



ISCO NEWSLETTER

The Newsletter of the International Spill Response Community

Issue 330, 16 April 2012

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News

EUROPE: COUNCIL AND THE EUROPEAN PARLIAMENT REACH INFORMAL AGREEMENT ON THE SEVESO III DIRECTIVE

March 28 - The Committee of Permanent Representatives endorsed today the compromise proposal agreed between the Council and the European Parliament regarding the directive on control of major-accident hazards involving dangerous substances, thus paving the way towards its formal adoption by the Council.

The Commission proposal ([18257/10](#)) presented on December 2010, aims at replacing, by 1 June 2015, the current Seveso II Directive 1 which applies to around 10 000 establishments in the EU. Its main objectives are:

- align Annex I (defining the substances falling within the scope of the directive) to changes in the EU system of classification of dangerous substances 2 to which it refers;
- adapt Annex I to deal with situations occurring after the alignment where substances are included/excluded, that do/do not present a major-accident hazard;
- strengthen the provisions relating to public access to safety information, participation in decision-making and access to justice, and improve the way information is collected, managed, made available and shared;
- introduce stricter standards for inspections of installations to ensure the effective implementation and enforcement of safety rules. *EU Press Release* [Read more](#)

UK: NORTH SEA ELGIN PLATFORM UPDATE

Total reports improving signs at Elgin

April 8 - Total reported a decreased flow of gas from the deck of its Elgin platform while the underwater leak has stopped in the North Sea.

A crew of Total engineers and specialists from Wild Well Control were sent to the platform Thursday to evaluate the possibility of launching an operation to kill the well through heavy-mud pumping.

"Everything went as we would have hoped and the planned well intervention is achievable," said Wild Well Control said. "There is certainly no showstopper to launch the well control operation."

News (continued)

Total has said it aims to perform a "top kill" on the well, which is leaking an estimated rate of 7 million cubic feet per day from a depth of about 1000 metres above the main Elgin producing reservoir.

The French major is also proceeding with a separate plan to drill two relief wells to divert the flowing gas, with drilling rigs being moved into position, although these could take as long as six months to complete. *Pipeline Magazine* [Read more](#)

Specialised equipment arrives to plug gas well



April 9 - Specialist equipment has arrived in Scotland to help stop the gas leak at the Elgin platform in the North Sea. A team from operators Total flew out to inspect the leak last week.

The equipment, which will be used as part of the company's "dynamic kill" plan to plug the well with mud, was flown into Prestwick airport from Houston, Texas.

The Scottish government is also starting its assessment of the environmental impact of the leak. Marine research vessel, *Alba na Mara*, spent the weekend collecting samples in the area around the rig, 150 miles east of Aberdeen. Marine scientists expect to have the results from the tests on fish samples on Tuesday. *BBC News* [Read more](#)

North sea gas leak fish "untainted"

April 11 - Tests on fish from close to the gas leak platform in the North Sea have shown they are "untainted", the Scottish government has said.

A research vessel spent the weekend at sea taking samples near Total's Elgin platform which were then analysed.

Taste tests concluded that "no taint of hydrocarbons" was found in the samples. Full chemical testing of all environmental samples is continuing, with initial results expected by the end of the week.

The fish samples collected for an expert panel covered cod, haddock, whiting, plaice, lemon sole, herring and mackerel. *BBC News* [Read more](#)



BRAZIL: OIL SPILL REPORTS

Oil leak found in state-run field off Brazil

April 10 - The [saga of deepwater oil spills off the coast of Brazil](#) has taken a new twist with the discovery of leaking crude in a field operated by state-owned [Petrobras](#), the country's dominant producer.

The leak was discovered in the Roncador field, which lies alongside [Chevron's](#) Frade field, the scene of two spills in the past six months that have led to multibillion-dollar lawsuits against the US oil group. *Oil & Gas* [Read more](#)

Spill At Roncador didn't originate in Campos Oil Reservoir

April 11 - Brazil's oil industry regulator ANP said tests on samples collected from an oil spill at Roncador field in Brazil's Campos Basin indicate the oil didn't originate in any Campos oil reservoir. Results of the tests indicate the fluid collected is drilling oil or another type of oil. *The Wall Street Journal* [Read more](#) (Registration required)

OTHER INCIDENTS ROUND-UP

VIETNAM : Sinking of Container ship

April 11 - *Truong Hai Star*, a Vietnamese ship, has sunk with a 66-container cargo following a collision with a Thai vessel, *Krairatch Dignity*, in the offshore region of Vung Tau city in the early morning hours on Tuesday.

