# ISCO NEWSLETTER

***The Newsletter of the International Spill Response Community***

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## News

### CHEMICALS USED IN HYDRAULIC FRACTURING: A-Z

US House of Representatives Committee on Energy and Commerce releases the definitive report on chemicals used in hydraulic fracturing

This 32-pager, described as the "most comprehensive national assessment to date" commissioned by Henry A. Waxman: Committee on Energy and Commerce; Edward J. Markey: Committee on Natural Resources, and Diana DeGette: Subcommittee on Oversight and Investigations, constitutes *the* list of chemical compounds used in fracking fluid (excluding water).

The report covers a five-year period (2005 – 2009) and in it one finds stunners like diesel, benzene and lead amongst others. Fourteen "leading" fracking companies were called on to give the details which revealed that over 2 500 hydraulic fracturing products contained 750 chemical compounds with more than 650 containing chemicals known, or possible, human carcinogens, or listed as hazardous air pollutants.

"Overall these companies used 780m gallons of hydraulic fracturing products – not including water added at the well site."

The most widely used chemical in hydraulic fracturing during this time period, as measured by the number of compounds containing the chemical, was methanol which was used in 342 hydraulic fracturing products. Methanol is a hazardous air pollutant. Some others widely used include isopropyl alcohol (used in 274 products), 2-butoxyethanol (used in 126 products), and ethylene glycol (used in 119 products).

In addition, the hydraulic fracturing companies injected more than 30m gallons of diesel fuel, or hydraulic fracturing fluids containing diesel fuel, in wells in 19 states. The use of diesel fuel in fracturing fluids poses the greatest threat to underground sources of drinking water. Read more [Thanks to Don Johnston of ISCO Associate Member, DG & Hazmat Group, for the link to this report]

## USA: SHALE DRILLING FACES CRACKDOWN

April 27: The Environmental Protection Agency will more closely regulate the use of diesel fuel in a drilling process used to recover natural gas, Administrator Lisa Jackson said Tuesday.

The EPA until recently hasn't moved to regulate hydraulic fracturing, a process that involves injecting various types of drilling fluids into wells to free oil and natural gas trapped in shale formations deep underground.

Instead, the EPA relied on state regulators, in part because Congress in 2005 exempted hydraulic fracturing from regulation under the federal Safe Drinking Water Act. Read more [Subscription required]

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## USA: THE COAST GUARD AUTHORIZATION ACT OF 2010

From Blank Rome Briefing, April 2011: The Coast Guard Authorization Act of 2010 (Public Law No. 111-281, October 15, 2010) (the "Authorization Act") was signed into law by President Obama on October 15, 2010. This legislation represents the first major piece of maritime legislation enacted by Congress in four years when both the Coast Guard and Maritime Transportation Act of 2006 and the Security and Accountability for Every Port Act of 2006 (commonly known as the SAFE Port Act) were enacted.

The Authorization Act includes measures to address Coast Guard Modernization and reform of the acquisition directorate of the Coast Guard, and ensure that maritime safety is put on an equal footing with other Coast Guard responsibilities. It also includes measures relating to oil pollution prevention, port security, implementation of the Convention on the Control of Harmful Anti-Fouling Systems on Ships (2001), and general maritime safety laws that have been under consideration since 2006.

**TITLE VII: OIL POLLUTION PREVENTION**

*Section 701: Rulemakings*

Requires the Coast Guard to report to Congress on the status of all Coast Guard rulemakings required or being developed for which no final rule has been issued. The Coast Guard is required to issue final rules relating to these required or developing regulations by mid-April 2012. Also requires issuance of a notice of proposed rulemaking regarding inspection requirements for towing vessels before mid-January 2011, with a final rule to be published before October 15, 2011.

*Section 702: Oil Transfers from Vessels*

Requires the Coast Guard to issue regulations by October 15, 2011, to reduce the risks of oil transfers to or from tank vessels. The regulations will focus on operations with the highest risks of discharge, including operations at night and in inclement weather, and shall consider requirements for the use of equipment and operational procedures, as well as personnel safety and the effectiveness of the procedures and equipment for preventing or mitigating transfer spills.

