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MEDIA RELEASE

Integrated government-industry research program needed to better understand and respond to crude oil spills in water

CALGARY, November 25, 2015 – Canada needs an integrated, comprehensive, government-industry research program to better understand, prevent, respond to and clean up crude oil spills in water, The Royal Society of Canada (RSC) recommends in a new report.

The RSC Expert Panel, in its report released today, *The Behaviour and Environmental Impacts of Crude Oil Released into Aqueous Environments*, found that major oil spills in freshwater and marine ecosystems are rare, but there are critical and significant research gaps.

"While advances in science and technology and improved safety practices have significantly reduced the threat of oil spills in Canadian waters over the past few decades, much about the fate, environmental impacts and remediation of oil spills remain poorly understood," said RSC Expert Panel Chair Dr. Kenneth Lee, Director of Oceans and Atmosphere, Commonwealth Scientific and Industrial Research Organization, Perth, Western Australia.

"The focused, prioritized research we recommend will equip policy makers, oil industry decision makers, oil spill responders and other Canadians with improved operational guidelines and advanced tools to reduce the risk of accidental spills, and to ensure the protection of Canada's marine and inland waters and the sustainability of their living resources from the effects of spilled oil."

The panel noted that while protocols are in place within Canada for spill-response measures, their effectiveness is limited by the availability of information to support their decision-making process.

The panel recommended the formation of an integrated (government-industry-academia) research program to support and maintain a comprehensive national database to identify and provide information on regional sites at high risk for spills. This database would include the characteristics of oil spilled and behaviour under different environmental conditions, pre-spill baseline data including identifying valued ecosystem components for high-risk sites, and the effectiveness of various spill response options.

Canada produces more than 3.7 million barrels of oil every day and imports hundreds of thousands more. The unique properties, or chemical 'fingerprints,' of dozens of crude oil types transported in Canada determine how readily spilled oil spreads, sinks, disperses, impacts wildlife and ultimately degrades in the environment, the panel found.

However, the panel concluded that the overall impact of an oil spill – including the effectiveness of an oil spill response – depends mainly on the environment and conditions (such as weather, waves and natural biodegradation) where the spill takes place, and the time lost before remedial operations.

The panel identified seven "high-priority" research needs that encompass spilled crude oil's impact on communities, wildlife populations and ecosystems across Canada.

In addition to studies on "spills of opportunity," carefully controlled field research on oil spills in actual water bodies should be conducted to better understand spill behaviour and effects across a spectrum of crude oil types in different ecosystems and conditions, the panel recommended. Coordinated studies should be done at sites of previous oil spills in Canada to increase understanding of the effects of spilled oil over the long term and the extent of natural cleanup.

Studies are needed to better understand the chemistry, properties and spill behaviour of oil sands bitumen, diluted bitumen and other unconventional oils. Also, more research should be done on the development and validation of spill cleanup methods that limit habitat damage and threats to wildlife, and methods to identify endpoints for cleanup operations based on habitat recovery.

More work is necessary to determine the environmental impact of spilled crude oil in high-risk and poorly understood areas and sensitive ecosystems, such as Arctic waters and shores, inland rivers and wetlands. Indigenous peoples from all parts of Canada need to be involved in spills preparedness, cleanup, remediation and long-term restoration, the panel recommended.

The seven-member RSC Expert Panel, comprising leading experts on oil chemistry, behaviour and toxicity, produced one of the most comprehensive reports of its kind. The panel surveyed scientific literature, key reports, selected oil spill case studies and extensively consulted key industry, government, aboriginal and environmental stakeholders across Canada.

RSC Expert Panels provide independent, timely and authoritative insights and advice to governments, industry, non-governmental organizations, and citizens. The Canadian Energy Pipeline Association and the Canadian Association of Petroleum Producers commissioned this panel's report.

The RSC Committee on Expert Panels has a rigorous set of procedures to ensure reports are independent, balanced and objective. Once the sponsors and the RSC agree on the "Terms of Reference" for the report, the RSC committee takes over in selecting panel members and peer reviewers; commissioning organizations are given no opportunity to request changes to reports or their recommendations.

"The Royal Society owes a debt of gratitude to the panelists for volunteering their time and expertise in preparing this report over the past year," said David Layzell, Chair of the RSC Committee on Expert Panels and Professor at the University of Calgary. "We also thank the sponsors for their support of this project, and for the professional way they interacted with the RSC, making it possible to create a report that is truly independent and arm's-length."

MEDIA OPPORTUNITY – To request an interview with Dr. Kenneth Lee, Chair of the RSC Expert Panel, email: mlowey@envirolinenews.ca

For more information about the RSC Expert Panels process and this report, contact:
Russel MacDonald, Officer, Expert Panels & the College, The Royal Society of Canada
T: (613) 991-4464 E: rmacdonald@rsc-src.ca www.rsc-src.ca; twitter.com/RSCTheAcademies

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Terms of Reference for a Royal Society of Canada Expert Panel on

The Behaviour and Environmental Impacts of Crude Oil Released into Aqueous Environments

A solid scientific understanding of the behaviour and environmental impacts of crude oil if accidentally released into aqueous environments can make an important contribution to the identification of optimal strategies for spill preparedness, spill response, and environmental remediation. A panel of experts is asked to review the state of the science on how various kinds of conventional and unconventional crude oils transported in North America[1] interact with the surface waters and associated sediments (suspended, shoreline, ocean/lake/river floor) in marine, estuarine and freshwater settings under a wide range of environmental conditions.

Specifically, the panel is asked to address the following questions:

1. How do the various types of crude oils compare in the way they behave[2] when mixed with surface fresh, brackish or sea waters under a range of environmental conditions[3]?
2. How do the various crude oils compare in their chemical composition and toxicity to organisms in aquatic ecosystems?
3. How do microbial processes affect crude oils in aquatic ecosystems, thereby modifying their physical and chemical properties and toxicity?
4. Is the research community able to relate, with reliable predictions, the chemical, physical and biological properties of crudes to their behaviour, toxicity and ability to be remediated in water and sediments?
5. Given the current state of the science, what are the priorities for research investments[4]?
6. How should these scientific insights be used to inform optimal strategies for spill preparedness, spill response and environmental remediation?

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[1] Including West Texas Intermediate, Alaskan light and heavy oils, California heavy oils, Offshore Eastern Canadian oils, , Alberta light and heavy oils, Bakken oils, conventional heavy, S. American heavy oils and bitumens (from Venezuela, Mexico, Brazil), and modified oil sand bitumens (including dilbit, synbit, syndilbit, railbit, upgraded light [synthetic crude oil]).

[2] Including, but not limited to floating or sinking in water, plume formation, evaporation, emulsion formation, oil and fine-particle interactions, dissolution, biodegradation, photo-oxidation, tar ball formation, or dispersion.

[3] Including, but not limited to wave or current action, river flows, temperature, ice, solar radiation, mixing with sediments, etc.

[4] Including, but not limited to observational studies, development of analytical methods, standardization of protocols, understanding scientific principles / mechanisms, spill preparedness, spill response, and environmental remediation.