Immediately after the incident, both ships communicated SOS signals. Vessels were sent to tow the now sunken ship to Bai Truoc in Vung Tau city by the local port authorities. However, the ship completely sunk with all of its cargo before any aid arrived. *The Maritime Executive* [Read more](#)

News (continued)

AUSTRALIA: Investigations into Methyl Bromide leak

April 9 - The New South Wales Fire and Rescue Hazardous Materials (HAZMAT) unit was called to the Graincorp Carrington terminal just before 7pm (AEST). About 100 kilograms of the gas methyl bromide leaked from a canister, while staff were fumigating at the site. *ABC Newcastle* [Read more](#)

UAE: Fujairah hit again by oil pollution

April 8 - Oil tankers and other foreign ships shuttling the Gulf appear to be still violating local laws and dumping sludge into the water as a large beach strip in Fujairah has been hit by pollution for the second time in two weeks. *Emirates 24 News* [Read more](#)

TURKEY: Blast hits Iraq-Turkey line

April 5 - Oil flow was disrupted Thursday following an explosion on one of the two pipelines linking crude from Kirkuk in Iraq to the Turkish port of Ceyhan on the Mediterranean.

A Turkish security official meanwhile said there were three near simultaneous explosions at separate points along the pipeline in the Idil area of Turkey's Sirnak province, close to the border with Iraq.

It was not immediately clear what had caused Thursday's blasts but sabotage is common on oil and gas pipelines leading into Turkey from Iran and Iraq, where Kurdish separatist militants operate. *Pipeline Magazine* [Read more](#)



UAE: Salvagers will renew bid to retrieve tanker

April 9 - The Ministry of Environment and Water will resume efforts this month to refloat the fuel-oil tanker White Whale which foundered in heavy seas off UAE shores in late October.

A ministry spokesman said salvagers will visit the site 35 km off the Sharjah coast in the coming days to begin the operation of raising the ship and its 1,000 tonnes of diesel from the seafloor. *Gulf News* [Read more](#) [Thanks to Don Johnston of ISCO Industry Partner, DG & Hazmat Group]

BAHRAIN: Crippled Liberian tanker Stolt Valor no longer poses a pollution threat to Bahrain.

April 12 - Public Commission for Protection of Marine Resources, Environment and Wildlife officials yesterday said Marine Emergency Mutual Aid Centre and Dutch salvage company SMIT were carrying out rescue operation.

The chemical tanker that caught fire and exploded en route to the kingdom from Saudi Arabia's Al Jubail port last month, will be fully unloaded by April 20. *Gulf Daily News* [Read more](#)

USA: GULF OF MEXICO

More than 10,000 participants have joined the Gulf Study

February 29 - Nearly two years after the Deepwater Horizon oil spill in the Gulf of Mexico, more than 10,000 cleanup workers and volunteers have enrolled in the Gulf Long-term Follow-up (GuLF) STUDY, a national effort to determine if the oil spill led to physical or mental health problems. Reaching the GuLF STUDY's target goal of 55,000 participants would make it the largest health study of its kind.

The study is conducted by the National Institute of Environmental Health Sciences (NIEHS), part of the National Institutes of Health. *NIH News* [Read more](#) [Thanks to Marc K. Shaye, Member of the ISCO Executive Committee]

National Wildlife Federation says Gulf of Mexico still suffering from oil spill

April 10 - Two years after [the BP Deepwater Horizon oil spill](#), there are still clear signs that the environment along the northern Gulf of Mexico, especially in Louisiana, continues to be affected by oil pollution, according to a report released Tuesday by the [National Wildlife Federation](#). "Although the oil has stopped flowing from the wellhead, the gas has stopped spewing out of the wellhead, the Gulf oil spill is not over," said Doug Inkley, senior scientist for the federation.

The federation called on Congress to pass the [Restore Act](#), which would dedicate fines and penalties against BP and other responsible parties toward long-term restoration of the Gulf. It also called for better safeguards in oil and gas leasing practices and permitting.

The federation concluded that six key Gulf features remain at risk from BP oil, although not all are in serious danger yet, Inkley said. The most visible of them: the [bottlenose dolphins of Barataria Bay](#), declared in poor health last month by the National Oceanic and Atmospheric Administration. *Nola.com* [Read more](#)

Attorneys ask court to keep Nalco, cleanup companies, in oil spill litigation

April 9 - Several attorneys with nearly 2,300 clients filed statements in court Monday asking U.S. District Judge Carl Barbier not to dismiss Nalco, the manufacturer of the chemical dispersants used to break up the oil from the Macondo well blowout in summer 2010, and about a dozen companies that handled the clean-up, from the BP litigation. Clean-up workers, oil rig workers and others who spent time in the Gulf of Mexico while the efforts were underway to break up and burn the oil from the April 2010 explosion and sinking of the Deepwater Horizon drilling rig say they oppose Nalco and the clean-up companies' efforts to be severed from the litigation.