*Section 703: Improvements to Reduce Human Error and Near Miss Incidents*

Requires the Coast Guard to report to Congress by October 15, 2011, the types of human errors in the past ten years that could lead to oil spills (with particular attention to human error caused by fatigue), the most frequent types of near-miss oil spill incidents, the extent to which there are gaps in the data required in the foregoing, and recommendations to address the identified types of errors and any gaps in the data. Also includes a requirement for the identity of any person making a voluntary disclosure under this section to be treated as confidential subject to certain exemptions.

*Section 704: Olympic Coast National Marine Sanctuary*

Enlarges the "area to be avoided" off the coast of the State of Washington so that restrictions apply to all vessels required to prepare vessel response plans.

*Section 705: Prevention of Small Oil Spills*

Requires the establishment of an oil spill prevention and education program for small vessels, providing for assessment, outreach and training and voluntary compliance activities to prevent and improve the oil spill responses from vessels and facilities not otherwise required to prepare a vessel response plan. An amount of $10,000,000 has been authorized for each of fiscal years 2010-2014.

*Section 706: Improved Coordination with Tribal Governments*

Requires the Coast Guard to complete the development of a tribal consultation policy before mid-April 2011 to improve the Coast Guard's consultation and coordination with the tribal governments of federally recognized Indian tribes with respect to oil spill prevention, preparedness, response, and natural damage resource assessment. Authorizes an amount of $500,000 for each of fiscal years 2010-2014.

*Section 707: Report on Availability of Technology to Detect the Loss of Oil*

Requires the Coast Guard to submit a report to Congress by October 15, 2011 on the availability, feasibility, and potential cost of technology to detect the loss of oil carried as cargo or fuel on tank and non-tank vessels greater than 400 gross tons.

*Section 708: Use of Oil Spill Liability Trust Fund*

Amends OPA 90 to allow funding of up to $15M in each fiscal year of expenses and activities related to response and damage assessment activities of the National Oceanic and Atmospheric Administration. Also includes provisions for audits at least every three years of the OSLTF for disbursements in excess of $500,000. The Coast Guard is also required to report before October 15, 2011, and annually thereafter, a list of each disbursement of at least $250,000 from the OSLTF during the preceding fiscal year.

*Section 709: International Reports on Enforcement*

Requires the Coast Guard, in consultation with other federal agencies, to pursue stronger enforcement in the IMO of agreements related to all discharges from vessels, including joint enforcement operations, training, and stronger compliance mechanisms.

*Section 710: Higher Volume Port Area Regulatory Definition Change*

Requires the Coast Guard to initiate a rulemaking before mid-October 2011 to modify the definition of "higher volume port area" in 33 C.F.R. §155.1020 and to replace "Port Angeles, WA" with "Cape Flattery, WA", which will expand the reach of various federal oil spill response provisions in that area. Also requires the Coast Guard to complete before mid-October 2015 its review of any changes to vessel response plans to reflect this modified definition.

*Section 711: Tug Escorts for Laden Oil Tankers*

Encourages the Commandant to enter into negotiations with Canada by mid-October 2011 to update the comparability analysis that serves as the basis for the Comparative Vessel Traffic Service Agreement. Requires before mid-April 2012, the Commandant to submit to Congress recommendations based on the analysis. Also amends OPA 90 to extend the application of the requirement for two escort vessels currently applicable to single hull tankers to double hull tankers over 5000 gross tons transporting oil in bulk in Prince William Sound, Alaska. Also requires the preparation of a vessel risk traffic assessment for Cook Inlet, Alaska, by mid-October 2011.

*Section 712: Extension of Financial Responsibility*

Amends OPA 90 to extend the financial responsibility requirements to any tank vessel over 100 gross tons using any place subject to the jurisdiction of the United States.

