15 MHz for oil). The acoustic pulse travels down through the oil until it reaches the oil-water interface where it is partially transmitted and partially reflected back towards the oil-air interface, where it slightly displaces the oil's surface. The time required for the acoustic pulse to travel through the oil and back to the surface again is a function of the thickness and the acoustic velocity of the oil. The displacement of the surface is measured by a second laser probe beam aimed at the surface. Motion of the surface induces a phase or frequency shift (Doppler shift) in the reflected probe beam. This phase or frequency modulation of the probe beam can then be demodulated with an interferometer.<sup>3</sup> The thickness can be determined from the time of propagation of the acoustic wave between the upper and lower surfaces of the oil slick. This is a very reliable means of studying oil thickness and has great potential. Laboratory tests have confirmed the viability of the method and a test unit has been flown to confirm its operability.<sup>34</sup>

Several attempts have been made to measure thickness by using visible spectral imaging. As there is no visual indications other than the rainbow sheen area around 0.8 µm, these efforts are wasted.<sup>3</sup> Others have tried to use laboratory measurements to attempt to establish relationships for remote sensing outputs, such efforts fail because of the complex relationships of light in the atmosphere and on the surface.<sup>3</sup> Similarly, several workers have tried to use the assumption that the oil layer is transparent, therefore the differences in reflection from the water surface and the top of the oil layer could yield a thickness measurement.<sup>3</sup> Unfortunately, this oil is not transparent in the visible ranges, therefore such methods do not work.

- 3 Fingas, M. and C.E. Brown, Oil Spill Remote Sensing: A Review, Chapter 6, in *Oil Spill Sci. Techn.*, M. Fingas, Editor, Gulf Publishing Company, NY, NY, 111, 2011
- 31 Lehr, W.J., Visual Observations and the Bonn Agreement, *AMOP*, 669, 2010
- 32 Hollinger, J.P. and R.A. Mennella, Oil Spills: Measurements of Their Distributions and Volumes by Multifrequency Microwave Radiometry, *Science*, 54, 1973
- 33 Horstein, B., The Visibility of Oil-Water Discharges, *IOSC*, 91, 1973
- 34 Brown, C.E., M.F. Fingas, J-P. Monchalain, C. Neron and C. Padioleau, Airborne Oil Slick Thickness Measurements: Realization of a Dream, *Proceedings of the Eighth International Conference on Remote Sensing for Marine and Coastal Environments*, Altamur, 2005

## Technology

### RESEARCHERS DESCRIBE METHOD FOR CLEANING UP NUCLEAR WASTE

March 23 - While the costs associated with storing nuclear waste and the possibility of it leaching into the environment remain legitimate concerns, they may no longer be obstacles on the road to cleaner energy.

A new paper by researchers at the University of Notre Dame, led by Thomas E. Albrecht-Schmitt, professor of civil engineering and geological sciences and concurrent professor of chemistry and biochemistry, showcases Notre Dame Thorium Borate-1 (NDTB-1) as a crystalline compound which can be tailored to safely absorb radioactive ions from nuclear waste streams.

Once captured the radioactive ions can then be exchanged for higher charged species of a similar size, recycling the material for re-use.

If one considers that the radionuclide technetium (99Tc) is present in the nuclear waste at most storage sites around the world, the math becomes simple. There are more than 436 nuclear power plants operating in 30 countries; that is a lot of nuclear waste. In fact, approximately 305 metric tons of 99Tc was generated from nuclear reactors and weapons testing from 1943 through 2010. Its safe storage has been an issue for decades.

"The framework of the NDTB-1 is key," says Albrecht-Schmitt. "Each crystal contains a framework of channels and cages featuring billions of tiny pores, which allow for the interchange of anions with a variety of environmental contaminants, especially those used in the nuclear industry, such as chromate and pertechnetate."