After Monday's deadline for comments on the issue, the question is now in the hands of Barbier, who was appointed to the federal court by President Bill Clinton in 1998. *Nola.com* [Read more](#)

CANADA: SCIENTIFIC SUPPORT PROVIDED BY FISHERIES AND OCEANS CANADA DURING THE GULF OF MEXICO OIL SPILL RESPONSE OPERATIONS BOOSTS CANADA'S OIL SPILL PREPAREDNESS

Following the Deepwater Horizon oil platform explosion in the Gulf of Mexico in 2010, the U.S. Environmental Protection Agency called on Fisheries and Oceans Canada to provide scientific and technical expertise in the spill response operations. Over a four month period, a team of research scientists and technicians from the Department assisted the Unified Command to monitor the fate and transport of an estimated 4.9 million barrels of crude oil that were spilled into the Gulf.

"We've been collaborating on oil spill research with the United States since the early 1990s," says Dr. Kenneth Lee, the Canadian team lead in the Gulf of Mexico and Executive Director of the Centre for Offshore Oil, Gas and Energy Research (COOGER), a DFO centre of expertise. The experience gained from working together in the Gulf of Mexico has enhanced our knowledge on how to select the best clean-up techniques and design monitoring protocols to confirm their effectiveness and potential detrimental effects." says Dr. Lee. *Fisheries and Oceans Canada* [Read more](#)

UK: 69 SPILLS REPORTED IN NORTH SEA

April 8 - There have been 69 reported incidents of oil and chemical spills in the North Sea during the last three months, figures have revealed.

A total of 18 companies have been named in the table of incidents published by the Department of Energy and Climate Change (DECC). The most recent one reported was the Total gas leak at the Elgin platform on March 25, with its status described as "under review".

Oil & Gas UK, which represents offshore companies, said the leaks were "relatively small" and many of the chemicals "benign".

BP and Shell were among the companies listed, with BP reporting the highest number of incidents at 23. Other companies included EnQuest, British Gas and Nexen.

The DECC published the details of all oil and chemical releases since January 1 on its website. Around half of the spills were chemicals and the other half were different types of oil, including crude oil and diesel. *Yahoo News* [Read more](#) [Thanks to David at ADR Training]

NIGERIA: RECENT REPORTS

Warri Oil spill: Impacted communities assured of compensation

President, Marine Board of Inquiry into J. S. Amazing vessel oil spill, Magistrate Nureni Kuranga, has assured the 248 communities comprising Itsekiri, Ijaw, Urhobo and Ilaje, impacted by oil pollution, that adequate compensation would be paid from International Oil Pollution, IOPC, fund and lasting solutions proffered to forestall a repeat of such pollution in Nigeria's territorial waters.

Magistrate Kuranga gave the assurance, weekend, in Warri, Delta State, when members of Marine Board of Inquiry visited the site, where the vessel, J. S. Amazing spilled its content while loading diesel at the PPMC jetty in Ijala, Delta State. *Vanguard Newspaper* [Read more](#)

Ogonis blocking spillage clean-up - Shell

The oil giant, Shell Petroleum Development Company (SPDC), has accused some Ogoni communities in Rivers State of barring it from launching clean-up operations in some areas affected by oil spills in Ogoniland.

The company's manager in charge of spillage clean-up, Augustine Igbuku, told the Nigerian Tribune in an exclusive chat that the company was not granted access to some spill sites, adding that the situation had worsened environmental impact of oil spills in the areas. *Nigerian Tribune* [Read more](#)

According to the official, individuals or community groups or armed gangs denied the company access to spill sites because of many reasons, including expectation of higher compensation if spill sites were not cleaned up.

PHILIPPINES: POLICY ON CHEMICAL ACCIDENT PREVENTION SOUGHT

April 2 - A string of gas leak episodes in different parts of the country should push government to craft a policy that will help avoid such incidents from happening again. This was the response of toxics watchdog Eco Waste Coalition following an ammonia spill last Sunday at a candy manufacturing plant in Manggahan, Pasig City.

This is not the first chemical spill of its kind though, according to Thony Dizon, coordinator of the EcoWaste's project Protect (People Responding and Organizing against Toxic Chemical Threats). Last February 29, an [ammonia gas leak](#) from the ENL ice plant and storage in Ayala, Zamboanga City sickened over 100 villagers.

In its recommendation, Eco Waste said the government should establish an awareness program on hazardous chemicals.

The policy, Eco Waste added, should also support increased capacity-building for rapid response in case of chemical accidents for both the public and private sectors, and further support clean-up and rehabilitation of contaminated areas. *Sun Star* [Read more](#) [Thanks to Don Johnston of ISCO Industry Partner, DG & Hazmat Group]

PAKISTAN: OVER 2,000 KILLED IN CNG CYLINDER BLASTS IN 2011: REPORT

April 10 - More than 2,000 people died in CNG cylinders explosions in 2011 and the figures are likely to be doubled this year as the government and concerned authorities have yet not taken any concrete steps in this regard, stated a report released by the Civil Society Front (CSF) Pakistan, a non-government organisation (NGO) during a press conference at a local hotel on Monday.