*Section 713: Liability for Use of Single-Hull Vessels*

Amends OPA 90 to broaden the definition of "responsible party" to include cargo owners if the oil is being transported in a tank vessel with a single hull after December 31, 2010. Read more

## USA: AMERICAN WATERWAYS OPERATORS (AWO) ANNOUNCES RECORD LOW OIL SPILLS

April 25: With Earth Day just last week, the American Waterways Operators (AWO) is pleased to announce that 2010 saw the lowest-ever recorded number of tank barge oil spills. The 2010 spill statistics newly released by the U.S. Coast Guard show that the American tugboat, towboat and barge industry had a record low of 75 spills and a record low volume of 919 gallons spilled.

AWO is recognized as the industry's safety leader, with its members required to comply with the AWO-developed Responsible Carrier Program, a safety management system that mandates operational audits every three years. The Oil Pollution Act of 1990 (OPA 90) has successfully helped the industry to put in place safeguards that have dramatically improved the industry's safety record. Tank barges now account for the least number of oil spills of any source, including offshore drilling rigs, fixed shoreside facilities, and recreational vessels. Read more

## USA: NASA SATELLITE IMAGES OF OIL SPILL - ONE YEAR ON

A year on from the catastrophic explosion of the Deepwater Horizon oil rig and the ensuing oil spill in the Gulf of Mexico, and news still abounds regarding the cause and affect the spill has had on the region and its inhabitants, human and otherwise.

Following the oil spill, NASA satellites provided us with images depicting just how far and fast and wide the oil was spreading. Now, thanks to the NASA Earth Observatory, those images have been put into a great video which shows the sequence of events.

Along with the video are a series of links that shed more light and give a greater picture on what happened, courtesy of the NASA Earth Observatory. Over 45 satellite images have been collated here, of the oil slick as it grew from April 21 to July 28, 2010. And a handy FAQ page has been set up here with some great answers to common questions, specifically regarding the imagery NASA provided. Watch the video [Thanks to Don Johnston of ISCO Associate Member, DG & Hazmat Group, for providing this link]

## WIDE-RANGING OIL SPILL SCENARIOS COMPLICATE U.S. CONTAINMENT PLANS

After millions of gallons of oil spilled and billions of dollars spent, Mark Cohen figures the United States is ready to handle a spill like the deepwater blowout that fouled the Gulf of Mexico a year ago.

But it's probably not prepared for the one that happened in 1979.

Ixtoc was a nine-month spill off Mexico that spewed 140 million gallons into the Gulf after a drilling platform sank on top of the well.

To researchers like Cohen, vice president of research for the think tank Resources for the Future, it is a symbol of how industry and the Obama administration are racing back to deepwater drilling even though they are still unprepared for other large spills.

"I don't know what the next blowout will look like, but it won't look like the last one," said Cohen, whose environmental think tank did research **reports** (pdf) for the presidential commission that investigated last year's Gulf spill. "Neither" of the new spill containment outfits, he said, "is ready to handle Ixtoc." Read more

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## KAZAKHSTAN: OSCE PROMOTES UN CONVENTIONS ON OIL SPILL PREPAREDNESS AND RESPONSE

April 27, 2011 -- An OSCE-supported roundtable discussion on enhancing international oil spill preparedness and response through the promotion, ratification and implementation of key UN conventions was held in Astana today.

The one-day event focused on the Kazakhstan's hydrocarbon-rich Caspian region and brought together 60 participants from state institutions, oil companies, international organizations and non-governmental organizations.

It was organized by the OSCE Centre in Astana in partnership with the Ministries of Foreign Affairs, Transport and Communications, and Oil and Gas to assist Kazakhstan in assessing the implications for the country if it ratifies key UN conventions. A study presented at the roundtable discussion assessed Kazakhstan's compliance with International Maritime Organization (IMO) conventions.