Albrecht-Schmitt's team has concluded successful laboratory studies using the NDTB-1 crystals, during which they removed approximately 96 percent of 99Tc. Additional field tests conducted at the Savannah River National Laboratory in Aiken, S.C., and discussed in the paper have shown that the Notre Dame compound successfully removes 99Tc from nuclear waste and also exhibits positive exchange selectivity for greater efficiency. *TerraDaily* [Read more](#)

## Publications

### INVENTORY OF POSSIBLE TRAINING COURSES PROVIDED BY EMSA FOR MEMBER STATES

Published 20 March 2012 - The purpose of this inventory is to set out, in one document, the programmes that form the basis of EMSA's routine training activities. It describes those training courses which are provided on a regular basis for the benefit of Member States, even if these are not necessarily held every year. While the majority of



## Publications (continued)

training activities are organised on a regular basis, EMSA also occasionally provides some ad hoc courses to cover the very specific needs of maritime administrations at a particular time. [More info](#)

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### USA: OSHA HAZARD COMMUNICATION STANDARD

"Exposure to hazardous chemicals is one of the most serious threats facing American workers today," said U.S. Secretary of Labor Hilda Solis. "Revising OSHA's Hazard Communication standard will improve the quality and consistency of hazard information, making it safer for workers to do their jobs and easier for employers to stay competitive."

The Hazard Communication Standard (HCS) is now aligned with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS). This update to the Hazard Communication Standard (HCS) will provide a common and coherent approach to classifying chemicals and communicating hazard information on labels and safety data sheets. Once implemented, the revised standard will improve the quality and consistency of hazard information in the workplace, making it safer for workers by providing easily understandable information on appropriate handling and safe use of hazardous chemicals. This update will also help reduce trade barriers and result in productivity improvements for American businesses that regularly handle, store, and use hazardous chemicals while providing cost savings for American businesses that periodically update safety data sheets and labels for chemicals covered under the hazard communication standard. [More info](#) [Thanks to Peter L. Zavon of Hazmat 101 Group]

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### IMO PUBLISHING NEWSLETTER

[Download the March 2012 issue.](#)

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### USA EPA TECHNOLOGY INNOVATION NEWS SURVEY

The February 1-15, 2012 *Technology Innovation News Survey* has been posted to the CLU-IN web site. The *Survey* contains market/commercialization information; reports on demonstrations, feasibility studies and research; and other news relevant to the hazardous waste community interested in technology development. The latest survey is available at: <http://www.clu-in.org/products/tins/>

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## Events

### USA: CLEAN GULF 2012 – NOVEMBER 13-15 - YOUR CALL FOR PARTICIPATION

The CLEAN GULF 2012 Conference is extending an industry-wide call for participation. Prospective speakers are invited to submit a 200-300 word abstract(s) for consideration by the program committee by Monday, April 2nd.

The CLEAN GULF Conference & Exhibition brings together professionals in the oil spill prevention & response industry looking to discover new technology, best practices and industry trends. An industry-based committee has been formed to assist with the programming of the conference.

**New for 2012** = CLEAN GULF will expand its educational programming for the 2012 event and will host an additional dedicated conference program on deepwater prevention & response. **Main themes for 2012:** Planning/Preparedness ■ Prevention ■ Response ■ Deepwater Prevention & Response ■ Technology ■ International Focus [More info](#)

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### UK: INLANDSPILL 2012 – 24 APRIL 2012, FIRE SERVICE COLLEGE, MORETON IN MARSH

A full day's programme will feature speakers from the Environment Agency, talking about the way ahead, its relationship with the Accreditation Scheme, and the Oil Care Campaign. The ARMS joint project with Oil & Gas UK will be explained, together with presentations by Veolia on working with Fire Brigades, and an insight into Environmental claims by OAMPS. A mini exhibition and the traditional hot lunch will be included in the £50 fee for the seminar, **BOOK NOW TO SECURE YOUR PLACE**, email [info@ukspill.org](mailto:info@ukspill.org) or call 0845 6259890