The CSF further said OGRA Hydrocarbon Institute of Pakistan should certify the CNG workshops that they possess qualified staff and the required equipment. They also called on the government to abandon unauthorised CNG-kit installing and checking shops, where fake fitness certificates are being issued to the CNG vehicles. *The News* [Read more](#)

PERU: WHO WILL DEAL WITH THE THOUSANDS OF ABANDONED OIL WELLS ?

April 14 - A jurisdictional dispute is hindering the Peruvian government from compiling an inventory of abandoned oil and gas wells, some of them dating back centuries - Peru has more than 6,000 abandoned oil wells that continue to pollute their surroundings, with 270 considered to pose a serious hazard. But the government has yet to carry out an inventory in order to identify and subsequently clean up and seal them, despite a law passed in 2007 for this purpose.

These wells were left behind as environmental liabilities from oil and gas extraction activities carried out between 1863 and 1993, when there were no regulations requiring concession holders to properly clean up and plug wells that were no longer in use. *Terramerica* [Read more](#)

USA: GAS INDUSTRY PRESSES WHITE HOUSE ON 'FRACKING' RULES

April 4 - Natural-gas companies are taking concerns about looming Interior Department "fracking" regulations to the White House with efforts that include a meeting between a major producer and the Obama administration's top regulatory official.

The recent meetings — which include trade groups and big players like Exxon and Anadarko Petroleum — are part of a wider industry push to ensure that regulation of the development method doesn't create what the companies consider burdensome requirements that stymie production.

Interior is readying to propose rules to govern fracking, which is short for hydraulic fracturing, that occurs on public lands. The rules are expected to require disclosure of chemical ingredients used in the fracking process, and also address well integrity and water management. *The Hill* [Read more](#)

UK: CONTAMINATED LAND: CLEANING UP THE STATUTORY GUIDANCE IN ENGLAND

Revised Statutory Guidance in relation to the contaminated land regime, and regulations amending the definition of when land will be considered to be contaminated, came into force on 6 April 2012. There are two significant changes:

1. Changes to the Definition of Contaminated Land - Under current law and guidance, land is "contaminated" and at risk of regulatory enforced clean up if:

News (continued)

- Significant harm is being caused to human health or the environment or there is a significant possibility of significant harm ("SPOSH") being caused to human health or the environment; or
- Pollution of controlled waters is being or is likely to be caused. *JD Supra* [Read more](#)

ISCO News

ISCO IS LOOKING TO GROW NUMBER OF COUNCIL MEMBERS

There are still many countries that are not represented on the ISCO Council and ISCO is looking for individuals willing to serve on the Council.

The ISCO Council is composed of the appointed National Representatives of each country in which there are one or more Members of ISCO. The ISCO Council acts as an advisory and consultative body, assisting the Executive Committee on policy, new initiatives and other matters.

Countries and their representatives at this time are –

AUSTRALIA	Mr John Wardrop
AZERBAIJAN	Mr Namig Gandilov
BRAZIL	Capt. Bill Boyle
CANADA	Dr Merv Fingas
CHINA (Hong Kong)	Capt. Davy T. S. Lau
CHINA (Mainland)	Mr Guobin Li
CROATIA	Mr Darko Domovic
EGYPT	Eng. Ashraf Sabet
ESTONIA	Mr Torbjörn Hedrenius
FAROE ISLANDS	Mr Pauli Einarsson
GREECE	Prof. Harilaos N. Psarftis
ISRAEL	Mr Dan Arbel
KENYA	Mr Sanjay Gandhi
LUXEMBOURG	Mr Joseph Braun
NIGERIA	Chief Kola Agboke
NORWAY	Mr Jan Allers
SINGAPORE	Capt. Chris Richards
SOUTH AFRICA	Mr Anton Moldan
UAE	Dr Ali Saeed Al Ameri
UK	Mr Kevin Miller
USA	Dr Manik Sardessai

Countries in which members are not yet represented on the ISCO Council include -

BELGIUM	IRAN	MALAYSIA	URUGUAY
BRITISH VIRGIN ISLANDS	IRELAND	MALTA	
DENMARK	INDIA	NETHERLANDS	
FINLAND	INDONESIA	SAUDI ARABIA	
FRANCE	ITALY	SWEDEN	
GHANA	KUWAIT	TURKEY	

And in the many other countries in which ISCO does not yet have any members, there is an opportunity to become the first member in your country by joining ISCO and to submit your name for consideration as a possible Member of ISCO Council.

Any Member interested in serving on the ISCO Council should submit his/her name. Alternatively, you may recommend another person as a suitable candidate for consideration if he/she is willing to become a member and serve on the Council.

Persons wishing to be considered as members of ISCO Council should live in the country they wish to represent and should submit a short CV by email to the Secretary at info@spillcontrol.org together with a short note describing what you feel you can do to support ISCO in achieving its objectives.