"Caspian Sea countries have yet to take advantage of certain international agreements on oil spill response, liability and compensation for environmental damages. We hope that this workshop will aid preparations for the ratification of such internationally-binding instruments for the benefit of Kazakhstan. The OSCE Centre assists this process by providing international expertise and timely legal advice," said Ambassador Alexandre Keltchewsky, the Head of the OSCE Centre in Astana. Read more

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## TURKEY: ISTANBUL'S NEW BOSPHORUS CANAL 'TO SURPASS SUEZ OR PANAMA'

*Istanbul is to build a canal for commercial shipping in order to cut traffic through the Bosphorus. Photograph: Renaud Visage/Getty Images*

April 27: Turkish prime minister, Recep Erdogan, trumpets 'crazy and magnificent plan' for channel to reduce traffic and oil spills - The ferries, fishing boats and pleasure cruisers which crisscross the Bosphorus may one day have more room for manoeuvre on the watery highway that separates Europe and Asia.

If Turkey's prime minister can get what he calls his "crazy and magnificent" plan to work, the gargantuan tankers that clog the strait will be diverted into a man-made waterway linking the Black Sea to the Sea of Marmara.

Recep Tayyip Erdogan's project, which he calls Canal Istanbul, is nothing if not ambitious: the channel will be around 30 miles long, 25 metres deep and 150 metres wide. It would, he confidently predicted, be an unparalleled feat of engineering. "We are building the canal of the century, a project of such immense size that it can't be compared to the Panama or Suez canals," he said.

## News (continued)

Although Erdogan, whose career began as mayor of Istanbul, his home city, has previously alluded to the "crazy project", the announcement only came as he campaigned for a general election on 12 June. Ten days ago, he announced a plan to split the city in two to help it cope with an ever-growing population expected to soon peak at 17 million.

The 19-mile-long Bosphorus strait that bisects Istanbul into a European and an Asiatic half is the sole shipping passage between the Black Sea and the Mediterranean. As a result, the waterway is heavily congested with tanker traffic to and from Bulgaria, Romania, Georgia, Ukraine and southern Russia, and has been the scene of many maritime accidents. Read more

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## JAPAN: FUKUSHIMA NUCLEAR ACCIDENT UPDATE LOG (Updates of 28 April 2011)

**Current situation** - Overall, the situation at the Fukushima Daiichi nuclear power plant remains very serious, but there are signs of recovery in some functions, such as electrical power and instrumentation.

**Changes to Fukushima Daiichi plant status** - The IAEA receives information from various official sources in Japan through the Japanese national competent authority, the Nuclear and Industrial Safety Agency (NISA). Additional detail is provided in the IAEA Incident and Emergency Centre (IEC) status summary with information received by 17:00 UTC on 27 April 2011.

**Management of on-site contaminated water -** According to the 25 April evaluation by NISA of the report submitted by the Tokyo Electric Power Company (TEPCO), there is a little less than 70,000 tonnes of stagnant water with high level radioactivity in the basement of the turbine buildings of Units 1, 2 and 3.

**Plant status -** On 25 April the power supply for the temporary electrical pumps that supply water to the reactor pressure vessel of Units 1, 2 and 3 was switched from the off-site power supply to temporary diesel generators to allow work to enhance the off-site power supply. The power supply has now been returned to the off-site supply. Read the complete update log

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## USA: TACOMA HAZMAT TEAM FIGHTS CARGO SHIP SPILL

Cleanup continues onboard a cargo ship at the Port of Tacoma after an early morning hazardous material spill on Tuesday. Tacoma Fire Department spokesman Joe Meinecke says an ink solvent used in printing leaked out of a container aboard the Hyundai Oakland.

"The major threat with that particular chemical is it is highly flammable," says Mienecke. No one was injured, but several crew members complained of burning eyes.

The spill was contained to the ship. None of the chemical got into the water. Crews clad in protective suits are using other solvents to clean up the spill. Read more [Thanks to Jeff Taylor of ISCO Corporate Member, Marine Pollution Control Corp. for relaying this report]

From Takoma Fire Dept. - Incident Date: 4/26/2011
Issuing Officer: Joe Meinecke
Incident Location: 1815 Port of Tacoma Road
Incident Type: Hazardous Material Spill


At 3:51 a.m. five companies of Tacoma Firefighters (1 engine, 1 ladder, 1 medic unit, haz-mat 44 and command staff) were dispatched to a reported hazardous materials spill on a cargo ship in the Port of Tacoma.