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### USA: SITE CHARACTERIZATION: THE GROUNDWATER SYSTEM

Denver, Colorado • April 26, 2012 - This course covers data needs and sources, as well as presentation tools, for characterizing both the geologic framework and groundwater system, essential to characterizing, protecting, and cleaning up the environment. It also addresses synthesizing the relationship, especially recognizing important geologic controls of groundwater occurrence, movement, and quality, factors critical in formulating the sound conceptual hydrogeologic model regulators expect in reports. [More info](#)

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### **SEACOR HOLDINGS ANNOUNCES CLOSING OF SALE OF NATIONAL RESPONSE CORPORATION, NRCES AND SEACOR RESPONSE**

March 19 - SEACOR Holdings Inc. today announced that it closed its previously announced agreement to sell a portion of its environmental business to J.F. Lehman & Company, a leading middle-market private equity firm focused on the defense, aerospace and maritime sectors. The businesses sold included National Response Corporation (NRC), one of the largest providers of oil spill response services in the United States; NRC Environmental Services Inc., a leading provider of environmental and industrial services on the West Coast; and SEACOR Response Ltd. which provides oil spill and emergency response services to customers in various international markets. The transaction did not include O'Brien's Response Management Inc., a leading provider of crisis and emergency preparedness and response management services, which will continue to be a subsidiary of SEACOR Holdings Inc. post-closing. *Market Watch* [Read more](#)

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### **ENVIRO-EQUIPMENT, INC. SHOWCASES PATENTED NEW OXYGREEN IN SITU AEROBIC BIOREMEDIATION SYSTEM AT INDUSTRY CONFERENCE**

"[Groundwater remediation equipment](#) sales and rental specialists Enviro-Equipment Inc. ([www.enviroequipment.com](http://www.enviroequipment.com)) demonstrated the patented new in situ aerobic bioremediation system "OxyGreen" at the Third Biennial Southeastern In Situ Soil and Groundwater Remediation Conference in Raleigh, North Carolina on March 6-7.

The much-anticipated demonstration involved placing the OxyGreen Cell in a mock well constructed out of clear PVC for display, and then filling the well with tap water so attendees could see the substantial amount of oxygen produced by the device's in-situ electrolysis process. A video of the OxyGreen Cell demonstration was made and can be seen on the [Enviro-Equipment website](#)".

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### **MARKLEEN ANNOUNCE NEW CONTAINMENT BOOM SYSTEMS AT INTERSPILL 2012**

News of new products received from Peter Øye of Markleen AS in Norway

"The new Uniboom Oceanmaster single point offshore boom with radio-controlled operation inflates automatically as soon as it is released from the reel – One man remotely controlled deployment.

The new and smaller Uniboom Seamaster coastal boom self-expands instantly by spring-loaded action. No check-valves and probably the fastest launching oil boom in the world – Ideal for unmanned installations". [More info](#)

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### **POWER PLUS REPORTS ON FURTHER RADIOACTIVE DECONTAMINATION TRIALS CARRIED OUT IN JAPAN**

Received on March 21 from Power Plus President Kevin Wang – "We did the impossible again and broke a couple of our own records. On some tests we beat 95% removal from soils and did 80% in the field.

We decontaminated radioactive plants with success ranging from 83% in place with no plant damage to 150 % with damage to grass. (Yes you can get 150% it means we also took out natural, war and nuclear global activity as well) We have consistently been in the high 85% to 90% on hard surfaces. We also did this in pretty bad conditions and without proper set up time.

Had some problems that kept us from even better results and have already developed solutions to allow even greater removal the next time! We were happy to exceed people's hopes and expectations on everything except a rice patty. (We know how now) and later proved it in a cherry orchard with 80% removal rates.

Please send this to anyone you know who might care about helping the people of Japan as we need to get the word out as they are using some really ineffective and usually dangerous methods(Burning,Burning,and Pressure washing) that just put the radioactive waste back into their Air,,Food,and Ground/Drinking water. So please help us to help partner with them and clean up the disaster".

A pdf document with a full description and results of the latest trials is available from Kevin at [KevinW@powerplusonline.com](mailto:KevinW@powerplusonline.com)

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