Members of Council act as the primary point of contact between the membership in each country and the Executive Committee, providing support in facilitating communications between ISCO and government ministries or agencies, and other national authorities, institutions or bodies in the countries represented. They encourage the formation of national (or regional) associations which bring together individual professionals, companies and other entities involved in spill control in their countries, as a means of raising levels of co-operation, knowledge and competence, facilitating sector recognition and creating channels of communication with governments. They are expected to promote ISCO's objectives and encourage growth of ISCO membership in their countries, organising local meetings of members and supporting ISCO initiatives in the countries represented.

If you would like to have more information about ISCO's objectives and the ISCO Council send an email to info@spillcontrol.org



In this issue of the ISCO Newsletter we are printing No. 72 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 72: KNOWLEDGE OF MECHANICAL RECOVERY

As shown by trials conducted by the then Hydraulics Research Station (HRS), Wallingford, UK, it is advisable to measure velocities and water depths at hourly intervals during the flood tide and to determine the value of K (article 71) by measuring tensions for the boom chosen for deployment in particular estuaries before the need arises in actual incidents. In trials conducted by HRS, it was found that the terminal forces exceeded 1 tonne while three intermediate anchors experienced a total of 200kg; that in estuaries where incident deployments may be expected, such prior data collection enables the most favourable deployment locations to be identified; and that having done so, a mid-channel anchoring block and shore anchoring posts or blocks can be permanently installed. Thus, in one location HRS recommended for the apex position (at mid-channel, greatest depth, and possibly lowest linear velocity) the laying of two 55lb Danforth anchors and a 6 tonne concrete block, both to be buried in the centre of the main channel and marked by a buoy while the shore terminals were to consist of concrete blocks with steel eyebolts or frames set into the sand above the high-water mark to withstand a load of 3-4 tonnes.

HRS also recommended that for booms to operate optimally, the depth of water beneath the skirt should be at least 6 times the skirt draught, though this is unlikely where beach slopes are gradual enough for booms to be laid out and moorings set by men on foot at low water. In such cases it is likely that pollutant will pass beneath the boom as it begins to float with not enough water beneath it to prevent its flow rate from exceeding 1 knot. Even booms designed to sit in the vertical position when grounded are likely to pass oil beneath until the minimal water depth for retention is reached on the flood.

Materials such as welded polyurethane make booms strong enough to be deployed by terminal attachment to river banks without needing intermediate anchoring points to produce a single chevron arm which permits pollutant released upstream to be deflected towards the bank attachment at the downstream end for collection and recovery. This approach was adopted in Sweden by Captain Erling Blomberg who sustains the tension in a separate tension line to which a vertically battened curtain boom is attached to the tension line by bridles from the tops and bottoms of the battens. This design enables one end of the tension line to be attached to a river bank and the other to a paravane controlled by lines to that bank. This arrangement continues to permit river traffic to pass, even when another such arrangement is deployed and controlled from the other bank upstream or downstream of the first.

However, WSL was more interested in using ship-towed booms to increase encounter rate by increasing swath width while retaining the possibility of recovering the thus encountered pollutant from the back of the consequent U-formation of the boom without exceeding the escape velocity normal to the direction of movement at that location. WSL therefore turned its attention to the escape velocities exhibited by differing boom designs as determined by HRS.

Escape Velocities Related to Differing Elements of Boom Design

Boom Type	Design Elements	Escape Velocity ms ⁻¹
1	Vertical flexible screen Floats and ballast weights at intervals Mooring points at waterline	0.33
2	Figure-of-eight section flexible barrier Continuous air floatation and water ballast tubes Mooring points at waterline	0.50
3	Flexible continuous buoyancy chamber Permeable skirt chain-ballasted along bottom Mooring points at waterline	0.67
4	Rigid buoyant panels on flexible screen No ballast Mooring points at foot of skirt	0.82
5	Flexible continuous buoyancy chamber Flexible skirt chain-ballasted along bottom Mooring points at foot of skirt	1.33

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.

OIL SPILL REMOTE SENSING : CHAPTER 12



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

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 13th 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.

Satellite Remote Sensing – Radar

Radar satellites, including ERS-1 and -2, Radarsat-1 and 2, and ENVISAT, have usefulness for detecting large offshore spills and for spotting anomalies.³ RADARSAT has been used for detecting oil seeps, and many other features on the ocean. A novel application of RADARSAT has been the study of oil lakes in the deserts of Kuwait.³

Radar satellites are now used routinely by a number of nations to provide imagery for spills and to give indications of ship discharges. ERS-1 and 2 have been used for mapping of oil spills in the Caspian Sea.⁹ Fortuny describe the use of ERS-2 and ENVISAT to provide imagery during the Prestige incident off Spain.⁴⁰ Torres Palenzuela and co-workers used two ASAR (Advanced SAR) images from the Envisat satellite to study the same Prestige spill off Spain.⁴¹ Using several techniques that were readily-available such as filtering and comparison to GIS data of the areas, several slicks were identified. These slicks were confirmed by recorded sightings from helicopters and ships.