First arriving companies were informed by employees that a small quantity of a highly flammable liquid - Chlorobenzotruiflouride (an ink solvent used in the printing industry) had spilled in a container on the terminal dock and in the hull area of the "Hyundai Oakland" cargo ship moored at the Washington United Terminal.

Tactically, the ships crews were sheltered in place for precautionary measures, the Haz-mat team investigated the scope of the spill and monitored the atmosphere for fume/explosion hazards, and the businesses contracted technical clean up crew was called in to conduct the clean up of the spill. Read more

[Note from editor – ISCO is collating information on Marine HNS incident response for the IMO OPRC-HNS Technical Group and would like to send Joe Meinecke an incident information response template. If any reader can provide an email address for Takoma Fire Dept. this would be appreciated]

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## REMPEC: ACHIEVING A CLEANER AND SAFER MARITIME SECTOR IN THE MEDITERRANEAN

The Mediterranean is one of the world's major shipping areas with more than 300,000 port calls per annum and more than 10,000 ships plying this busy highway every year. As a result, the problem of marine pollution from ships is an acute one in the Mediterranean Sea. Since the mid-1970s, however, significant measures to address this multifaceted issue have not only contained this problem but also avoided the occurrence of potential incidents that could have been disastrous for this semi-enclosed sea and the economies of its coastal states.

A Mediterranean Action Plan (MAP) emphasising the need to address pollution from ships in this vulnerable region was set up in 1975, followed, a year later, by the Barcelona Convention and the Protocol Concerning Co-operation in Combating Pollution of the Mediterranean Sea by Oil and Other Harmful Substances in Cases of Emergency (Emergency Protocol). REMPEC has been a central component in the regional effort to counter marine pollution ever since, having come into being in Malta in 1976 under its initial name of Regional Oil Combating Centre for the Mediterranean Sea (ROCC). This key role was extended to also cover the field of prevention of pollution from ships with the adoption in 2002 of the Protocol Concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea (Prevention and Emergency Protocol).

In over 35 years of service, REMPEC has contributed greatly to the strengthening of the Mediterranean region's competence and capability for the prevention of, preparedness for and response to marine pollution from ships. The Centre assists the coastal states in ratifying, transposing, implementing and enforcing international maritime conventions regarding marine pollution from ships.

Instrumental to its many achievements is the regional communication network that REMPEC has developed. This network acts as a platform for open communication, allowing the Centre to provide effective assistance to − and facilitating co-operation among − the coastal states of the Mediterranean. Throughout the years, REMPEC has implemented a vast array of approaches and technologies in fulfilling its mission to assist these coastal states, which so request, in the development of their national capacities in the field of marine pollution.

Assistance in the development of systems for prevention, preparedness and response

Sixteen Mediterranean coastal states are being assisted by REMPEC in the development of their national preparedness and response systems, and in the planning and implementation of their national contingency plans. This is a delicate and demanding process which involves setting up the organisational framework for dealing with marine pollution incidents, based on a political decision to do so, the preparation of a national contingency plan and related local contingency plans, the training of personnel designated to respond to pollution incidents, and the acquisition of appropriate pollution response equipment and products.

The Centre also assists the coastal States in developing bilateral and sub-regional operational agreements and systems between neighbouring countries in the field of preparedness for and response to major marine pollution. Any Contracting Party to the Barcelona Convention affected by a marine pollution incident can request assistance from REMPEC by following the official communication procedure or through the Pollution Report (POLREP) system.

The Centre employs an "officer-on-duty" 24-hour/day system to ensure that all requests for assistance are responded to promptly. Such assistance could involve the provision of information and advice on operational, technical, administrative and legal aspects of pollution response, requests for assistance in coordination with various interlocutors on behalf of the states concerned, co-ordinating regional assistance, or the provision of expert advice on the site of accident by sending REMPEC officers.