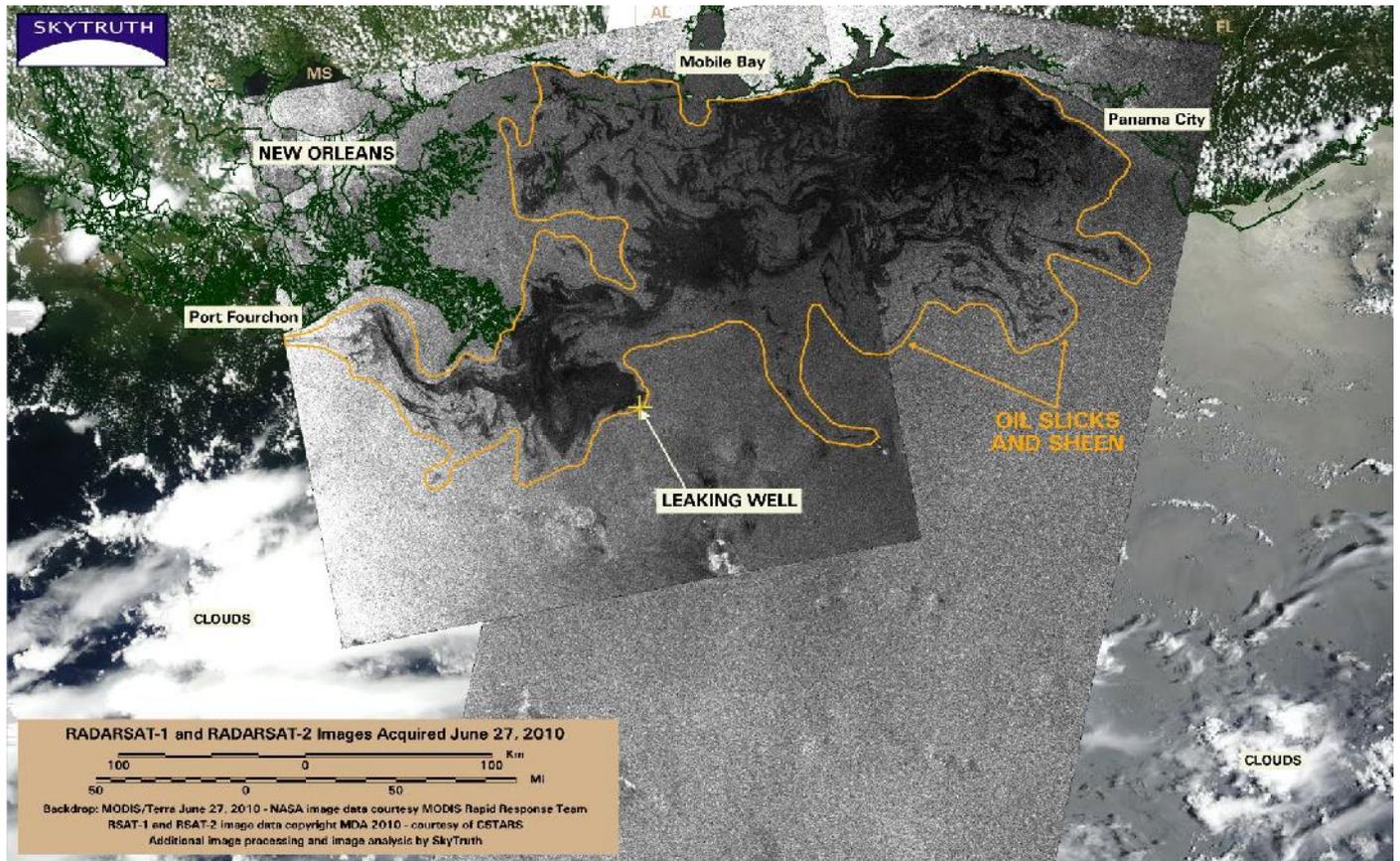


Figure 14 A RADARSAT-1 and -2 combined image of the Gulf oil spill. The radar images are laid upon a satellite visible image of the coast. Oil slicks and sheen are outlined in color. (Photo from Canadian Space Agency website <http://www.asc-csa.gc.ca/images>)

Radar satellite data is increasingly being used to monitor oil spills. As there are several satellites active, frequent coverage is now possible. During the 2010 Gulf of Mexico oil spill, there was extensive use of satellite data. Some of this is illustrated in Figures 14 to 15.

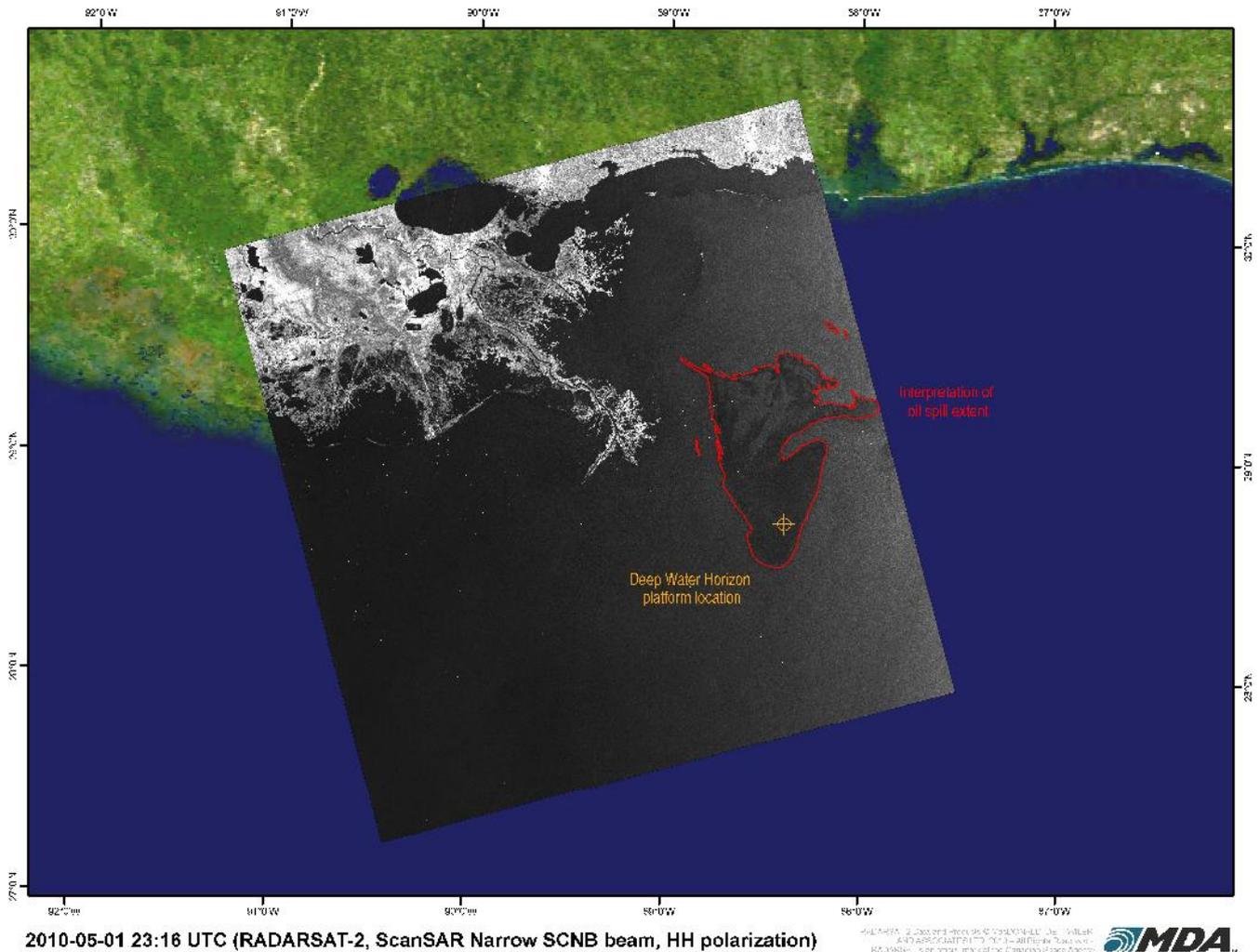


Figure 15 A RADARSAT-2 image of the Gulf oil spill. The spill can be clearly seen and is outlined in red. The shoreline is in white and the image is set onto a visible satellite image. (Photo from Canadian Space Agency website)

Several countries have instituted satellite monitoring systems for oil pollution.³ Many of these use processing methods as described above. Extensive programs are in place in the Baltic Sea, North Sea and English Channel. There are now programs in the Black, Caspian and Azov Seas. Canada has had a program in place for several years. The Mediterranean Sea has had such a program for a long time. A constellation of monitoring satellites is proposed for the Mediterranean sea.