In cases of emergency, and upon receiving a request, the Director of REMPEC is responsible for mobilising the Mediterranean Assistance Unit (MAU) − an expert advice capability set up to provide national authorities with the advice and technical expertise required to take optimal courses of action during the critical periods just after a marine pollution incident. The MAU has been effectively employed in several incidents, including the Nassia incident (Turkey, March 1994) and following a request from Syria in summer 2006.

Facilitating information exchange, technical co-operation and training

REMPEC has developed a reliable communication network for exchange of information on operational, technical, scientific, legal and financial matters, while supporting dialogue aimed at conducting coordinated actions at national, regional and global levels for the implementation of maritime regulations and conventions.

The Centre has published an extensive library of technical papers, training materials, documents, studies and reports. The Centre's website offers another valuable information source, kept up-to-date with reliable in-depth information, news items, key contacts, and access to software applications and so on. One of the more recent additions to the site is the introduction of 'Country Profiles', detailing each countries resources, expertise, and status with respect to implementation of pertinent Protocols.

A core activity of the Centre is in country training in the field of prevention of marine pollution from ships as well as response techniques to spills. Whereas this training is mainly delivered in English or French, which are the two working languages of the Centre, it has also developed training in the Arabic language with the assistance of the Arab Academy for Science, Technology and Maritime Transport of Alexandria (Egypt) in order to better fit the Beneficiaries' needs.

## Special feature (continued)

Conclusion - The maxim 'prevention is better than cure' is most applicable in the context of marine pollution incidents. However, when dealing with a problem as complex as maritime pollution in the increasingly exploited Mediterranean Sea, REMPEC has demonstrated the efficiency of prevention in combination with efficient response.

Through its many achievements, many of which involved the application of innovative solutions in response to the age old problem of marine pollution from ships at sea, REMPEC has earned invaluable experience and, in turn, a reputation as a consistently reliable and responsive authority always ready to offer the appropriate solutions. It is therefore no surprise that REMPEC was selected by the European Commission to act as the implementing body of the SafeMed I and II Projects, two major projects covering the period 2006-2011 that aimed at enhancing the level of implementation of the international maritime conventions in the European Neighbourhood Policy participating countries in the Mediterranean region.

[This article, timed to coincide with the REMPEC Focal Points meeting in Malta, is reproduced with acknowledgement to the *Malta Independent* ] Source document

## Events

Events are listed here as soon as possible after they are notified to ISCO and will usually only be featured once in this column. To find a more comprehensive listing of upcoming events, including ones previously announced in this column, click HERE

### NAMEPA: SAFETY AT SEA FOCUS OF NATIONAL MARITIME DAY DC SEMINAR

NAMEPA's May 23rd event features Emergency Response and Seafarer Issues

One year after the Gulf oil spill, and amid daily reports of piracy and needless accidents at sea, the North American Marine Environment Protection Association (NAMEPA) will be offering a seminar "Environmental Intelligence in Shipping: Safety at Sea, featuring an emergency preparedness & response regulatory update, as well as a panel on piracy, STCW update, and terminal access for seafarers. The seminar will take place on May 23rd at the National Press Club in Washington DC commencing at 3:00pm. The seminar is intended to commemorate National Maritime Day, which is held on May 22nd to honor merchant mariners.

Panelists include (to date): VADM Brian Salerno, USCG; Clay Maitland, International Registries Inc. (Marshall Islands), RADM Robert North (Ret.), North Star Maritime; Jonathan Waldron, Blank Rome LLP; Greg DeMarco, ExxonMobil; the Rev. Mary Davisson, Baltimore International Seafarers' Center; the Rev. Canon James Von Dreele, Seamen's Church Institute-Philadelphia; Mauricio Garrido, American Salvage Association.

"NAMEPA designed this seminar to be both informative and participatory so that the risk of an event such as the Deepwater Horizon oil spill recurring can be reduced" stated NAMEPA Chairman Clay Maitland. "We must also look at seafarer welfare. Piracy is on the rise. Lifeboat safety hook failures are on the rise. Seafarer fatigue is on the rise. The seminar will explore strategies and realities to mitigate future risks."