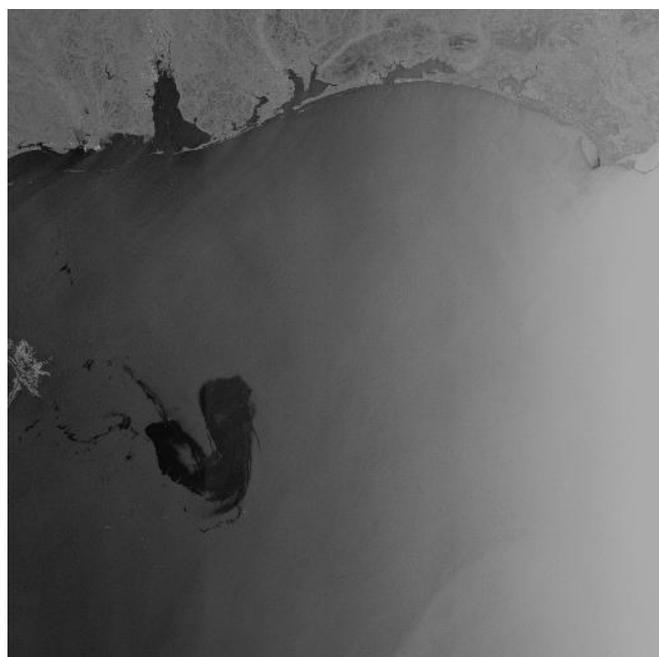


Figure 16 An ENVISAT image of the Gulf oil spill. The spill can be clearly seen as can the cliff shadows and calm areas near the shore. (Photo from European Space Agency website <http://www.esa.int/esaEO/>)

In recent years there have been a number of new satellite-borne SAR sensors launched, see Table 2. While one of these sensors, RADARSAT-2, operates in the traditional C-band, TerraSAR-X and Cosmo Skymed operate in the X-band, and the PALSAR sensor on ALOS operates in the L-band. As noted above, X-band is the preferred band for oil spill remote sensing in terms of Bragg scattering. All four of these new SAR satellites have polarimetric imaging modes (some are experimental vs. operational modes) and much higher spatial resolution (down to 3 m) which may have application for oil spill remote sensing. RADARSAT-2, like its predecessor is an operational commercial satellite that can be tasked to respond to emergency situations like major oil spills. The time required to task RADARSAT-2 in emergency mode is now 4 hours, which is a large improvement from the 12 hours required to task its predecessor. As noted above VV polarization provides a superior clutter to noise ratio (CNR) over HH polarization for oil spill detection.³ RADARSAT-2 is fully polarimetric and there is interest

Special series (continued)

in investigating whether a dual polarization ScanSAR mode utilizing VV/VH polarizations will work for oil and ship detection respectively as part of the Integrated Satellite Tracking of Pollution (ISTOP) program. The increased number of SAR satellites plus the plans to operate constellations of small satellites like Cosmos (Constellation of Small Satellites for Mediterranean basin Observation) will provide increased temporal coverage with revisit times down to a few hours in some circumstances. The opportunity for increased frequency of image collection should prove useful to the oil spill response community.

Table 2 Current and Future Satellite-borne SAR Sensors

Satellite	Launch Date	Owner/Operator	Band	Polarization
ERS-1	1991 (end 2000)	European Space Agency	C	
ERS-2	1995	European Space Agency	C	VV
RADARSAT-1	1995	Canadian Space Agency	C	HH
RADARSAT-2	2007	Canadian Space Agency	C	
ENVISAT (ASAR)	2002	European Space Agency	C	HH, VV, Cross pol
ALOS (PALSAR)	2006 (end 2011)	Japan Aerospace Exploration Agency	L	
TerraSAR-X	2007	German Aerospace Centre	X	
Tandem -X	tbd (was scheduled for 2009)	German Aerospace Centre	X	
Cosmos Skymed-1/2	2007	Italian Space Agency	X	
TecSAR	2008	Israel Aerospace Industries	X	
Kompsat-5	?	Korean Space Agency	X	
Sentinel-1	2012	European Space Agency	C	
RADARSAT-Constellation (3-satellites)	2014	Canadian Space Agency	C	

Li et al. highlighted the differences between optical and radar satellites.⁴² This research group studied the Montara spill in the Timor Sea using the ALOS PALSAR (L-band radar), the ENVISAT ASAR (C-band radar) and the MODIS (AQUA - color visible) satellite data. The ALOS PALSAR did function, but as expected from L-band radar, was not clear. The ENVISAT ASAR data was the clearest and provide useful imagery always. The visible data from MODIS function well only during completely clear skies, but most of the time did not yield useful images. Cloud interference in the latter was cited as a reason, but the lack of specific oil coloration should have also been noted.

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*

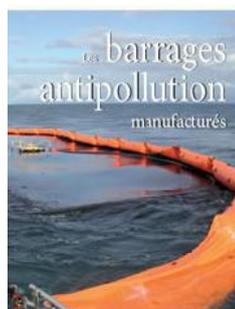
40 Fortuny, J., D. Tarchi, G. Ferraro, and A. Sieber, *The use of Satellite Radar Imagery in the Prestige Accident, Interspill, 2004*

41 Torres Palenzuela, J.M., L.G. Vilas and M.S. Cuadrado, *Use of ASAR Images to Study the Evolution of the Prestige Oil Spill off the Galician Coast, 1931, 2006*

42 Li, Y., G-X. Lan, J-J. Li and L. Long, *Potential Analysis of Maritime Oil Spill Monitoring Based on MODIS Infrared Data, IGARSS, 2009*

Publications

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