*For more information, go to www.namepa.net*

## Publications

### RESEARCH INTO CHEMICAL SPILL RESPONSE PROTOCOL AT HUTCHINSON TECHNOLOGY INCORPORATED IN EAU CLAIRE, WISCONSIN

A Research Paper by Carrie L. Hallquist - The objectives of this study were to compare/contrast current training requirements with federal regulatory requirements, identify basic knowledge-related competencies of individuals who are members of the CRRT, and identify HTI specific information about the chemicals in use and their spill potential and severity. Regulations from the Environmental Protection Agency (EPA) and Occupational Safety and Health Administration (OSHA) that require emergency response plans were examined. The majority of the research focused on OSHA's Hazardous Waste Operations and Emergency Response (HAZWOPER) standard. Read more

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### US EPA: TECHDIRECT, MAY 1, 2011

TechDirect's purpose is to identify new technical, policy and guidance resources related to the assessment and remediation of contaminated soil, sediments and ground water.

Download and read the latest issue

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## Cormack's Column

In this issue of the ISCO Newsletter we are printing No. 24 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*

### KNOWLEDGE OF WATER-IMMISCIBLE SYSTEMS (CHAPTER 24)

Despite previous uncertainties of relating emulsion viscosities to those of the continuous-phases and the volume-fraction of the dispersed phase, Mackay successfully established this relationship for Alberta and six other crude oil emulsions using the Mooney equation : $\eta/\eta_c = \exp\{2.5\phi/(1 - \phi/\phi_{max})\}$ for water contents ranging from $\phi$ at 25% to $\phi_{max}$ at 80%. As to emulsion formation by wave agitation, Mackay suggested the rate of water-uptake to wind speed to be: $d\phi/dt = K(1 + u)^2 (1 - \phi/\phi_f)$ where u is wind speed and $\phi_f$ is the volume-fraction finally attained.

Again, Lynch at WSL, investigated the influence of asphaltene-content on the viscosities of a range of crude oil emulsions after sea-surface exposure had produced water-contents of 60% as tabulated below.

| Crude Oil | Asphaltene Content, wt % | Emulsion Viscosity, cP |
|---|---|---|
| Ekofisk | 0.037 | 740 |
| Brent | 0.046 | 910 |
| Forties | 0.090 | 1200 |
| Thistle | 0.24 | 1000 |
| Ninian | 0.46 | 2130 |
| Heather | 0.72 | 4500 |
| Iranian Light | 1.54 | 2979 |
| Kuwait | 2.04 | 26500 |
| Safaniya | 3.75 | 20000 |

It is clear from the above that while other constituents of these crude oils may be exercising a lesser influence on emulsion viscosity at constant water-content, that of the asphaltenes appears strong in all of them. Using these results, Buchanan at WSL, derived the relationship between $\eta_f$ and asphaltene-content, $A_c$, as: $\eta_f = 10^{3.87}\sqrt{A_c}$, from a log-log plot of these parameters. Again, through his modified Mooney equation: $\eta = 224\sqrt{A_c} \exp(2.5\phi)/(1 - 0.654\phi)$ he showed satisfactory conformity between its calculated viscosities and those previously measured for a range of corresponding water-contents.

In subsequent articles, I will return to this wave-induced increase in emulsion viscosity over that of the parent oil, in reviewing its effect on natural rates of slick dispersion, on spillage recovery from sea and shoreline surfaces and on the recycling of their oil-contents. In the meantime, I continue my current review of the factors affecting the formation of emulsions and their stability once formed.

It will be recalled (c.f. article 16) that some emulsions form only with difficulty if at all; that others are unstable to the extent of requiring solid particle simulation for some comparative investigations (c.f. article 22). Again, it will be recalled that emulsion formation requires energy input and facilitation by suitable emulsifiers; that emulsions nonetheless separate spontaneously with release of energy; and that time-related stability varies from one emulsion to another (c.f. article 16)). In general, however, five processes contribute to emulsion breakdown: creaming in which the droplets rise or sink by differing in density from the continuous phase and thus come closer together; flocculation in which three-dimensional droplet clusters accrete to separation only by a thin film of the continuous phase; coalescence in which this film drains to permit small droplets to form larger droplets; Ostwald ripening in which a widening distribution of droplet size occurs; and phase inversion in which the dispersed phase becomes the continuous phase and *vice versa*. In assessing progress through these stages, droplet sizes can be estimated by light-scattering and microscopic methods while stabilities can be compared by accelerated life-testing in the ultra-centrifuge to which Stokes' Law applies as: $u = (D - D)d^2\omega^2R/18\eta$ where $\omega^2R$ replaces g in the standard equation, $\varpi$ being the angular velocity of the centrifuge and R being the distance of the sample from the centre of rotation.


1 The *Rational Trinity: Imagination, Belief and Knowledge*, D.Cormack, Bright Pen 2010 available at 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.

## ISCO Notices

### APPEAL FOR YOUR HELP: ISCO'S COMMITMENT TO IMO – URGENT NEED FOR MORE INFORMATION ON EXPERIENCE GAINED AND TECHNIQUES USED IN RESPONSE TO MARINE HNS INCIDENTS AND FOR SUB-SEA OIL RECOVERY.

The twelfth session of the OPRC-HNS Technical Group meeting is fast approaching and we are disappointed to note that over the last few months there has been very little new information received from our members and other readers of the ISCO Newsletter. We would be grateful for your help.

ISCO joined with other delegations in agreeing to support the IMO Secretariat in pursuing possibilities of obtaining data on HNS incidents, including near misses, in order to address data gaps that exist and to submit that information to future meetings of the Technical Group.

The availability of data on experience and lessons learned in response to marine HNS incidents and sub-sea oil recovery needs to be improved and the ISCO delegation took the view that within the response community represented by ISCO at IMO there should be a significant source of additional information.

Information gathered will be shared with other OPRC-HNS Technical Group delegates and used in the preparation of new IMO Technical Guidelines on marine HNS response, and on sunken oil assessment and removal techniques.

What we are looking for is short case histories, with emphasis on information on the techniques used, problems encountered and lessons learned – the kinds of experience and knowledge that you won't find in the textbooks. We are also interested in special equipment that has been developed to deal with marine HNS incidents, and for the assessment and recovery of sunken oils.

To make things easy, ISCO has developed simple-to-use templates.

These are available for download on the ISCO downloads page Just click on this link. Subsea Oil Recovery and Marine HNS Response are respectively the third and fourth of the listed documents.

Please don't worry about having to write a beautiful literary production – we'll be happy to edit the grammar and spelling. If for reasons of commercial confidentiality you need to exclude details of clients, that will be OK – but we would like to know who you are – all contributions will be acknowledged and this is a way for you to raise your profile – it's good to know who has the experience and knowledge in dealing with these matters.

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### ISCO MEMBERS – HAVE YOU RECEIVED THE NOTICE OF AGM, AGENDA & MEETING PAPERS?

These were sent out a few days ago by email. If you have not received them, please let your Secretary know.

If you didn't receive these documents it could be that our Members mailing list is not up-to-date. This mailing list currently contains the name and contact details of the person who originally filled out the membership joining form. Over time things change, so please send me updated information if this is appropriate.

Please note that staff of Corporate Members can also request copies of these documents, but use of the voting Form of Proxy is restricted to one only per Member of the organization. I will be happy to update the mailing list to ensure that in future you will receive communications being circulated to ISCO Members.

If you are attending IOSC please be sure to visit the ISCO booth (No. 242) in the Exhibition Hall.

Finally, just a reminder – The ISCO AGM will take place in the Doubletree Hotel, Mount Hood & Mount St. Helens Room, at 3.30 p.m. on Wednesday, 25 May, 2011.

Members are invited to bring along friends. Light refreshments will be available.

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